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Market Competition and Performance of Tanzanian Manufacturing

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Abstract: The paper analyses the impacts of market competition on performance of firms in developing countries. The critical empirical question addressed by the paper is the question 'Why competition has not boosted firm level performance?' The paper addresses the questions by using panel data to estimate productivity effects of competition controlling for firm fixed effects and other determinants of productivity. Estimates of a Cobb Douglas production function. Competition is measured using the Hirschman-Herfindahl Index (HH) as competition variable indicates that 1 percent increase in competition results into 0.4 percent increase in productivity. However, the results are not robust when GMM and Fixed effects estimates are applied suggesting; biasness of OLS estimates and the fact that more productive firms are likely to self select into more competitive firms. Furthermore, the results indicate a positive correlation between firm specific characteristics with competition which influence profitability. Major conclusion of the paper is that there are broad ranges of micro level characteristics that influence firm performance that are not entirely addressed by macro level reforms including competition. Policy actions to tackle down are needed before we can expect trickle down to materialize.

Key words: Herfindahl; competition and firm level productivity

JEL codes: D43, L22

1. Introduction

This paper analyses the impact of competition on firm level productivity in Tanzania Manufacturing. The backdrop for this analysis is the persistent low level of development of manufacturing sector despite comprehensive economic reforms launched over two decades ago. This is a puzzle because some sectors such as mining and tourism have shown impressive performance after taking advantage of reforms, whereas Tanzania manufacturing still lags behind. There are studies (see for instance Harding et al., 2005) which suggest that the Tanzanian manufacturing sector has failed to recover its pre-reform level of 1970s when manufacturing export had significant share to total exports. There are competition related factors which might explain the observed poor performance of the sector. Low productivity, inability to export, high competition in domestic market, inadequate infrastructure and inputs availability are among the major factors that inhibit performance of Tanzania manufacturing. In all these factors, productivity appears to have significant influence in determining the state of manufacturing performance. Thus, analysis of this paper will contribute knowledge to a major question of 'Why competition has not boosted firm level performance in Tanzania?'

The question is important because experience from other parts of the World provide strong evidence of

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positive effect of competition on firm performance and overall economic growth and development. The economic reforms introduced via Structural Adjustment Programs (SAP) and later on Economic Reforms Programs (ERPs), Poverty Reduction Programs and others all had some competitiveness goals to ensure that a competitive economy is attained by stimulating productivity. Specifically for manufacturing we expect that competition will enhance productivity of manufacturing firms. This is partly due to the fact that productivity influence key determinants of firm success especially skills intensity, entrepreneurships, on the job training, innovation and quality of goods and services. Most significant outcome of productivity increase can be reduced production cost, increased output and quality. Hence, productivity gains will be most beneficial to consumers if competition ensures that reduced costs or increases in quality are passed on to them.

The ultimate outcome of course being increased profitability of a firm. This is why several empirical studies of product markets and of deregulation provide strong evidence of the high level relationship between competition and productivity. In principal, there are three ways through which competition has proven to influence productivity; first within firm effect whereby firm specific aspects that influences productivity might be determined by trends in competition. In this respect competition places pressure on the managers of firms to increase internal efficiency (x-efficiency) several authors have indicated how such relationships hold. Based on such findings, it has been imperative to notice that competition enforcements such as regulation of the market is justified for effective marketing of goods and services and most important well functioning of the economy.

The second most important vehicle that competition can influence productivity is via stimulating innovation. Authors who have confirmed this relationship have indicated that innovation increases dynamic efficiency through technological improvements of production processes, or the creation of new products. However, the competition effect on innovation is not always positive and there are cases where competition does harm innovation. The possible circumstance when competition cannot result into innovation is when competition is very high. This is why there is a need to ensure optimal level of competition that cannot harm innovation process. Lastly, competition can influence performance of firms if de-regulations or liberalization of the product market result into reduced administrative barriers to entry, increased consumers driven competition through the choices they make. Consumer policy may empower consumers to drive competition, and therefore have productivity enhancing potential. In sum competition can be a driver of both efficiency and innovation. Both of these factors lead to enhanced productivity.

