MANUFACTURING PRICE DISTORTIONS AND THEIR EFFECTS ON THE NIGERIAN ECONOMY: AN EMPIRICAL ANALYSIS

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ABSTRACT

This research examines the effects of manufacturing Price Distortions on output in the manufacturing sector of Nigeria. Specifically, the study tests the hypothesis that manufacturing price distortions are inversely related to output growth in the same sector. The conclusiveness of all previous studies on this problem has not been without doubt largely because their analyses were based on multi-country cross-section data and aggregate price distortion indices. The present study seeks to overcome this failing by disaggregating the price distortions sector-wise for a single country; namely, Nigeria. The study adopts a model based on a modified neoclassical production function where manufacturing exports are taken as inputs. Manufacturing price distortions causes a wedge between the domestic and foreign price of manufacturing exports and thereby reduces the volume of trade and, in consequence, the real GNP as well. And to derive consistent, unbiased, and efficient estimators of the structural equations, the model so developed was estimated by Ordinary Least Square (OLS) method. The analysis confirms the view that manufacturing price distortions have a significant and negative influence on manufacturing output. An important implication of the study is that reforms of manufacturing pricing policies should constitute a major component of any remedial program designed to accelerate economic growth in a country like Nigeria. If her manufacturing sector is to become modern and efficient, it should be given the opportunity and the motivation to reduce costs. Indiscriminate reduction of the rate of protection and the reduction of the implicit taxes on exports alone are not the correct or adequate solution. Better physical infrastructure, better education and training, and more modernized manufacturing experience can contribute to the ability to reduce costs and raise productivity.

Keywords: Price distortions, Nominal Protection Rate, Subsidies, Misallocated resources, and Economic growth.

INTRODUCTION

Nigeria is well endowed with rich natural resources and also regarded as the most populous country in Africa. And with over 165 million people and almost one million square kilometers in size, it is the third most densely populated country in the region and it is considered an economic giant. The economy of Nigeria prior to the oil boom (1960-1973) was primarily agricultural. Therefore, exports of primary commodities, namely cocoa, groundnut, palm oil, coffee etc. were the engine of growth. In 1960, agriculture contributed 62.9% to the Gross Domestic Product (GDP). By 1974, its contribution to GDP dramatically decreased to 23.9%. This sudden decrease came as a result of the improvements in the oil sector in the late part of 1973 and the early part of 1974. However, with the increased demand for imported consumer goods, a non-agricultural sector consisting of modern services and a small manufacturing sector emerged. The manufacturing sector at this period was essentially agro-allied or agro-processing and, hence, had a strong link with the

agricultural sector. The Nigeria's manufacturing has been established both through the processing of domestic materials and through using imported inputs. But there is a far greater variety of manufacturing industries designed for the local Nigerian markets. However, most of the limited range of manufactured export goods were still quite close to the raw material stage, for instance, tin, groundnut, palm oil, rubber, and plywood. At this early period of the 1960s, manufactured exports constituted about 10% of total Nigerian exports. By 1962-1963 the manufacturing sector contributed 5.6% to the GDP. Since then, the manufacturing sector has been growing but at a slower pace. However, in 1973-1974, its contribution to the GDP increased to 8.9%. As time went on, production of manufactured goods for domestic consumption, regardless of whether the inputs are domestically produced or imported, accounted for the largest share of manufacturing output. Indeed, one can observe that the structure of the manufacturing sector had changed from essentially agro-processing to one of import-substituting, for instance, soft drinks, tobacco products, beer, and textiles.

The period 1974-1986 experienced a dramatic decline in the manufacturing exports. Manufacturing exports fell from 2.8% in 1973 to 1.1% in 1975. At this period, more emphasis was given to the oil sector as the main engine of growth. Though the country's oil sector earned virtually all the foreign exchange; its share declined from its peak in 1975 to 14.4% of the GDP in 1979. The share of the manufacturing sector in the GDP was still negligible, being a tiny 6.1% in 1979. The period 1974-1981 represents the oil boom era. Nigeria had been receiving increasing prices for its oil between 1971 and 1973. Due to the increased prices, oil exports had risen from 83.1% in 1973 to 92.6% in 1974. Hence, Nigerian government oil revenues almost quintupled in nine months, the rise coming from higher prices, greater production, and an increase in the government's share of the oil revenues from higher taxes and royalties and ownership. By the mid-1970s, the engine of Nigeria's economic growth was its oil exports. Such over specialization meant, of course, that Nigeria became a very "dependent" country. By 1981, the oil sector was accounting for over 95% of total exports. As a result of this, the structure of the Nigerian economy changed dramatically. For most of this period, economic policies were directed towards continuing fluctuating balance of payments, rising inflation, supply rigidities, and overall industrialization efforts. Between 1982 and 1986, the fall in oil prices and export volume was felt in all sectors of the economy. For instance, the percent of oil export which stood at 96.1% in 1980 fell to 93.8% in 1986. The external payment situation was worse in 1983 leading to the largest accumulation of payments arrears ever recorded. Both industrial and agricultural output fell drastically. Therefore, agricultural and manufacturing exports did not help the situation at this period. The contributions of the agricultural and manufacturing exports to the total exports were still negligible. Hence, during this period, Nigeria was still dependent on its oil exports for its foreign exchange. The period 1982-2010 which represents the post oil boom era experienced a dramatic decline in manufacturing exports and remained relatively low throughout the period. This period was marked by dwindling government revenue, structural adjustment, and privatization. At this period, emphasis was shifted in favor of private sector-led economic growth.

