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Strategic capacity utilization and competition: An analysis of competitions in Nigerian flour industry

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The competition in Nigerian flour industry has deepened within the last one decade. The rivalry was triggered by the rapid growth in capacity utilizations of the flour firms in the past few years. Using Chiappori and Salanie test statistics, the study examined the link between acquisition of strategic capacity utilization and firm competitiveness. The data used were drawn from sales invoices made by 6 major flourmills between January 2005 and June 2014. Evidence from the study revealed that the firms capacity utilization correlate positively with competitiveness. For the firms, acquisition of additional productive capacity reduced costs and enhanced competitiveness. Based on the test statistics, the largest firms were observed not to be the most positively correlated. The study suggests that the flour industry may continue to grow in capacity as much as the present nature of competition subsists.

Key words: Strategic investment, Production capacity, capacity utilization, competition

INTRODUCTION

The rate at which competitions in Nigeria's flour industry had intensified in the last one decade provokes some economic thinking. Specifically, two reasons are important for our considerations. First, the industrial growth occurs at the collapse of some weaker firms which had become crowded out of the market because of their inability to compete with the large firms[1]. The occurrence of this put to question the generalization the traditional theory which suggests that competitive intensity of any industry will be proportional to the number of competitive firms (Sheth, 1986). Second, the development did not lead to substantial crash in price compared to what obtained in similar markets[2]. A brief on some of the factors contributory to the increased competitions in the industry may suffice at this point. Mainly, the emerged dominant firms from the competition do not desire that the failed firms re-enter the industry. In view of this, all attempts at re-entry into the market by the new owner of the failed firms were matched by strong marketing strategies which included undercutting prices, over bagging (in excess of the usual 50-kg), quality improvement and rebranding. In view of this, the barrier for the new firms tightened over the years. This occurrence of this impacted greatly on the profit margin of the firms as a number of the firms posted declining profit records in the stock exchange in the face of

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[1] For instance, Diamond Flourmill Ltd. (DFL), Lagos; Lion Flourmill Ltd. (LFL), Umunya; Lister Flourmill Ltd. (LFL), Ibadan; Bendel Flourmill Ltd. (BFL) Ewu, among other were some of the flour mills which had collapsed because of their uncompetitiveness.

[2] Compared to the sugar industry where the entry of a new firm, Golden penny sugar refinery (GPSR) caused the price of sugar to crash by over 27% between December 2012 and 2013 (see Ofonyelu, 2014).

the competition. Within the competitions, it was discovered that firms still increased their production capacity. Apparently, capacity utilization has become an important competitive strategy. For instance within the last three years, Honeywell Flour Mills Plc (HFM) and Flour Mills of Nigeria Plc (FMN) more than any the other flour millers grew their production capacity. This act majorly enabled the two firms to increase their dominance in the industry. The practice of firms building production capacity in excess of the market share reveals the extent to which individual firms can increase capacity to supply the industry output. The key hypothesis of this study is establishing the link between firms' capacity utilization and their market share holdings in the market. The rest of the paper is sectioned as follows. Section II contains a brief discussion of some stylized fact on the Nigerian Flour Industry. Section III contains a theoretical model discussing the relationship between capacity expansion and competitiveness. Section IV and V presents the results and conclusion respectively.

Stylized facts on the flour market

This section briefly discusses some stylized facts about the flour market in Nigeria in terms of production, competition, entry and concentration.

Production

Flour by nature is a homogeneous product (Ma, 2005), but strong brand attachment may preclude consumers from perfectly substituting the products for one another. Flour is produced via a common process and technology. Wheat is transformed at a fixed range of generally accepted coefficient into flour. It is made from whole wheat grains and packaged in 50-kilogram (kg) bags. In terms of content, the product is physically identical but producers differentiate their products through bagging and brand names. Wheat constitutes the main variable in the production of flour, of which over 90% were imported. Nigeria presently demands for about 3.7 million metric tonnes of wheat yearly (2012 estimate), and this is expected to increase to about 5 million metric tonnes by 2020 in view of the increasing use of wheat for many food substitutes. Flour once produced or bagged has a shelf life of 90 days (or 3 months). The short shelf life implies that over production is undesirable and firms must ensure that they have a steady market for their products to sustain continuous production. In view of this, firms attempt to sustain their market share by going through various lengths to increase capacity. The common trend in the flour industry is that the firms operate below their installed capacities. For instance, FMN operates on only 55 percent of the current production capacity. For Honeywell, Mama Gold and Life flour brands, each of these companies harbours as much as about 30, 25 and 18 percent idle