There are more explanations on the observed manufacturing performance and competition. The recent years have seen relevance of competition in the progressive dynamics of manufacturing sector of Tanzania. This was not the case prior to 1980s when competition played little role in most African economies including Tanzania. During that period it was contended that free trade did not allow true comparative advantage situation to develop due to differences between marginal social and marginal private costs. Based on this argument industrialization in most of the African countries was undertaken through highly protective industrial and trade policies particularly through the infant industry argument for protection. While there were some gains in industrialization, the general performance of inward looking protected industrialization programs was not very successful. High effective rates of protection resulted into monopolistic enterprises which were featured by high investments but with low rate of capacity utilization, falling value added and total factor productivity, over-reliance in government subsidies and generally inefficient industrial base in most of developing countries. The presence of a large state sector partly explained why many developing countries did not find it necessary to have a competition. Therefore, the paper argues that competition did not exist and would not have any effect on firm performance.

But, over three decades later what sort of industrialization suits Africa? Definitely economic liberalization and reforms introduce after 1980s points to an outward looking industrialization based on competitive regimes as the relevant industrialization. In Tanzania, the post reforms period has seen a reversal of trade and industrial policies. After the introduction of the reforms it is not difficult to see why the need for competition becomes crucial in a developing country like Tanzania. Specifically in Tanzania industries, trade liberalization is an important reform measure introduced and aimed at increasing market competition for manufactured products, and this may affect profitability, productivity and efficiency, all aspects that might also affect wages. In the absence of subsidization, increased competition will benefit some firms (productive, efficient and competitive ones) and harm some (less productive, inefficient and uncompetitive ones) through affecting their ability to pay wages and therefore affect their factor demand including labour. The long run reaction of such firms has been either to close down or restructure in line with the existing production environment.

Other measures undertaken in the product market that may directly or indirectly affect wages are: product price deregulation, sales reforms aimed at improved competitiveness through increasing incentives for efficiency, increased access to productive resources, abolition of non-tariff protection, and reduced tariffs aimed at reducing the cost of imported inputs shortage of goods. Previously Tanzania had a price control system whereby government controlled prices of 373 products categories including 1,134 product types (JASPA, 1982) and on top of that, exercised restrictive trade policy in the form of quantitative restrictions, to protect both the infant industry and external trade balance. Tariff rates were also prohibitive ranging between "0 to 300[1]"(Mans, 1994). The reduction in trade barriers has led to increased importation of manufactured products competing with domestic manufactured ones. The general performance of the manufacturing sector in Tanzania has not been very satisfactory three decades after reforms.

In sum, there were expectations that macroeconomic success gained after the reforms would trickle down to micro level and stimulate growth in areas like manufacturing and enhance welfare growth of Tanzanians. Whether that has materialized is one of the questions that preoccupy most of the analysis presented in this paper. Furthermore, there are emerging questions and the popular one is "Why poverty has not declined as fast as attainment of macro level performance such as low rate of inflation and stable economic growth?" This paper contributes knowledge in this area by investigating what might be lacking at micro level, by comparing competition and firm performance. The paper does so by using various measures of firm level performance to examine whether and to what extent have such measures been influenced by the reforms.

The single measure of reforms used in change in degree of competition induced by the reforms. Estimates of a Cobb-Douglas production function that treat competition as one of the regressors are used to check if there is any significance correlation between competition and productivity. The estimates utilizes panel nature of the data available over the period 2000 to 2008 to control for firm specific characteristics that may potentially bias such firm level estimates. Competition is measured using the Hirschman-Herfindahl Index (HH).