The pace of economic growth of Nigeria is best indicated by the trend of its Gross Domestic Product (GDP) or Gross National Product (GNP) during the study period (1967-2010). Generally, these two measures are the best available indicators of general welfare and living standards in any given economy. It is always believed that when GDP and GNP are rising, prosperity looms in the future; while if GDP and GNP decline, recession, hardship and gloom are on the horizon. Since it has been shown that the oil sector is exogenous, being an enclave in the Nigerian economy, a clear appreciation of the relative role of manufacturing sector will

manifest, particularly since 1974, if we relate it not to the total economy but to the non-oil GDP. During the same period, the manufacturing sector of the Nigerian economy is relatively very small, but manufacturing is a rapidly growing sector. Its share of the non-oil GDP increased in real terms from 4.8% in 1960 to 9.7% in 1986. In spite of this impressive growth rate, the manufacturing sector remains not only relatively small in absolute terms, but its spectrum is also still somewhat limited. During the oil boom period, manufacturing share increased from 3.7% in 1974 to 11.3% in 1981. This increase in the manufacture's share of the non-oil GDP may be as a result of government policies of encouraging industrialization at this period and the obvious neglect of the agricultural sector. During this period, greater emphasis was placed on import substitution strategy, and more of the government funding was directed to such ventures. However, from the 1982 to 1993 sub-period, manufacture's share of the non-oil GDP decreased from 12.5% to 7.9%. And between 1994 and 2004, a period of ten years, there was no major development strategy in the Nigerian economy. Consequently, the economy continue to decline showing signs of high unemployment rate, high interest rate, depreciation of Naira exchange rate, deterioration in balance of payment, and unsatisfactory economic growth. Therefore, National Economic Empowerment and Development Strategies (NEEDS) was introduced in march 2004 to reverse the distortions. And the key instruments used are privatization, de-regulation, and liberalization.

The system of Protection and Taxation in Manufacturing

The major thrust of pricing policies in Nigeria works through trade policies, and its greatest impact is on the incentives for traded commodities. While trade restrictions have had an impact on the prices of non-traded commodities, they have been indirect, depending on the extent of substitutability between traded and non-traded commodities. Generally, price distortions exist when the prices of traded and non-traded goods do not correctly reflect their scarcity. For traded goods, the scarcity price is indicated by the border prices, that is, the prices at which the goods could be exported or imported. And the reference price for these traded goods is usually the international or border price adjusted for market exchange rates, transport and distribution costs, and country-specific taxes (Burniaux et a., 2009). For non-traded goods, the scarcity (or efficiency) price can be measured by the opportunity cost of their production when the alternative would be to produce traded goods (Agarwala, 1983). Because of trade, the border price will provide a convenient benchmark for pricing. Typical causes of price distortions in tradables consist of price and non-price factors. Price factors include ad-valorem and specific tariffs, producer price supports, surcharges, advance deposits for imports, export and import quotas, licensing, input-subsidies and exchange controls. These described price factors of protection influence foreign trade and resources allocation through their effects on domestic prices. In turn, non-price factors set permissible levels of imports directly in quantitative terms. By limiting the amount imported, they lead to a rise in the domestic prices of commodities subject to such restrictions. In each case, the distortion derives a wedge between the domestic price and the world or border price.

