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Trade Liberalisation and Market-Discipline: Micro-Level Evidence from the Manufacturing Sector in Nigeria

[1]Kanang Amos AKIMS

Department of Economics,
Faculty of Social Sciences,
University of Jos, Plateau State, Nigeria.

[2]Perez Ayieko ONONO

Department of Applied Economics,
School of Economics Kenyatta University,
Kenya.

Abstract

Amongst the key objectives of trade policy in Nigeria is the integration of the economy into the global market by establishing a liberal market economy and the pursuance of a progressive liberalization of the import regime towards increasing competitiveness of domestic industries. This paper provides empirical evidence on the pro-competitive effects of trade liberalization in the manufacturing industry in Nigeria. Using a rich data base on manufacturing firms for the period 2008 to 2010, we construct a pseudo-panel data set to test the effects of trade liberalization on price-marginal cost margins, employing import penetration as the trade variable. We find weak evidence of a market-discipline effect of trade liberalization in Nigeria; higher import penetration only reduced the price-marginal cost margins of firms in the Foods, Beverages and Tobacco sub-sector, and this was significant at 10 per cent level. The results suggest that trade liberalization may not be sufficient in ensuring a competitive domestic market hence, additional measures may be needed to improve competitiveness across the industry.

Keywords: Trade liberalization, Market Discipline, Price-cost Margins, Manufacturing Sector, Nigeria

JEL Code: Classification: F12, F14, D4

Contribution/Originality
This paper provides evidence on the import-discipline hypothesis for Nigeria using firm level data. This hitherto, was not available.

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1.0 Introduction

International trade has been existent throughout much of history and the motivation has been hinged to the fact that the distribution of natural, human, and capital resources vary across economies. Different

technologies or allocations of resources are required for the efficient production of various kinds of goods. Moreover, preferences for goods also differ between countries. As a result, international trade has provided the means through which countries have expanded their range of available goods through worldwide sourcing strategies. This offers new scope for firms to participate in the global market; supplying many goods and services on a competitive basis. Thus, international trade has been suggested to be a powerful means by which countries can promote their economic growth and development (Rondinelli, 2003).

The removal or reduction of restrictions on the free exchange of goods between nations occasioned by trade liberalization widens the possible opportunities available to countries for the upgrading of their economic activities. Theoretical literature outline various channels through which trade liberalization improves performance of firms in an economy, otherwise referred to as the dynamic gains from trade liberalization. One of these channels points to an import discipline (pro-competitive) effects by which, increased competition from foreign markets on domestic producers leads to a lower markup and reduced market power in domestic markets. This has been argued under the assumption of perfect competition based on allocative efficiency, and extended to imperfectly competitive markets where trade liberalization will reduce the dead weight losses created by domestic monopolies and oligopolies by increasing competition and reducing price-marginal cost mark-ups (Krishna & Mitra, 1998). More so, the pro-competitive effect of trade liberalization has been demonstrated whether the domestic industry produces homogenous products (Helpman & Krugman, 1989) or in the case where differentiated products are produced (Melitz & Ottaviano, 2008).

In Nigeria, trade policy began to be liberalized considerably in the mid-1980s. Measures including reductions in the average tariff rates and effective rates of protection were implemented as a means to achieving industrialization of which manufacturing is key. This began with the introduction of the Structural Adjustment Programme (SAP) in 1986 aimed at substantially reducing the dependence on imports while enhancing the non-oil export base of the country in a bid to realize a diversified economy away from over-reliance on crude oil. The direction of Nigeria's trade policy towards greater liberalization culminated in the adoption of the Economic Community of West African States (ECOWAS) Common External Tariff (CET) in 2008. These have ensured the integration of Nigeria's economy into the global market thereby establishing a considerable liberal market economy.

Freer trade was anticipated to among other things increase the competition among firms in the manufacturing sector in Nigeria leading to higher capacity utilization in the sector as firms engage more intensely resources available to them in order to raise their profits that would follow falling markups; given that a larger number of firms will participate in the industry with lesser restrictions on trade. To this end, the manufacturing sector capacity utilization was expected to reach 60 per cent by 2010. This target was not realized instead, only 56.9 per cent and 53.6 per cent level were reached in 2010 and 2015 respectively. By 2020, the level of manufacturing capacity utilization dropped to 43.1 per cent (Federal Government of Nigeria, 1997; World Bank, 2016; Central Bank of Nigeria, 2021).