2. An Assessment of Trends and Performance of Tanzania Manufacturing

2.1 Overview and Current Performance

Tanzania's manufacturing sector is one of the smallest in the East and Southern Africa region (EAC, 2009; DBSA, 1997). The major industries are food processing, textiles, metal, cement, fertilizer, and vegetable oil and

[1] The bulk of imports were subject to tariff rates of 0, 25 and 60 percent. There were other 15 rate ranging between 15 and 200 percent.

wood products. The most recent information on manufacturing performance shows that in 2009, the value of exports of manufactured goods decreased by 24.9 percent to USD 497.6 million from USD 662.3 million in 2008. The value of manufactured goods exported particularly cement; cooking oil; metal and copper products decreased due to fall in demand in the neighboring countries as a result of global financial crisis. However, the value of tobacco exports increased to USD 5.3 million in 2009 from USD 1.8 million in 2008. The exports of manufactured goods accounted for 23.0 percent of total nontraditional goods in 2009, compared to 29.2 percent in 2008. The growth rate in manufacturing sub activity was 8.0 percent in 2009 compared to 9.9 percent in 2008. The lower growth rate was attributed to decrease in the production of exported goods following the impact of the Global Financial Crisis. However, production of some items such as food and dairy products, chemicals, and printing increased. The contribution of manufacturing to GDP in 2009 was 8.6 percent, compared to 7.8 percent in 2008.

The production costs increased from shs 1,747,351 million in 2008 to shs 1,764,351 million in 2009, equivalent to an increase of 1.0 percent. The increase was due to rise in the production cost of food, beverages, tobacco, cigarettes and chemicals. The current performance is an improvement from the previous state. It will be recalled that prior to the 1990s the sector was dominated by state owned firms. These were either acquired through nationalization introduced in February 1967 or established through government industrial development projects. Import substitution was the dominant industrial strategy. Initially the sector generated significant growth especially in the 1970s, but from the late 1970s this growth halted. It is estimated that by 1986 output was at only 30 percent of its 1979 level, with the share to GDP falling from 12 percent in the 1970s to 8 percent in 1980s. Following major economic reforms adopted in 1986, the manufacturing sector has been subjected to substantial re-structuring aimed at increased capacity utilization; export promotion, attraction of private sector (both foreign and domestic), investment increased competitiveness and overall efficiency. During the period from mid 1980s to 2010 the manufacturing sector begun to recover. Its GDP contribution during the 1986-1991 increased by 23 percent, growth in real manufacturing recovered from negative and was positive each year starting from 1987, with manufacturing output growing faster than total GDP (Mans, 1994 and URT, 2011). The GDP contribution of manufacturing has remained relatively small at between 8 and 9 percent.

2.2 Trends in Productivity Growth

The productivity trends in Tanzania matches in three phases that can be said to reflect three periods of development in the post-independent Tanzania namely: a period of expansion, 1974-1980, a period of collapse 1981-1990 and a period of adjustment, privatization and re-structuring, 1991-2000s. It will be recalled that after the introduction of rural development policies that contained the population under community village settlements, nationalization, Import Substitution and Basic Industrialization Strategies the Tanzanian manufacturing sector became a fast-growing sector. However, rapid expansion particularly in the 1960's and 1970's was followed by a collapse in the early 1980's. War with Uganda, extensive periods of droughts, failure of crop production especially sisal, inefficiency due to high protection in the form of tariffs and non tariffs instruments, scarcity of foreign exchange, excessive state involvement in industrial production (including subsidization), anti export bias are among possible factors, why the collapse was very severe.

The production of goods, which were formerly imported, was accompanied by imports of capital goods and intermediate inputs. Two implications of this phenomenon may be identified. First the desired production levels could only be maintained if the productivity of the import substituting industries was high enough to generate foreign exchange to facilitate importation of inputs. Secondly, the import substitution industrialization objective could be realized if, foreign exchange saved by producing manufactured goods was high enough to cope with the

requirements of imported inputs to keep industry operating at the desired levels. In connection to that, the collapse of manufacturing production intensified during the period of economic crisis.

Furthermore, trends in real output over the period from 1990 to 2010 are declined followed by some recovery in certain years. The pattern of value-added growth shown by the official statistics is very broadly similar to that for output in that there was a decline from 1990 to 2000 and then a recovery. These result showing a recovery are based on the large and medium sized firms covered by the industrial survey, thus there is a question as to how representative they are of the whole sector. It is apparent that Tanzania's share in the world market is negligible and has been declining both in real terms and as a proportion of output. One objective of the trade and financial sector liberalization, which has been implemented since the 1980s, is to encourage manufacturing firms to operate in a more competitive environment so as to enhance their efficiency and productivity.