There is a wide range of pricing policies in place in Nigeria, which have direct effects on the prices of traded inputs, although they are not effective in many cases. Until 1962, the Nigerian customs tariff was constructed on the principle that basic raw materials attract no duty, semi-finished products 10%, and finished products 20%. By 1964, Nigeria raised tariffs to as high as 66% to 75% on many items. The successive tariff increases have been influenced by a number of considerations: to preserve the balance of payments, to protect local industry, and to raise fiscal revenue. To demonstrate the government's intent to

reconstruct the tariff so as to stimulate manufacturing, the "mobilization budget" for 1962-1963 was adopted to revise consumer goods tariffs upwards. During this early period of 1960s, most imports were under open general license. However, there was increased restriction on imports towards the end of 1967. In early 1968, luxury consumer goods, including passenger cars and virtually all imports under Open General Licensing (OGL) were subject to specific licensing. Also, in 1968, all goods which could previously be imported duty-free were subject to a 10% ad valorem import surcharge (IMF, 1968). In 1980, duties on finished goods were raised from 20%-50% to 25%-75% (Central Bank of Nigeria [CBN], 1980). Excise duties on 25 categories of goods were abolished and others were reduced. At this period also, tariffs were generally low, amounting to between 5%-10% for intermediate and capital goods and about 50% for non-food consumer goods. In 1981, weighted average tariffs were estimated at about 13.5%, in part due to the fact that public sector imports (including food, machinery, and equipment) were exempted from tariffs. In mid-1982, several policies were put in place by the government to redress the deteriorating balance of payments position of Nigeria. Most of the policies were aimed at controlling imports. Higher or new rates of import duties were placed on 42 groups of items in 1982. The list of items banned from importation was expanded. Tariffs were revised upwards and the approved user status, which allowed some importers to import duty-free was abolished. In January 1983, the Government introduced further import restrictions in the form of license requirements and higher tariffs aimed at reducing the level of imports. Consequently, import duties continued to rise and use of quantitative restrictions on imports were intensified. Tariffs were rationalized in 1984 and the range reduced from zero and 500% to between 5% and 200%. As a result of the Second Tier Foreign Exchange Market (SFEM) that became operative in September 1986, import licensing was abolished. The import prohibition list was reduced from 72 items to 16 items (IMF, 1985). Because of the depressed economic situation at this time, the Nigerian government introduced the Structural Adjustment Program (SAP) to salvage the economy. This program abolished the marketing boards, removed most quantitative restrictions on imports, abolished ex-factory price controls, and reduced the rate of protection of domestic industries. Also, all subsidies were removed and privatization was highly encouraged by the administration at this period.

Nigeria, like many developing countries, has pursued an industrialization strategy relying on import substitution. Any evaluation of the system of subsidization or protecting manufacturing industries in Nigeria must deal with (a) the tariff structure, (b) the indirect tax system, (c) the multiple exchange rate system for exports, and (d) the system of quantitative controls on imports. In Nigeria, quantitative restrictions gave industries protection that was far more extreme. Studies of effective rates of protection indicated that effective protection for industrial commodities ranges from negative protection levels for export industries to positive protection in excess of 200% for assembly industries. The protection in manufacturing was very uneven over the study period. The level of protection stood at 15.8 in 1966, but by 1973, it was -30.9. For periods, 1973/1974 and 1979/1980, it was clear that the consumer goods sector received substantially higher levels of protection than did the intermediate goods or capital goods subsectors. The outcome could have been expected because of the import substitution strategy which was has been pursued by Nigeria. It existed throughout the 1970's. Another finding consistent with the two periods is the negative rates of protection for export industries, which would suggest a persistent and significant bias against the export sector.

LITERATURE REVIEW

The issue of whether there is a linkage between manufacturing price distortions and economic growth has been of constant concern to many economists and also to policy makers over the years. It was in the 1930s that the orthodoxy of free trade was challenged by the new heterodoxy associated with the economic problems and theoretical developments of the time. At this time, the great depression revived the mercantilist arguments for tariffs. The theory of optimal tariff rests on the existence of a distortion in international markets such that market prices diverge from opportunity costs. However, in recent years, developing countries have recognized the need to undertake "liberalization policies" aimed at reducing domestic market distortions and thereby raising allocative efficiency in resources use. Protection can be giving through tariffs – taxing particular imports or through quantitative restrictions on import, such as quotas or outright embargoes, limiting the imported supply, or through both together. However, a major disadvantage of widespread use of protection is that it discourages and decreases trade, thereby, destroying or giving up many of the advantages from trade.