capacity respectively, based on their current output levels. The accumulations of idle capacities by the firms serve as buffer and a preying strategy for market capture. Firms' idle capacities reflect the potential supply which individual firms could release to the market in the short run without recourse to building additional capacity. Implicit in the size of this capacity is the potential output that could be supplied to the market in the short run.

Competition

A number of theoretical contributions, such as Osborne and Pitchik (1983, 1986, 1987), Allen et al (2000), and Roller and Sickles (2000) have emphasized the strategic effect of capacity utilization on competition. The prevailing view in the literature suggests the existence of competition in markets with absence of monopoly power (Tirole, 1988). The existence of the market imply that no buyer or seller possess noticeable influence to affect market outcomes (Shepherd, 1985). Product differentiation confers on the flour firms some form of some form of market power. In view of this, the flour firms share the characteristics of both a monopolistic and oligopolistic competitions (Ekanem and Iyoha, 2000). Competitions in Nigerian flour industry are in three different forms: capacity utilization, market share and product differentiation. In terms of capacity, flour firms are allowed to build and increase their production capacity unimpeded such as to supply significant portions of the industry output. For firms who are able to build and increase capacity, they benefit from lower average production cost which places them at strategic position to undercut market price and/or increase market share. Production capacity and capacity utilization levels are strategically pursued by firms to maximize output. Individual firms compete by making strategic investments to increase capacity utilization, market share and profit. The mode of competition in the industry is in terms of quantity and price strategies. Majorly, an individual firm fixes its price around that of its closest rival and build its productive capacity such that it could flexibly satisfy all the demand for its product. The competition in the industry is affected by geographical location (see Table 1). Specifically, Golden Penny competes with Honeywell flour in the south-west; Golden Penny against Dangote/Mama Gold flour in the North. In the south-east and south-south, Golden Penny competes with Honeywell, Valleumbra, and Life flours. In view of the regional rivalry and market share competition, customers in regions with stiffest customers are given highest rebates that those in the captured regions. Buyers in the region of the stronghold of the rivals are given higher rebate on transport and location. In view of this, it is possible for such regions to sell at prices which may be lesser than that obtainable elsewhere.

Table 1 show that the small firms (e.g. Eagle, Mama Gold and Dangote) also compete with the larger firms (e.g.,

Table 1. Cumulative Rebate Structures of some of the Flour Mills in Nigeria (Naira)

Years/ Flour brand	Golden Penny	Honeywell	Eagle	life	Supreme/ Mix and Bake/ Mama Gold	Dangote
2009	280	290	300	300	290	210
2010	300	340	360	350	360	240
2011	350	380	410	410	420	180
2012	370	400	450	450	460	170
2013	460	450	480	480	500	150
2014	660	640	590	660	550	150

Source: Compiled from companies' sales invoices

Honeywell, Golden Penny) in terms of the rebate size. Except for the quarterly charge which is credited to individual's account at the end of every quarter (usually N50 across the firms), the net is paid in as opening in the customers' account at the beginning of every month. Since rebates were used as implicit ways of undercutting the effective market prices, firms closely monitors the size of its rival's rebate at every point in time. In effect, when a leading firm adopts a marketing strategy, other firms follow suit, reacts or retaliate. A vivid case occurred through the first two quarters of 2014. Mama Gold brand (produced by Olams Flour Mills Ltd) began giving 6 bags on every 300 bags between January and April, 2014 as a market penetration strategy. In view of this, it was able to snatch some customers form the FMN and HFM. As a retaliatory action, on April 16, 2014, Golden Penny brand started giving 20 bags extra on every purchase of 600 bags of 50-kg flour for a period of one month. In a similar suit, Honeywell Flour mills began similar promo on May 2, 2014 through the remaining 30 days of the month. By the beginning of June, 2014, the flour mills had to stop the promo, having seriously dipped their profits and worsened the competitiveness of the smaller firms.