Enhanced firms' competitiveness is vital in achieving an enviable level of economic growth and development in an economy hence, the importance of the import discipline hypothesis. However, despite the fact that this argument has been adduced for, very little studies have tested it using firm level data in sub-Saharan Africa. This paper examines the effects of trade liberalization on the price-marginal cost margins of firms in the Manufacturing sector of Nigeria. The data set used contains detailed firm-level information on a sample of firms in a variety of industries over the period 2008 to 2010, thus facilitating a robust micro level investigation. The main result of the paper is that we find evidence of significant reductions in price-marginal cost margins of firms only in the Foods, Beverages and Tobacco sub-sector.

The paper is organized as follows: Section 2 presents the theoretical framework upon which the study is based and reviews the empirical evidence in this area. Section 3 discusses the methodology followed in the analysis of the paper including a description of the data type, the empirical model estimated and the definition and measurement of the variables used. While Section 4 presents the empirical results and discussions Section 5 outlines the conclusions drawn and the policy implications arising from the analysis.

2.0 Literature Review

Theoretical Framework

The theoretical framework employed is based on the neoclassical theory of competition. The neoclassical theory of competition postulate that in a perfect competition setting, prices and quantities are assumed to converge towards an equilibrium and therefore, profits of firms within an industry should converge to zero. Deviations from this are considered to result in imperfect competition or monopolistic competition. Such a deviation might occur as a result of factors including increasing returns to scale, price discrimination through product differentiation and cross subsidization causing spillover effects from one concentrated market to another (Bikker & Bos, 2008).

The deviation from the perfect competition setting is evident in Nigeria as there exist a variety of differentiated goods in the market supplied by a range of firms implying some form of monopolistic competition. Hence, the firms may not be price takers as such, different prices may be charged and profits spread over the competitive one. According to the neoclassical theory of competition, the competitive landscape within an industry comprises of industrial concentration and barriers to entry.

$$\theta = f(CR4, BE) \quad (1)$$

where:

θ = measure of competition

$CR4$ = industry concentration ratio

BE = barriers to entry

However, barriers to entry is conceived as a vector comprising the capital requirements for the operation of a firm and its efficient size (Semmler, 1982). Equation 1 can therefore be expressed as:

$$\theta = f(CR4, K/E, SIZE) \quad (2)$$

where:

K/E = the capital per employer.

$SIZE$ = number of workers engaged by a firm in the production process.

It is expected that competition will reduce with increase to the concentration ratio in an industry, and increase in size. On the other hand, competition will increase with reductions in a firm's capital to employee ratio.

In providing the theoretical explanation for competition resulting from trade liberalization, the theory by Melitz and Ottaviano (2008) applies. Melitz and Ottaviano (2008) put forward that increased import penetration arising from trade liberalization induces competition in an industry. Thus, highlighting the pro-competitive effect associated with trade liberalization. Therefore, the general functional form for evaluating the effect of trade liberalization on competitiveness of firms can be expressed as:

$$\theta = f(MP, CR4, K/E, SIZE) \quad (3)$$

where MP is import penetration.

Empirical Literature

Empirical studies that have attempted to test the effects of trade liberalization on firm competitiveness include Yalçin (2000), Goldar and Aggarwal (2005),Wong (2007) and Noria (2013). These studies have estimated the import penetration effects on the markups of firms. Yalçin (2000) obtained results suggesting that trade liberalization had different effects on competition in the private and public sectors in Turkey. Therefore, the study concluded that a freer trade regime is not sufficient for a competitive domestic market.

On the other hand, Goldar and Aggarwal (2005) in a study for India obtained results attesting to a pro-competitive effect of trade liberalization on manufacturing firms. Similarly, Wong (2007) in analyzing the pro-competitive effects of trade liberalization in Ecuador's manufacturing sector during the period 1997 to 2003 found an inverse relationship between import penetration and price-cost margin implying that trade liberalization brought about market discipline effects in Ecuadorian manufacturing industries and establishments. Thus, they concluded that trade policies oriented to liberalization could constitute an important element towards fostering a pro-competitive environment in domestic markets.

Akin to Yalçin (2000), Noria (2013) found varying results on the effects of trade liberalization on competition for Mexico. Examining the effect of North American Free Trade Area's (NAFTA) second round trade liberalization on firms' price-cost margins over the period 1994 – 2003 found a weak

relationship between trade liberalization and markups of firms. This was because for industries that liberalized over a 10-year period, there was no effect of trade liberalization on price-cost margins and for industries where trade liberalization was implemented over a 5-year period, the relationship between trade liberalization and price-cost margins was weak. Hence, the study concluded that trade liberalization is not sufficient in enforcing competition in less protected industries.