There is overwhelming empirical evidence that suggests a strong link between price distortions and economic growth, especially in developing countries; Harberger (1959) attempted to explain the possible results of eliminating misallocations of resources in economies like Chile, Brazil, and Argentina. It was concluded that policies aimed at eliminating distortions in the price mechanism can raise the long-term rate of growth of national income. And results from global and single country studies of subsidy reform suggest that on an aggregate level, changes to GDP are likely to be positive due to the incentives resulting from price changes leading to more efficient resources allocation (Von Moltke et al., 2004). Also, regarding neoclassical analysis, Little et al., (1970), Bhagwati (1978), and Timmer (1980) have stressed the existence of potentially high social costs of domestic price distortions I terms of their resources allocation, national output, and income distribution effects. Bhagwati (1978) and Krueger (1978) showed that those countries that embark on programs of correcting price distortions in the 1960s, for instance, Brazil, Columbia, and South Korea, showed significant gains, not only in output but also in employment from these liberalization efforts. Aguirre and Yucelik (1981), in their review of African experience emphasized that the mixing of revenue and protective functions have led to excessive levels of protection, resulting in damaging effects on resource allocation. Gillis (1981) and Tanzi (1981) noted the detrimental effects on production, allocation of resources and exports due to the high share of export duties in GDP. Agarwala (1983) noted from the discussion of the relationship between price distortion and economic growth that one third of the variation in growth performance of 31 developing countries can be explained by a composite index of price distortion. As summarized by Balassa (1982), studies for Brazil, Chile, Pakistan, the Philippines, and Turkey relating to the 1960s estimated that the costs of distorted prices due to trade restrictions alone could have amounted from 4% to 10% of their GNP. Also, Marsden (1983) found a significant negative relationship between taxes and GDP growth and critical growth determinants.

It was noted that removing quota alone in Turkey in 1978 would have increased its GDP by as much as 5.4% (Grais, De Melo, & Urata, 1986). Nonetheless, the gain from trade liberalization either at the global or national level appears to be small. Whalley (1985) estimated that the global net gain of the world GDP in 1977 was about 0.3%. Also, it was found out that the case of Srinivasan (1986a, 1986b) do not exceed 0.5% of GDP for any country. However, Srinivasan (1986a) has argued that the results of these models are not

credible, partly because of both data and specification bias. For other models-based estimates of these static gains; see Krueger (1984), Taylor and Black (1974) and de Melo (1978a). Also, it was discovered that most of these models do not take into account the "rent seeking" and "directly unproductive" activities caused by quotas and tariff regimes (Tullock, 1967; Krueger, 1974; & Bhagwati, 1980). Also, Ubogu (1988) concluded that a liberal trade regime with low tariffs and without quotas up to 1973 led to export-led growth in the world economy and relative stability in Nigeria's export earnings and inflow of foreign capital. It was evident that when economic reform began in the late 1970s in China, market-orientated reforms involved efforts in creating autonomous incentives at the micro level, such as adoption of various systems in agriculture and urban industries (Lin, 1992; Huang, 1998, 2001); and removing restrictions over free markets by trade liberalization (Drysdale & Song, 2000; Lardy, 2002); and building institutional infrastructure necessary for the market economy, such as the development of large modern financial industry (Huang, 2001). This set of reform policies resulted in what can be described as the "China puzzle" (Huang, 2010).

THEORETICAL FRAMEWORK

Generally, two coefficients were normally used to measure the incentive/disincentive effects of administered prices, taxes and subsidies to producers of traded goods. These are Nominal Protection Coefficients (NPC), which is the ratio of the domestic price to its border price; and Effective Protection Coefficient (EPC), which measures the effects of protection, not only on traded output but also on traded inputs. Nominal Protection Coefficient (NPC) of any commodity is the ratio of its domestic price to its border price:

$$NPC = Pd/Pb \quad (3.1)$$

Where,
NPC = Nominal Protection Coefficient of the commodity;
Pd = Domestic Price of the commodity;
Pd = Border price of the commodity

The difference between the domestic producer price and the border price of a comparable product is the ad valorem tariff rate (calculated as a percentage on c.i.f. prices) where the product is not subject to quantitative restrictions. Where there are quantitative restrictions, domestic producer and border prices have to be related directly. Where there are differential indirect taxes, the differential tax rate, expressed as percentage of c.i.f. prices, have to be added to the tariff rates. The Nominal Protection Coefficient (NPC) can also be expressed as a percentage difference between domestic and border prices, in which case it is called the Nominal Rate of Protection (NRP). Hence, the proportional difference between the domestic price and world price of final goods is as follows:

$$NPR = (Pd - Pb)/Pb \quad (3.2)$$

Where,
NPR = Nominal Rate of Protection
More precisely, the relationship between world price of a good (Pb) and the domestic price (Pd) may be expressed as:

$$Pd = Pb(1 + T) \quad (3.3)$$

Where,
T = the nominal rate of protection (measure of price distortion).