The Golden penny raised their rebate structure by ₦200 by paying an extra ₦200 instant rebate over the period. As a reaction, HSFM monetised the allowance they pay on bran to N300. These actions raised the gross value of the rebates by the two firms to ₦590 and ₦640 respectively for buyers of 60 tonnes bags of flour per month, while Life flour rebadged, improved quality, and increased their rebate amount from ₦450 to N550 (see Table 1). For Dangote flour specifically, the invoice price per bag of 50-kg flour had reduced from ₦6550 in 2012 to ₦6400 since 2013. Total rebate for Eagle flour through 2013 was 420 until the acquisition by FMN brought it uniform rebate as Golden Penny flour. Between February and March, FMN bagged Golden Penny flour from the Eagle flour factory in Ibadan, Oyo State. This action was to ostensibly convince the consumers of the uniformity in the quality of the two brands. However, the production of the two products while boosted the quality profile of Eagle flour worsened that of Golden flour. For bakers who were used to mixing of two

flour brands in their productions, combination of Golden and Eagle became undesirable and thereby leading to an increase in the net sale of other competitive brands through the period. In the main, Honeywell, Mama Gold and Life flour increased their sales through the months of February-March by 9%, 5% and 3.2% respectively across the period. A look at the general wholesale invoice price of flour (50kg bag) shows that prices tend to uniformity. The convergences partly arise from the role of the FMAN in the fixing of the industry price. At the maximum, the highest dispersion was less than 5 percent of the average industry price (see Table 2).

Being a staple food industry competing with many substitutes, the demand for flour is highly elastic. Increases in the price of flour during harvesting time tend to produce more effect than during harvesting time. Customers' demands tend to be very elastic in favour of agricultural food substitutes during harvesting time because then the food prices are cheaper. In view of this, seasonal variation is prevalent in the industry with its attendance effects on income and output. Traditionally, the demand for wheat based food items[3] tend to be higher in the dry season and lower during the rainy season. These foods are cheaper and are more readily accessible and therefore in higher demand during the periods when they are available. Competitions for market become stiffer during this time as production capacities across the firms fall. The strategy therefore is to take advantage of the peak periods by aggressively growing volumes while reducing their outputs during the lag periods in line with forces of demand and supply. The ability to increase capacity is also directly related to market share, ultimately leading to greater output and profitability. In view of this, all the flour mills build a distribution network to supply their dealers at competitive charges. As flour is consumed in virtually all areas of the country, the transport rate fare charged by each firms constitutes another dimensions to price competition in the market.

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[3] The same applies to all wheat by-products such as bran, wheat meal, semolina and semovita. The dry season essentially serve as the boom period for the firms as output is maximized in terms of the main product and the by-products.

Table 2. Wholesale invoice prices of some flour brands in Nigeria

Date/ Flour brand	Golden Penny	Honeywell	life	Dangote
31/12/2005	2940	2860	2830	2860
31/12/2006	3260	2960	2980	2980
31/12/2007	4750	4620	4680	4600
31/12/2008	4980	5060	4950	4950
31/12/2009	5100	5090	5050	4940
31/12/2010	5450	5440	5400	4950
31/12/2011	5950	6060	5900	5850
31/12/2012	6900	6900	6850	6550
31/12/2013	6900	6900	6900	6400
01/06/2014	6900	6900	6900	6400

Source: Computed from Sale Invoice of the flour mills excluding transport fare rates.
Note: For those years that price changed, the average over the year was reported

Table 3: Market Share Distribution among the Region of Nigeria (2005-2014)

Region	Leading Brand (%)	2nd Lead Brand (%)	3rd Lead Brand, others
	Golden penny (45%)	Honeywell (28%)	Valleumbra (13%) Life (12%)
South-East	Golden Penny (55%)	Honeywell (36%)	Life (7%), Mama Gold (5%)
South-West	Golden Penny (39%)	Life (28%)	Honeywell (17%)
South-South	Golden Penny (48%)	Honeywell (35%)	Life (11%)
North-East	Golden Penny (41%)	Dangote (23%)	Honeywell (19%), Life (13%)
North-Central	Golden Penny (36%)	Dangote (29%)	Honeywell (17%), Life (6%)
North-West	Golden Penny (44%)	Honeywell (33%)	Dangote (26%),Life (14%), Valleumbra
Aggregate Share			(13%), Mama Gold (5%)

Source: Computed
Note: Values approximated to the nearest percentage

Firms therefore own and run cheap transport sections to convey their products to customers at competitive rates. Adequate distribution network therefore compliments the productive and marketing strategies of the companies.