The empirical evidence of this link is lacking for Nigeria. Thus, the question of whether or not trade liberalization increases competition remained unanswered in the case of Nigeria. The urge to fill this gap provided a motivation for the current study.

3.0 Methodology

Data Types and Sources

Firm level data from the Survey of Manufacturing Industry (SMI) in Nigeria was sourced from the National Bureau of Statistics. The conducted SMI collected information on a sample of 596 firms located in the different states of Nigeria on a quarterly interval for three years (2008, 2009, and 2010). The sampled firms' activities cut across a broad range from light agricultural-based industries to heavy iron and steel companies. Specifically, each firm was assigned a four digit-code following the International Standard Industrial Classification (ISIC). Whereas, the first two digits identify the particular division a firm's activity falls, the last two digits identify the item under that division. Going by this system, the firms were organized into eleven manufacturing sub-sectors including: Food, Beverages and Tobacco, Textiles, Machinery and Motor Vehicle, Wearing Apparel, Rubber and Plastic Products, and Fabricated Metal Products. Other sub-sectors include Leather and Related Products, Paper Products, Printing, Publishing and Reproduction; Wood, Wood Products and Furniture, Chemical and Pharmaceutical Products and Non-metallic Mineral Products.

Other information including those on the implicit price deflator used to remove price effects on the data; and imports of finished goods for each sub-sector of the manufacturing industry in Nigeria used in computing the import penetration at the 2-digit industry level were obtained from the Central Bank of Nigeria. For confidentiality reasons, necessary information identifying firms and tracing them over time were not provided. Therefore, the data could only be accessed as a repeated cross-section. Nonetheless, theoretical literatures including Deaton (1985), Moffitt (1993), Nijman & Verbeek (1992), Collado (1997); (1998), and Verbeek & Vella (2005) have demonstrated that in such kind of surveys, tracking 'cohorts' through such data over time to form a pseudo-panel would yield consistent estimators.

To transform the data into a pseudo-panel data set the study grouped firms according to region, industry and size characteristics (studies on manufacturing firms by Heshmati & Kumbhakar, 1997; Kang *et al*., 2005; Bruneau & Renzetti, 2010; Dwenger *et al.*, 2011; Niringiye, 2014; and Bardazzi & Duranti, 2015 considered these characteristics in constructing cohorts). The regional level considered is the 36 states in Nigeria; the 4-digit ISIC classification of economic activities constituted the industry type and size was defined by a firm's number of employees. While a firm with a labour size of not more than 10 workers was considered to be micro, a firm with 11 – 100 employees was regarded as a small-scale firm.

Furthermore, whereas, a medium scale firm was defined as one with a labour size of between 101 – 300 workers, a large-scale firm was one with over 300 employees. A firm's industry activity, location and size decision should remain unchanged over a short time horizon.

To account for price fluctuations in the data all variables recorded in monetary units were deflated to remove the price effect in each period. After that, a synthetic identity number based on the time invariant identified firm characteristics (state, industry activity and size) was assigned to each firm. This was done in order to trace individual firms and to account for dependency of observations over time. Then, the means of the variables were computed according to the identity and quarter (time).

This resulted to an unbalanced pseudo-panel dataset consisting of 51 cohorts in Food, Beverages and Tobacco; 1 each in Textiles, and Machinery and motor Vehicle; 5 each in wearing apparel, Rubber and plastic products, and Fabricated metal products. Leather and related products as well as Printing, publishing and reproduction had 2 cohorts each. While Wood, wood products and furniture had 31 cohorts, Paper and paper products had 4 cohorts. Chemical and pharmaceutical products; and Non-metallic mineral products had 7 and 38 groups respectively. Lastly, sub-sectors with less than 30 cohorts observed over the period were dropped in order to obtain consistent estimates in the analysis. Thus, only 3 sub-sectors remained: Foods, Beverages and Tobacco, Non-Metallic Mineral Products and Woods, Wood Products and Furniture. At the end of this procedure, the original dataset was reduced to a total of 120 cohorts which were in the dataset for at least 6 quarters in the period considered.