If the only form of trade intervention is the imposition of ad valorem tariff, and if this tariff is not prohibitive, the nominal rate of protection will then equal the tariff rate. In practice, the nominal rate of protection will depend upon a number of factors such as excess taxes, quantitative restrictions, that is, import quotas, ban, and some licensing arrangements in addition to tariffs. The main focus of the theoretical framework is to determine the impact of manufacturing price distortions (TM) on manufacturing output (YM). And explore the theoretical linkages between manufacturing price distortions and some growth components, such as exports and productivity. What accounts for the poor performance of the Nigerian manufacturing output? The level of manufacturing price distortions is clearly not the only factor. Development is complex, and its pattern can be influenced by many variables, endogenous and exogenous. Growth has been retarded in some developing countries by deterioration in their terms of trade, inflation, and high interest rates which have made progress very difficult. But the links between manufacturing price distortions and growth are there, operating mostly indirectly through resources mobilization and efficient use of resources. Price and quantity controls create distortions in the sense that goods and services are not valued at their opportunity cost. These distortions in turn affect the efficiency of resources allocation and, as a result, have macroeconomic consequences. Exports play a key role on both the supply and demand side of the economy. On the supply side, they provide the basis to acquire through foreign exchange the imported capital goods and technology which is necessary towards a rapid economic growth. On the demand side, they serve to prop up the aggregate demand. Indeed, the whole efficiency of resource allocation is, to a large extent, mirrored in terms of export performance. Since manufacturing price distortions affect the efficiency of resources allocation, it reduces the volume of manufacturing exports, thereby reducing the volume of imported capital and other intermediate goods which could have been made available through the manufacturing export proceeds. Manufacturing price distortions through faulty price signals generate inefficiencies in resource allocation which eventually wil reduce the amount available for investment, since Nigeria greatly depended on the availability of its imported capital and machineries for an efficient operation of its productive processes. As a result, manufacturing output will increase with a decrease in manufacturing price distortions over a time period. However, manufacturing output will be constrained if there are high levels of manufacturing price distortions.

The Production Function

The Nigerian economy is assumed to consist of a large number of firms, each producing the same product and subject to the same production function. Thus, different from the usual production function that includes only capital and labor. This model analyzed the role of manufacturing exports in economic growth in the framework of a straight-forward production function that treats manufacturing exports as similar to a production input. Manufacturing products are often implicitly or explicitly subject to export tax, reducing their domestic price relative to their world price. At the sectoral level, price intervention policies concerning manufacturing exports are likely to create biases in the structure of incentives within manufacturing. Each of these policies creates disincentive to manufacturing production. Subsidies are typically a significant drain on government savings and, hence, on resources available to finance investment. Therefore, over a time period, the effects of price distortions in the manufacturing sector will cause inefficiency in resources allocation thereby, inhibiting manufacturing productivity.

Producer behavior is represented in the model by the following manufacturing export equation:

MX = f(Pdmx, Z) (3.1.1)
Where,
MX = manufacturing exports;
Pdmx = domestic price of manufacturing exports;
Z = a vector of quantities of fixed inputs and other supply shifters such as technology and weather.

In a small open economy like Nigeria; it is usually the case that manufacturing export prices are determined in the domestic market as follows:

Pdmx = Pfmx . e(1 + MT) (3.1.2)
Where,
Pfmx = foreign price of manufacturing exports;
e = real exchange rate;
MT = manufacturing price distortion level

The domestic price of manufacturing exports (Pdmx) is determined by the foreign price of manufacturing exports (Pfmx), the real exchange rate (e), and the manufacturing price distortion level (MT). Trade policy for manufacturing exports limits the quantity exported through the imposition of either per unit manufacturing export tax or a manufacturing export quota, and the result is to cause the domestic price of manufacturing export to be lower than the world price of manufacturing exports. Therefore, the immediate impact of the manufacturing price distortion level (MT) is on the domestic price of manufacturing exports. The most general price effect of this distortion is to create a differential in the international price of the affected export commodities. Another effect of this distortion is to reduce the volume of international trade. By reducing the volume of trade, the country's real income is reduced. Also, there will be a distortion of optimum resource use and a breakdown of the price mechanism as a guide in the international allocation of resources.
In reference to the above considerations, Nigeria's manufacturing export supply function for the merchandise goods can be specified as follows:

MX = f(MT) (3.1.3)

dMX/dMT < 0

From the above formulations, a simple linear reduced form model was used to estimate manufacturing output in Nigeria. The model chosen which reflects the issues and constraints in the sector, is derived from the conventional supply behavior based on the theory of profit maximization. Therefore, structurally, manufacturing output can be expressed as a function of manufacturing output prices, input prices, and other exogenous shifters in reduced form. Both price and non-price factors have over the years influenced manufacturing productivity, thereby inhibiting manufacturing output growth. The inclusion of non-price factors in the model means that elasticities obtained are long-run elasticities. Long-run response, which involves shifts in the supply curve, can only come about through improvements in technology and other exogenous supply shifters. Manufacturer's decision on what to produce and in what quantity is based on their assessment of domestic price. This is particularly very important for Nigeria where bulk of manufacturing output is semi-processed food items. In

Nigeria, labor played a crucial role in the manufacturing sector since manufacturing is not fully mechanized. Thus, labor becomes an important factor in manufacturing output supply function.