Entry

The production of flour is typified by considerable barriers to entry which is typically created by economies of scale. The scale economies arise from the ability of the firms to build large capacity. Flour production involves a capital intensive technology as well as substantial sales and promotional costs. In view of this, optimal production is only achieved by firms whose production is essentially large.

This size requirement imposes a kind of barrier which seems to rule out entry almost completely. In addition, cost of importation (mainly from US and Brazil) imposes another form of barrier to individual firms in the procurement of the raw materials. Since Nigeria imports over 95 percent of the wheat used in the production of flour, each of the firms procures wheat under the same tariff but with differential cost depending on the size of the demand. Knowing fully the elastic structure of the product, rise in the price of wheat at the international market create a major challenge for new firms. The lifting of the ban on importation in 1993 was a major relief as the price of flour produced domestically reduced and opened up the industry for new entrants through till 2000. Except with an efficient capacity, it is really difficult for the smaller firms to break into the league of the big players. Table 4 shows the number of firms, quantity and the growth rate of wheat importation in Nigeria in metric tonnes.

Mainly, competition had led to the closure of more than 55% of flour firms. Despite the reduction in the number of firms, the import demand for wheat was on the increase and essentially suggests that the existing firms had enough capacity to supply the market.

Concentration

The flour milling industry comprised of 9 players as at March, 2014. This number excludes Standard Flour Mill Limited and Lister Flour Mills Nigeria Ltd. The two had attempted a skeletal production within the last 6 month, but had since remained closed down. The top two brands (Golden Penny and Honeywell) have an installed capacity of over 10,000 metric tonnes per day and control over 75% of the market. Table 3 shows that the 5 leading firms control over 90% share of the market. The firms were regionally

Table 4. Trends of Wheat Importation and Number of Flour Firms in Nigeria

Year	Imports (1000 MT)	Growth rate (%)	Number of firms*
2000	1913	49.22	23
2005	3679	222.06	21
2010	4052	1.55	14
2011	3931	-2.99	18
2012	4140	5.32	16
2013	4400	6.28	10
2014	4500	2.27	9
Mean	**2243.79**	**28.07**	
Std.Dev.	**1750.90**	**27.86**	

Sources: (i) United States Department of Agriculture, 2014
      (ii) Computed (Number of flour firms)
      * Classification was made based on the number of firms actually producing and had their products in the market as at March, 2014 when the flour mills as a whole ended their accounting year.

localized, and this provided locational advantaged to the smaller firms and caused the big firms to adopt a differential pricing policy across the regions. The Flour Mills of Nigeria[4] Plc (FMN), producing Golden Penny flour brand, is the largest producer in the market and had its mills distributed across the geographical regions. The market dominant essentially arise from the wide national coverage.

A Model of competition

The nature of competition in industry is determined by the flexibility of the rival firms' production function (Dixon, 1986), entry costs faced by new entrants, fixed costs of the incumbent producers, and the toughness of short-run price competition (Dunne et al., 2009). In the case of the flour industry, firms all together decide their fixed factor and variable factor inputs in competitively. By assuming that firms' production cost is dependent on production capacity, we can present the relationship between a firm's production capacity and competitiveness in a simple linear equation as follow:

$$\pi i = \beta_1 + \beta_2\, m_{sh} + \beta_1\, \lambda_{yrs} \qquad (1)$$

where πi represent production capacity. m_{sh} and λ_{yrs} represent market share and years of existence of the firms in question. The inclusion of λ_{yrs} basically serves as a control variable on the relationship between two variables of interest, capacity utilization and competitiveness. For the sake of simplicity, we proxy competitiveness for market share, while capacity utilization is reflected by the production capacity of the firms concerned. Equation (1) states that a firm's production capacity depends on the market share and years of existence in the industry. What this implies is that a firm will increase its productive capacity as its products increasing captures more market and overtime. From equation (1), a positive change in market share will raise the production capacity in a measure proportionate to the production function. Thus:

$$\Delta\pi i = \beta_1 + \Delta\beta_2\, m_{sh} + \beta_1\, \lambda_{yrs} \qquad (2)$$