Empirical Model

Based on the relationship in equation 3 competition is dependent on import penetration (*MP*), the concentration ratio (CR4) of the industry, capital to employee ratio (*K/E*), and number of employees (SIZE). Besides these variables, this paper following Yalcin (2000) included the interaction between concentration ratio and import penetration (*CRMP*), export shares (*XS*), growth rate of value-added output (*GRVADD*), and output per employee (*Y/E*). Thus, providing an inclusive picture of the industry structure as regards competition. Consequently, the model used in this article is specified as:

$$\Theta_{ijt} = F\left(MP_{jt}, CR4_{jt},\ CRMP_{jt}, XP_{jt}, GRVADD_{ijt}, Y/E_{ijt}, K/E_{ijt}, SIZE_{ijt}\right) + U_{ijt} \qquad (4)$$

where θ_{ijt} is the measure of competitiveness, and U_{ijt}denotes the error term. $i,\ j,$ and t represent the firm, 2-digit industry, and time subscripts respectively.

The variables included in equation 4 were measured as follows:

Competitiveness (θ) is the degree of domestic competition among firms in a sub-sector in a given time. It is measured by the price-cost margin; the ratio of sales revenue minus the sum of labour and material cost to sales revenue.

Capital per employee (K/E) is a variable indicating the capital intensity employed by firms. It was measured as the ratio of capital input costs to the number of labour employed. Its inclusion is intended to capture variations in price-marginal cost markup due to differences in capital utilization.

Concentration ratio (CR4) indicating the relative power of competing units. It was computed as the share of sales controlled by the four largest firms in an industry. The four largest firms were determined by the amount of labour employed in their production.

Export shares (XS) the degree to which domestic production of a sub-sector penetrates foreign markets in a particular time. It was measured as the percentage of exports to output ratio.

Growth rate of value-added (GRVADD) reflecting industry demand conditions. It was measured by the percentage change in value added. It reflects the expansion of the market demand in an industry in a given time.

Import penetration (MP) the extent to which domestic demand is satisfied by imports in a particular sub-sector in a given time. It was measured as the ratio of imports to the gross domestic product (GDP) adjusted for the foreign trade balance (difference between exports and imports). Measured in percentage.

Output per employee (Y/E) is value added per employee to a firm's production process in a given period. It is a measure of labour productivity.

Size is the number of labour employed. It was measured by the mean number of persons engaged by firms in a particular firm in a given period.

4.0 Empirical Results and Discussion

Descriptive Statistics

A summary statistic on the variables used in the study are as presented in table 1.

Table 1: Summary Statistics

Variable	Sub-Sector								
	Foods, Beverages and Tobacco			**Non-Metallic Mineral Products**			**Wood, Wood Products and Furniture**		
	Mean	**SD**	**No. of Obs.**	**Mean**	**SD**	**No. of Obs.**	**Mean**	**SD**	**No. of Obs.**
Price-Cost Margin	0.7350	0.1679	428	0.6398	0.1822	239	0.6181	0.2123	228
Import Penetration	50.48	15.24	428	91.03	7.81	239	51.70	14.18	228
Concentration Ratio	0.7251	0.1594	428	0.54	0.19	239	0.4739	0.2335	228
Export Shares	6.52	5.25	428	0.35	0.30	239	3.89	5.11	228
Growth Rate of Value-Added	30.66	55.59	377	45.20	69.45	201	42.24	71.64	197
Value-Added per Employee	0.9497	0.6681	428	0.8857	0.6751	239	1.0518	0.8250	228
Capital per Employee	0.0159	0.0148	428	0.0159	0.0152	239	0.0337	0.0252	228
Number of Employees	49	27	428	34	22	239	46	35	228

Variables are in ₦ '000 000 where relevant. SD = Standard deviation; No. of Obs. = Number of Observations. Source: Computations from Study Data (2019)

As shown in table 1, firms in all the sub-sectors on the average sold their output at above 50 per cent of their respective competitive prices. The sub-sector with the least competition as measured by the price-cost margin was observed to be Foods, Beverages and Tobacco with a mean of 0.73 as the fraction of price over the competitive price. This was followed by the Non-metallic Mineral Product with a mean of 0.64 as the fraction of price over the competitive price. The relatively more competitive sub-sector of the three was Wood, Wood Products and Furniture with 61 per cent of its price above the competitive price. With regards to the dispersion around the mean of price-cost margins, the reverse order was the case.