From the above formulations, a simple linear reduced form model can be derived from the conventional supply behavior based on the theory of profit maximization as follows:

MY = f(ML. Pdm, MT)
(3.1.4)

dMY/dML > 0; dMY/dPdm > 0; dMY/dMT) < 0

where,
MY = manufacturing output;
KM = Capital imports in the non-oil sector;
Pdm = domestic price of manufacturing goods.

Therefore, structurally, manufacturing output can be expressed as a function of input prices, output prices and other exogenous shifters in a collapsed reduced form.
The study period covers the oil-boom era when oil basically earned most of the foreign exchange for the country. At this point, the influence of oil-boom overshadowed other influences in the economy and dictated the movements of all the key macroeconomic variables and policy decisions. Therefore, oil-boom is represented in the following equation by a dummy variable to capture its influence on manufacturing output in the economy. The introduction of a dummy variable to represent the influence of the oil-boom is relevant in this model in the sense that there was a movement of labor from manufacturing during the oil-boom period to the oil sector. In the absence of technological progress in this sector, manufacturing output fall due to this outward migration. Thus, from the above formulation; output in the manufacturing sector was influenced as follows:

MY = f(KM, Pdm, MT, D1)
(3.1.5)
Where,
D1 = oil-boom influence.

Comparative Static Analysis of the Manufacturing Model

The following equations specify a modified Neo-classical production function in the Nigerian manufacturing sector while assuming profit maximization for the firms in the economy:

MY = f(KM, Pdm, MX)
(3.2.1)

dMY/dKM > 0; dMY/dPdm > 0; dMY/dMX > 0

MX = f(MT)
(3.2.2)

dMX/dMT < 0

By substituting (3.2.2) in (3.2.1), we have:

MY = f[KM, Pdm, MX(MT)]
(3.2.3)

From equation (3.2.3), we can analyze the overall impact of manufacturing price distortion on manufacturing output thus:

dMY = df/dKM . dML + df/dPdm . dPdm + df/dMX . dMX/dMT
(3.2.4)

Divide (3.2.4) across by dMT, we have:

dMY/dMT = df/dKM . dML/dMT + df/dPdm . dPdm/dMT + {df/dMX . dMX/dMT}/dMT < 0
(+) (-) (+) (-) (-)

From the above analysis, it is then easy to conclude that the overall effect, theoretically of manufacturing price distortion on manufacturing output is very negative. Therefore, we hypothesize a negative relationship between manufacturing price distortion and manufacturing output in the economy over the study period.

MODEL SPECIFICATION AND METHODOLOGY

These model specifications were based on the theoretical framework already developed in the study. And they also provide the empirical basis to investigate the effects of manufacturing price distortion on manufacturing output.
Two functional forms were used in the specification of the models: The first specifies the influence of only the policy and non-policy variables on manufacturing output without the impact of oil-boom, and the other specifies the influence of the policy and non-policy variables on manufacturing output with the impact of the oil-boom. This impact of the oil-boom on manufacturing output is represented by a dummy variable.

Model Specification

To develop a testable hypothesis, the export variable in the manufacturing sector (MX) is replaced with the other policy variables and therefore, the behavioral equations in the model are specified as follows:

$MY = \beta_0 + \beta_1 KM + \beta_2 Pdm + \beta_3 MT + e_1$
(4.1.1)

$MY = \beta_0 + \beta_1 KM + \beta_2 Pdm + \beta_3 MT + \beta_4 D1 + e_2$
(4.1.2)

Where,
β_0 = constant term in each equation
$\beta_1, \beta_2, \beta_3, \beta_4,$ = parameter estimates of the explanatory variables in each equation
$e_1, e_2,$ = stochastic error terms in each equation

METHODOLOGY

The models are represented by a series of algebraic equations. However; to derive consistent, unbiased, and efficient estimators of the structural equations, the hypothesis were tested using the Ordinary Least Square (OLS) regression technique. And to test the significance of the policy variables; statistical tests, such as the F-test, t-test, and the Durbin Watson (DW) statistics were used. In order to test the relationship among the policy variables in each of the behavioral equations developed; it was necessary to assume that their coefficients are the estimators of the population parameters. It was also important to ensure that the explanatory variables in the models were independent; meaning that they are not correlated among themselves and they do not influence each other. Without these assumptions, the population estimates may be biased; therefore statistically insignificant.