A large firm with huge productive capacity is expected to have a minimal per unit cost than a relatively smaller one. Equation (2) implies that there will be a positive association between change in market share and capacity utilization. If we treat capacity utilization as endogenous variables and that this is determined in the first stage of production, such that the impacts on the production cost and competition is felt in the second stage, the line of specification will allow firms to compete for a long-run variable (capacity utilization) and decide a short-run variable: output (and market share). For an individual firm, the concern will be on the effect of building long-run capital investment to increase production capacity on the rivals' short-run output decision. The analogy specifically assumes that firms produce a homogeneous commodity and faces an inverse linear demand function[5]. The dominant firms will behave monopolistically as long as its current production operation is below the installed capacity, and at that increasing the capacity utilization will lower production cost.

The Chiappori and Salanie (2000) propose a simple test as a complement to the positive correlation test approach. The test advocated does not rely on any specific functional form, assumption, preference, or the nature of equilibrium

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[4] FMN is the oldest flourmill in Nigeria. It was incorporated in September 1960 as a private limited liability company, and commenced operations in 1962 with an installed capacity of 600 metric tons per day. The Company was converted to a public limited liability company in 1978, and its shares were subsequently listed on The Nigerian Stock Exchange. At present, it has a rated milling capacity of over 8,000 metric tons per day.

[5] For details on this assumption, see Ma (2005). The assumption is justified by the technical structure of the industry. For instance, the output of the industry is homogeneous and the wholesale price tends to be uniform across the industry except for differences created by rebate offers.

Table 5. cross correlation between market share and capacity utilization of individual flour firms

Flour Brands	Golden Penny	Honeywell	Life	Dangote
Correlation Coefficient	0.670722	0.679339	0.671898	0.636793

Source: computed

Table 6. Chiappori-Salanie test statistics for the various firms

Firms	Golden Penny	Honeywell	Life	Dangote
Chiappori-Salanie correlation coefficient (W)	18	13.08	14.69	11.08

Source: Author's computation

but examined the relationship between the residuals of two related conditional distributions that are affected by similar variables – which in this case are the market size and years of existence in the industry. These two variables are seen as the major determinant of capacity utilization. In apply the Chiappori-Salanie test statistics; we used the quantum of wheat imported over the years to represent the average production capacity in the industry and the average price level as measure of competitiveness (see details profile of Wheat imports by the flourmills in the appendix).

RESULTS AND FINDINGS

Table 5 showed a strong positive relationship between the market share possessed by each of the flour firms and their productive capacity. In the computation, it was assumed that the import demand of wheat represent the aggregate size of the industry capacity. Thus, when import demand for wheat increases, industrial capacity utilization will also rise. Based on the seasonal pattern of demand for flour in Nigeria, aggregate demand tend to rise across board (though disproportionately) for each of the flour firms. The table showed the strength of the relationship between market share holding and production capacity to be strongest for Honeywell flour. This occurrence of this may not be unconnected with the ability of the company to increase its gross productive capacity by over 60% within the last three years.

In Table 6, we estimated equation (2) using ordinary least square regression and obtained the residual under two conditions: (i) when years of existence of the flour firms were included as a control variable and when it was excluded. The result also confirms a positive association between capacity utilization and the market share possessed by the individual firms. However, Golden Penny flour firm had the correlation coefficient, and followed by

life, Honeywell and Dangote brands. The main intuition from the result is that deepening capacity utilization of firms enhances their chance of being competitive. In the case of the flour firms considered, all firms had their productive capacity relative positively with their size of market capture.

It is therefore valid to suggest that firms during competition (as in the case considered) may continue to acquired excess capacity as a competitive strategy.

Conclusion

The study examined the relationship between the sizes of market capture by some flour firms in relation to their capacity utilization. Using correlation test analogy based on Chaippori-Salanie test statistics, the study observed that acquisition of large productive capacity increase the changes of the firms in being competitive. The study suggests that the flour industry may continue to grow in capacity as much as the present nature of competition subsists.

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