All the three sub-sectors experience high import penetration with the highest average of 91 per cent recorded in the Non-Metallic Mineral Products sub-sector. The lowest mean for import penetration was recorded in Foods, Beverages and Tobacco with a value of 50 per cent. With regards to concentration, while Woods, Wood Products and Furniture sub-sector was the least concentrated with only 47 per cent of its sales controlled by its four largest firms; the Foods, Beverages and Tobacco sub-sector was the most dominated by a few firms as depicted by the share of sales (73%) of its four largest firms. The largest variation around the mean value of concentration ratio was that in Woods, Wood Products and Furniture; followed by Non-Metallic Mineral Products; and Foods, Beverages and Tobacco with 0.23; 0.19; and 0.16 respectively.

For export shares, Foods, Beverages and Tobacco had the highest mean of 7 per cent. Conversely, Non-Metallic Mineral Products recorded the least mean with only 0.4 per cent of its output sold in foreign markets. The Woods, Wood Products and Furniture had the second highest mean for export shares, which was 4 per cent. In terms of growth rate of value-added, it is noted that the Non-Metallic Mineral Products sub-sector had the highest average of 45 per cent followed by the Woods, Wood Products and Furniture and Foods, Beverages and Tobacco sub-sectors with 42 per cent and 31 per cent respectively. On the other hand, the highest mean for the value-added per employee of ₦1.1 million could be traced to the Wood, Wood Products and Furniture sub-sector; followed by the Foods, Beverages and Tobacco sub-sector with ₦0.95 million, then the Non-metallic Mineral Product sub-sector with ₦0.89 million.

The Wood, Wood Products and Furniture sub-sector used the most capital intensive processes as depicted by the capital per employee. In the sub-sector, the average capital per employee was ₦33, 000. In the other two sub-sectors the average capital per employee was ₦15, 900. For number of employees, firms in the Foods, Beverages and Tobacco sub-sector employed on the average 49 persons thus leading the other sub-sectors. In contrast, the Non-metallic Mineral Product sub-sector recorded the lowest average of employed labour (34).

Empirical Findings

Preceding the estimation, the data on the variables used were evaluated for stationarity using the Fisher-type (Choi 2001) test which assumes that all series are non-stationary under the null hypothesis against the alternative that at least one series in the panel is stationary. From the results obtained (see table A1 in the Appendix), the null hypothesis that all panels contain unit root was rejected. Also, the Chow Test was done to determine whether the three sub-sectors could be treated jointly. The result of the Chow test as presented in table A2 in the Appendix has a probability value of less than 0.01 indicating that the parameters of any one of the sub-sectors were not equal to those of the other sub-sectors. Hence, three separate models; one each for the Foods, Beverages and Tobacco, Non-Metallic Mineral Products and Wood, Wood Products and Furniture sub-sectors were considered. The Multicollinearity tests results in table A3 in the Appendix indicate that the variables included in the models were not correlated.

To be consistent with statistical soundness, the Ramsey RESET test to detect specification error, the Modified Wald test for group wise heteroscedasticity, the Wooldridge test for autocorrelation, and the

Hausman test to determine the specification of the unobserved individual effects were conducted. Given the results of the regression specification error test presented in table A4 in the Appendix the study failed to reject the null hypothesis that models were correctly specified. The results of the Modified Wald test for group wise heteroscedasticity as shown in table A5 in the Appendix is significant at 1 per cent in all the models indicating the presence of heteroscedasticity. Therefore, in the estimations for each of the three sub-sectors the heteroscedasticity-robust standard errors option was employed. The probability values of the Wooldridge test for autocorrelation as presented in table A6 in the Appendix indicate that the residuals in the models were not serially correlated.

The results of the Hausman diagnostic test presented in tables A7, A8 and A9 in the Appendix had probability values less than 0.01 implying that the Fixed Effects (FE) model was appropriate in all the sub-sectors. Hence, the Least Squares Dummy Variable (LSDV) estimation was employed and the results presented in table 2.

Table 2: Parameter Estimates of the Effects of Import Penetration and Other Variables on Price-cost Margins.