ESTIMATION RESULTS AND ANALYSIS OF THE MODEL

To appreciate the empirical relevance of the theoretical framework already developed, equations have been fitted to Nigeria's annual data in constant 1980 prices for the period 1967-2010, using Ordinary Least Squares (OLS). All the equations were estimated in log form, and therefore, their coefficients are elasticities. These elasticities indicated the direction and magnitude of the impact of these exogenous variables on economic performance. The estimation results were given below with the t-values stated in parenthesis and corresponding to the coefficients of the exogenous variables of each equation. This t-value is defined as the estimated coefficient of the explanatory variable divided by its standard error, which is used to obtain the statistical significance of each of the individual results. Coefficient of determination R^2, F-Ratio, and the DW statistics are summarized below each equation. The R^2 determines the explanatory power of each equation by measuring the proportion of variations of the dependent variable that are mathematically accounted for by the independent variable taken together. On the other hand, the statistical significance of all the explanatory variables for the whole equation was tested by using the F-Ratio, which was defined as the ratio between the sum-of-squares of the residuals. Finally, the DW statistics was used to test for the first order autocorrelation in each equation. The results of the estimates are as follows:

$$MY = 1.02 + 0.15KM + 1.04Pdm - 0.02MT \quad (5.1)$$
$$(5.3) \quad (2.0) \quad (6.5) \quad (-2.1)$$

$R^2 = 0.94$; $F = 79.6$; $DW = 2.0$

In the above model (5.1), all the variables have correct signs and are statistically significant at 5 percent level, based on the t-value reported. Also, the model supports the hypothesis that price distortion in the manufacturing sector is negatively related to output in the same sector. Thus, a 100% increase in manufacturing price distortion will lead to a 2% decrease in manufacturing output. From equation (5.1), it can be seen that in the manufacturing sector during the study period; that output elasticities of capital imports in the non-oil sector, domestic price of manufacturing goods, and manufacturing price distortion level were 0.15, 1.04, and 0.02 respectively. In other words, over the study period, holding capital imports in the sector and domestic price of manufacturing goods constant; a 1 percent increase in manufacturing price distortion level (MT) will lead on average to about 0.02 percentage decrease in manufacturing output. As a result, manufacturing output is decreased due to an

increase in the manufacturing price distortion level. The model also showed increasing returns to scale with the sum of the coefficients summing up to 1.21; doubling the inputs will more than double the output. The statistical significance of the manufacturing output (MY) at the 5 percent level means that the hypothesis that manufacturing price distortion level is negatively related to manufacturing output cannot be rejected. However, since oil was the engine of growth during the greater part of the study period, it becomes necessary to test whether oil-boom has any significant influence on manufacturing output during this period. Therefore, when a dummy variable (D1) was introduced into the model to capture the effects of the oil-boom, the estimated results were as follows:

$$MY = 0.51 + 0.32KM + 1.03Pdm - 0.03MT - 0.16D1 \quad (5.2)$$
$$(2.4) \quad (3.8) \quad (8.2) \quad (-3.5) \quad (-3.3)$$

$R^2 = 0.96$; $F = 98.8$; $DW = 2.0$

Model (5.2) also exhibits correct signs in terms of the explanatory variables. And the explanatory variables are all significant including the price distortion variable. This suggests that in the manufacturing sector, the effect of the oil-boom does not overshadow the effects of price distortion. Therefore, price distortion in manufacturing sector has a negative and significant influence on manufacturing output during the study period.

SUMMARY RESULTS OF THE ESTIMATIONS IN THE SUB-PERIODS

Pre-oil Boom Period:

$$MY = 0.56 + 0.50KM + 0.62Pdm - 0.02MT \quad (5.1.1)$$
$$(0.52) \quad (3.6) \quad (1.0) \quad (-2.1)$$

$R^2 = 0.95$; $F = 19.0$; $DW = 1.7$

Oil-Boom Period:

$$MY = 1.3 + 0.03KM + 1.1Pdm - 0.02TM \quad (5.1.2)$$
$$(0.93) \quad (0.04) \quad (1.6) \quad (-0.54)$$

$R^2 = 0.80$; $F = 4.0$; $DW = 1.5$

Post-oil Boom Period:

$$MY = 0.86 + 0.28KM + 0.94Pdm - 0.03MT \quad (5.1.3)$$
$$(0.46) \quad (2.0) \quad (1.4) \quad (-2.1)$$

$R^2 = 0.82$; $F = 2.9$.

An analysis of the pre-oil boom period in model (5.1.1) indicated that manufacturing price distortion has a negative significant impact on manufacturing output, while the effects during

the oil-boom is still negative but not significant, and also significantly negative during the post-oil boom period; suggesting that the effects of the oil-boom is not noticed during the pre-oil boom and post-oil boom periods. In fact, despite the significant effect of oil-boom in this sector, manufacturing price distortion is still a significant negative determinant of manufacturing output.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The main objective of this study has been to analyze the relationship between manufacturing price distortions and manufacturing output in the Nigerian economy during the study period (1967 – 2010). The analysis of the experience during the study period confirms the view that manufacturing exports are important positive determinants of manufacturing output. The effect of manufacturing price distortions on manufacturing output is as a result of their impact on manufacturing exports. During the greater part of the study period, oil export is the engine of growth in the Nigerian economy. Hence, oil-boom greatly influenced other factors that determine manufacturing output. Empirical evidence also supports the fact that there is a significant negative relationship between manufacturing price distortion and manufacturing output. Also, statistical analysis shows that manufacturing price distortion is negatively related to manufacturing output. In this paper, it was shown that increase in manufacturing price distortion decreases manufacturing output despite the influence of the oil-boom. The obvious conclusion, therefore, is that an inverse relationship exists between manufacturing price distortion and manufacturing output, although this negative relationship was greatly suppressed due to the influence of oil-boom during the study period. Nigeria has over the years been engaged in a wide range of price interventions in the manufacturing sector with the sole intension of providing incentives to promote sectoral growth. However, these pricing and subsidy policies have had a distorting impact on the allocation of resources within the sector, thereby generating considerable costs in terms of economic efficiency.

In evaluating the system of protection in Nigeria, it was obvious that protection has been excessive in a number of manufacturing industries. Though protection is a powerful instrument for creating domestic industry, it is not useful for making that industry efficient. Tariffs help induce investment by increasing the profitability of domestic operations, but they also reduce the motivation for improvements in efficiency. High tariff protection, mostly in finished goods, often removed the competitive stimulus for efficiency in the production of domestic substitutes and frequently leads to failures to achieve economies of scale in areas of potential comparative advantage. Also, efficiency in some import-substitution industries has been undermined by smuggling which is often rife in Nigeria with high tariffs and quantitative controls on imported consumer goods. Smuggling reduces demand for domestic production and can be a major cause of under-utilization of plant capacity and consequent waste of capital, which results in low output.

Since future economic growth will depend on the pace and effectiveness of policy reforms designed to eliminate the price distortions in the economy, reforms of pricing policy should constitute a major component of any remedial program. If the Nigerian manufacturing sector is to become modern and efficient, it must be given both the opportunity and the motivation to reduce costs. Indiscriminate reduction of the rate of protection and the reduction of the implicit taxes on exports alone are not the solution. Better physical infrastructure, better education and training, and more industrial experience can contribute to the ability to reduce costs and raise productivity. Lower protection and the reduction of the implicit taxes on exports can only increase the motivation. Improved efficiency means better utilization of

productive factors and widening domestic markets. Also, improved efficiency creates greater possibilities for augmenting the exports of the non-oil sectors, which are of importance for both improving the balance of payments and maintaining a high growth rate of output.

The fact that theoretical and empirical evidence support complete trade liberalization as a competitive stimulus to efficiency does not rule out the direct benefits derived from some protection, especially in developing countries. The government should through the use of tariff, protect the infant industries. However, the tariff structure should be such as to ensure that these firms do not remain infants forever. In fact, the protection should be terminated after a specified number of years. The government should also implement policies that would provide exporters with duty-free imported inputs, such as intermediate and capital goods that facilitate the growth of exports, particularly, those engaged in labor intensive manufactures where competitive material costs are critical for successful penetration of international markets. This will increase the potential to utilize capacity fully, thereby increasing productivity in the short and medium term; and hence increase total factor productivity in the manufacturing sector of the economy. It will also accelerate the transfer of underemployed agricultural workers into more productive jobs in industry and related services.

With external indebtedness pressing on the country's debt-servicing capacity, improvements in foreign exchange earnings are necessary to provide the imports needed to maintain a high rate of economic growth. Apart from increasing import capacity, exports contribute to economic growth directly by raising incomes and providing demand for domestically produced inputs. This export-led growth can be achieved through sustained improvements in the pricing policies in the manufacturing sector. Policies that would reduce price distortions and improve the efficiency of the market mechanism should be encouraged. The changes required in the system of protection cannot come overnight. It then seems appropriate to distinguish between the short-term and long-term policy changes. For the short-term, there is the need to provide competitive pressures in the Nigerian manufacturing sector. For the long-term, policies should be devised to reduce discrimination against manufacturing exports and to improve resources allocation in the manufacturing sector. To increase the incentives to exports, it would be necessary to abolish export licenses, reduce the rate of domestic protection, and remove all other subsidies. This will re-establish and strengthen the market mechanism, especially in the manufacturing sector.

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