Independent Variable	Dependent Variable: Log of Price-Cost Margin		
	FBT	**NMMP**	**WWPF**
Log of Import Penetration	-0.1187* (-1.72)	-0.1004 (-0.36)	0.0021 (0.03)
Log of Concentration Ratio	0.5085*** (5.00)	0.0699 (0.95)	0.1139** (2.37)
Log of interaction between concentration ratio and import penetration	-0.4360*** (-4.72)	0.0477 (0.77)	0.0771 (0.60)
Log of Export Shares	0.0585** (2.98)	0.1866** (2.62)	0.1667** (2.01)
Growth Rate of Value-added	0.0005** (2.46)	0.0001 (0.36)	0.0005** (2.01)
Log of Output per Employee	0.1029*** (3.77)	0.4179*** (7.65)	0.3553*** (5.34)
Log of Capital per Employee	-0.0628*** (-6.19)	-0.0821*** (-4.38)	-0.0851*** (-2.83)
Log of Number of Employees	-0.0864** (-2.36)	-0.0099 (0.14)	-0.0389 (-0.53)
Constant	-1.3611*** (-3.06)	-5.1016*** (-3.83)	-4.3722*** (-4.36)
Number of Observations	377	201	197
Prob (F-statistic)	0.0000	0.0000	0.0000
R^2	0.6812	0.7609	0.7365

Note: t-values from the robust standard errors estimation are in parentheses.
**** significant at 1%; ** significant at 5%; * significant at 10%.*
Source: Computations using Study Data (2019).

In all the three models, the probability value of the F-statistic was 0. Thus, the study rejected the null hypothesis that the coefficients of the independent variables were simultaneously equal to zero. In addition, the measure of the goodness of fit shows that in the Foods, Beverages and Tobacco sub-sector (FBT) 68 per cent of total variations in price-cost margins were attributable to the explanatory variables included in the model. Similarly, 76 per cent of total variations in price-cost margins were said to be

explained by the independent variables in the model for the Non-Metallic Mineral Products sub-sector (NMMP) and in the model for the Woods, Wood Products and Furniture sub-sector (WWPF) 74 per cent of total variations in price-cost margin were explained by the included predictor variables.

From the results, the coefficient of the log of import penetration was negative and statistically significant in the Foods, Beverages and Tobacco. The value of the coefficient shows that an increase in import penetration by 1 per cent would lead to a decline in price-cost margins equal to 0.12 per cent. This gives credence to the notion that import liberalization leads to a more competitive domestic market through its effect in curtailing prices and excess profits of domestic firms. This finding concurs with those of Yalçin (2000) for Turkey, Wong (2007) for Ecuador, and Noria (2013) for Mexico. In the Non-Metallic Mineral Products and Woods, Wood Products and Furniture sub-sectors the coefficient of the log of import penetration was not significant implying that trade liberalization did not influence the competitiveness of firms in these sub-sectors.

As expected, the coefficient of the log of concentration ratio was positive and significant in the models for the Foods, Beverages and Tobacco, and Woods, Wood Products and Furniture sub-sectors. An increase in the concentration ratio by 1 percent would raise price-cost margins by 0.51 per cent and 0.11 per cent in the Foods, Beverages and Tobacco and Woods, Wood Products and Furniture sub-sectors respectively. These results support the stance that lower concentration leads to lesser market power, hence increasing competitiveness. These results are consistent with the findings of previous studies of Yalçin (2000) for Turkey, Goldar and Aggarwal (2005) for India. In the case of the interaction variable between the industry concentration ratio and import penetration, the results obtained show an inverse and statistically significant relationship between it and price-cost margins in the model for the Foods, Beverages and Tobacco. In that sub-sector, an increase in the interaction between the industry concentration ratio and import penetration by 1 per cent would reduce price-cost margins by 0.44 per cent. This result implies that as import penetration due to trade liberalization increases, there would be higher reductions in price-cost margins of higher concentrated industries. The finding is similar to the results of Yalçin (2000) for Turkey and Goldar and Aggarwal (2005) for Pakistan. For the models relating to the Non-Metallic Mineral Products and Woods, Wood Products and Furniture sub-sectors, the relationship is not significant.

Export shares had a positive and statistically significant effect on price-cost margins in all the three models corresponding to each of the sub-sectors. The results indicate that an increase in export penetration by 1 per cent would increase price-cost margins by 0.06 per cent in Foods, Beverages and Tobacco; 0.19 per cent in Non-Metallic Mineral Products; and 0.17 per cent in Woods, Wood Products and Furniture. Therefore, it could be said that export penetration provides greater market access for exporting firms thus, a channel for improving their revenues. This result is similar to that obtain in Yalçin, 2000 for Turkey. The coefficient of the growth rate of value-added was positive and statistically significant in all the sub-sectors except that of the Non-Metallic Mineral Products sub-sector. In the Foods, Beverages and Tobacco, and Woods, Wood Products and Furniture sub-sectors an increase in the growth rate of value-added by 1 per cent would increase price-cost margin by 0.05 per cent. Also, the coefficient of output per employee was positive and statistically significant in the three models corresponding to the three sub-sectors. An increase in the output per employee by 1 per cent would increase price-cost margins by 0.10 per cent, 0.42 per cent, and 0.36 per cent in the Foods, Beverages and Tobacco, Non-Metallic Mineral Products and Woods, Wood Products and Furniture sub-sectors, respectively. Hence, larger market demand, and higher labour productivity increase market power and thus leads to less competitiveness. These results are similar to those obtained by Yalçin (2000) for Turkey, Wong (2007) for Ecuador, and Noria (2013) for Mexico.

The capital per employee has a negative and statistically significant effect on price-cost margins in all the models. In the Foods, Beverages and Tobacco sub-sector; a rise in the capital per employee by 1 per cent would reduce price-cost margins by 0.06 per cent; and in the Non-Metallic Mineral Products sub-sector, an increase in capital per employee by 1 per cent would reduce price-cost margins by 0.08 per cent. Likewise, in the Woods, Wood Products and Furniture sub-sector a rise in the capital per employee by 1 per cent would decrease price-cost margins by 0.09 per cent. Therefore, price-marginal cost margins were decreasing in capital intensity. This finding is in consonance with that of Yalçin (2000) for Turkey. The number of labour employed had a negative and significant influence on the price-

marginal cost margins of firms in the model for the Foods, Beverages and Tobacco sub-sector. In that sub-sector, an increase in the number of labour employed by 1 per cent would cause a reduction to price-cost margins of about 0.09 per cent in the Foods, Beverages and Tobacco sub-sector. This implies that the employment of labour imposes a cost to firms and hence, there exist a tradeoff between price-cost margins and size of employment. The finding is similar to that of Yalçin (2000) for Turkey and Goldar and Aggarwal (2005) for India.In the models for the other two sub-sectors, the effect of the number of labour employed on price-cost margins was not significant.

5.0 Conclusion and Policy Recommendations

The paper has established that trade liberalization leads to a more competitive domestic market through its effect in curtailing prices and excess profits of domestic firms but, such may not cut across all sub-sectors of the manufacturing industry. This is because more import penetration only decreased the price-cost margins of firms in the Foods, Beverages and Tobacco sub-sector. In the Non-Metallic Mineral Products and Woods, Wood Products and Furniture sub-sectors the effect of import penetration on the price-cost margins of firms was not significant. Thus, trade liberalization may not be sufficient in increasing the competitiveness of firms in the manufacturing sector of Nigeria.

Given the above, we recommend that other complementary measures be considered. Notably is the need for firms to adopt more capital intensive procedures in their production since the results obtained indicate that higher capital to employee ratio curbs excess profits of domestic firms across all the sub-sectors. This way, competitiveness of firms in the sector can be enhanced towards improving performance of the manufacturing sector in Nigeria and stimulating overall growth in the economy.

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Appendix

Table A1: Fisher-Type Panel Unit Root Test Results

Variable	Test Statistic					
	FBT		**NMMP**		**WWPF**	
	ADF	PP	ADF	PP	ADF	PP
Price-Cost Margins	4.9855***	45.7588***	3.6324***	15.4967***	3.7860***	46.7288***
Import Penetration	5.5417***	9.3965***	7.2692***	5.2638***	7.3074***	1.7928**
Herfindahl Concentration Ratio	3.9249***	1.9099**	4.4433***	44.7683***	4.1169***	8.6382***
Interaction between concentration ratio and import penetration	2.6721***	1.4610*	18.4914***	-5.4651	2.6523***	41.1953***
Export Penetration	9.3573***	48.2354***	6.1400***	13.4783***	4.5894***	10.1961***
Growth Rate of Value-added	8.9651***	47.4438***		9.7412***		8.4746***
Output per Employee	4.1313***	12.0842***	6.9425***	37.7804***	4.8862***	18.7557***
Capital per Employee	7.1250***	11.1546***	4.4563***	9.9162***	3.9481***	-2.9384
Number of Employees	4.8854***	2.9650***	2.7734***	1.0885	3.3736***	-3.9228

*Note: *** Significant at 1%; ** significant at 5%; * significant at 10%*
FBT = Foods, Beverages and Tobacco NMMP = Non-metallic Mineral Products
WWPF = Woods, Wood Products and Furniture

Table A2: Chow Test Results

Chi-square statistics	**P-value**
67.95	0.0000

Table A3: Result of Multicollinearity Test for the Models on Effects of Trade liberalization on Competitiveness of firms

Variable	FBT		NMMP		WWPF	
	VIF	1/VIF	VIF	1/VIF	VIF	1/VIF
Log of Concentration Ratio	3.40	0.2938	1.75	0.5720	1.78	0.5627
Log of Import Penetration	3.02	0.3307	2.02	0.4956	1.49	0.6691
Log of Output per Employee	1.85	0.5415	1.44	0.6922	1.58	0.6330
Growth Rate of Value-added	1.47	0.6807	1.52	0.6586	1.74	0.5757
Log of Export Penetration	1.43	0.6993	1.11	0.8980	1.88	0.5309
Log of Capital per Employee	1.36	0.7360	1.27	0.7896	1.28	0.7840
Log of Number of Employees	1.35	0.7430	1.12	0.8897	1.16	0.8065
Log of interaction between concentration ratio and import penetration	1.13	0.8820	1.14	0.8786	1.24	0.8600
Mean VIF	1.88		1.42		1.52	

Note: VIF = Variance inflation factor

Table A4: Results of the Regression Specification Error Test

Sub-Sector	F-statistic	P-value
FBT	1.524	0.2194
NMMP	2.075	0.0594
WWPF	0.600	0.5499

Table A5: Results of the Modified Wald test for group wise Heteroskedasticity

Sub-Sector					
FBT		NMMP		WWPF	
Chi-square statistic	P-value	Chi-square statistic	P-value	Chi-square statistic	P-value
19000.00	0.0000	130000.00	0.0000	52081.15	0.0000

Table A6: Results of the Wooldridge test for Autocorrelation

Sub-Sector					
FBT		**NMMP**		**WWPF**	
F-statistic	**P-value**	**F-statistic**	**P-value**	**F-statistic**	**P-value**
0.09	0.7706	0.63	0.4326	1.61	0.2144

Table A7: Hausman Test Results (Foods, Beverages and Tobacco)

Variable	**FE Coefficient**	**RE Coefficient**	**Var(Diff.)**	**SE**
Log of Import Penetration	-0.1187	-0.0327	-0.0859	0.0449
Log of Concentration Ratio	0.5085	0.3063	0.2022	0.0614
Log of Export Penetration	0.0585	0.0314	0.0271	0.0102
Growth Rate of Value-added	0.0005	0.0003	0.0002	0.0001
Log of Output per Employee	0.1029	0.0457	0.0572	0.0204
Log of Capital per Employee	-0.0628	-0.0353	-0.0275	0.0079
Log of Number of Employees	-0.0864	-0.0433	-0.0430	0.0317
Number of Observations	377			
Hausman Statistic– Chi-square = 78.39				
Prob>Chi-square = 0.0000				

Table A8: Hausman Test Results (Non-Metallic Mineral Products)

Variable	**FE Coefficient**	**RE Coefficient**	**Var(Diff.)**	**SE**
Log of Import Penetration	-0.1004	0.2875	-0.3879	0.2259
Log of Concentration Ratio	0.0699	0.0239	0.0460	0.0575
Log of Export Penetration	0.1866	0.0961	0.0905	0.0585
Growth Rate of Value-added	0.0001	0.0004	-0.0003	0.0002
Log of Output per Employee	0.4179	0.1345	0.2834	0.0441
Log of Capital per Employee	-0.0821	-0.0313	-0.0508	0.0157
Log of Number of Employees	-0.0099	-0.0144	0.0046	0.0654
Number of Observations	199			
Hausman Statistic– Chi-square = 116.20				
Prob>Chi-square = 0.0000				

Table A9: Hausman Test Results (Woods, Wood Products and Furniture)

Variable	**FE Coefficient**	**RE Coefficient**	**Var(Diff.)**	**SE**
Log of Import Penetration	0.0021	-0.0078	0.0099	0.0678
Log of Concentration Ratio	0.1139	0.0720	0.0419	0.0391
Log of Export Penetration	0.1667	0.0907	0.0760	0.0256
Growth Rate of Value-added	0.0005	0.0003	0.0002	0.0003
Log of Output per Employee	0.3553	0.1348	0.2206	0.0503
Log of Capital per Employee	-0.0851	-0.0392	-0.0460	0.0192
Log of Number of Employees	-0.0389	-0.0083	-0.0307	0.0630
Number of Observations	197			
Hausman Statistic– Chi-square = 85.05				
Prob>Chi-square = 0.0000				