Following major economic reforms adopted in 1986, the economy has been subjected to substantial re-structuring aimed at increased growth capacity utilization and overall efficiency. The level of human capacity has been subjected to securitization and emphasis to raise availability of qualified manpower. The increased access to education in all levels is one of the major pre-occupations of Tanzania development policies expected to enhance, development. The empirical question now is what causes the observed increase in productivity after 1990s? The contribution of this paper is to addresses the question by testing if higher education has any role to such observed trends in productivity.

There was certainly an expectation that after the reforms local firms would hold their market share and increase exports. On the basis of the official statistics there is no basis to believe that expectation has been met.

2.3 Empirical Literature on Productivity of Tanzania Manufacturing

The most extensive study in this area of productivity was conducted by Professor Amon Mbele in 2005. His study investigated productivity performance in Tanzania, with the growth of the overall economy as the main focus. He used growth accounting, to assess the contributions of physical capital, labor and Total Factor Productivity. His findings were that Tanzania experienced growth in labor productivity and Total Factor Productivity for the whole period. There was high capital deepening during 1967-1985, compared to the reform period 1986-2000. If the record of growth is reflected on, this means that capital was less productive during 1967-1985. For the period 1986-2000, labor productivity growth declined marginally by 0.4%, while Total Factor Productivity growth was highest, implying that the impressive growth performance during 1986-2000 can be associated more with growth in Total Factor Productivity.

The detailed literature review on productivity is provided in UNIDO country case study of 2005. Ndulu and Semboja (1994) investigated productivity, efficiency and export performance in the manufacturing sector in Tanzania. Productivity was assessed in terms of domestic prices. Three measures of efficiency were used: partial factor productivity, a modified measure of labor productivity and a simple measure of investment productivity. The authors found variations in output to be totally explained by changes in factor inputs and that productivity growth in the manufacturing sector was statistically insignificant. This was explained partly by the cyclical instability of actual production. The large fluctuations in labor productivity were mainly influenced by output variations. In terms of efficiency, about 40% of manufacturing activities generated negative value-added. Further, they found the incentive structure during the first half of the 1980s to be grossly biased against exports (the real official exchange rate, commercial policy instruments such as quantitative restrictions and related exchange controls which served as explicit and implicit taxation of exports). It was only during the latter part of the 1980s that exports started to pick up as a result of the various measures instituted, such as real currency devaluation,

export promotion measures, reduced anti-export bias and the streamlining of export procedures.

Szirmai et al. (2001) investigated manufacturing performance in Tanzania using time series analysis. The International Comparisons of Output and Productivity Project (ICOP) methodology was used, with comparative US labor productivity as a benchmark. In general the authors found a large productivity gap between the US and Tanzania and attributed this to the vast technology gap between the two economies. Using 1976 as the base year, the authors traced trends in labor productivity. There was a rapid initial increase after 1965, reaching a peak in 1973 and later declining steadily throughout the 1970s and 1980s, probably due to continued retention of workers when output was declining. By 1990 the level was half that of 1973.

Micheline Goedhuys; Norbert Janz; Pierre Mohnen (2008), using cross-sectional firm-level data, examines the determinants of productivity among manufacturing firms in Tanzania. In particular, they seek to evaluate the relative importance of technological advances and the business environment in which firms operate in affecting productivity. Of the technological variables, R&D as well as product and process innovation, licensing of technology, and training of employees fail to have any impact; only foreign ownership, ISO certification and higher education of the management appear to affect productivity. Some important influences from the broader business environment, however, appear to affect productivity and are robust to different specifications of the model. The study shows that credit constraints, administrative regulatory burdens and a lack of business support services depress productivity; membership of a business association is associated with higher productivity.

3. Conceptual Framework Theory and Literature

3.1 Theory and Conceptual Framework

Many theoretical models available for estimating competition aspects of manufacturing sector are based on principal agent model, in which the owners of a firm design incentive scheme for the manager, but the structure of the scheme depends on various factors including market competition. The models analyze how the optimal incentive scheme changes in response to the change in the extent of market competition. The definitions of competition are so diverse and, furthermore, the results rely on factors incorporated into these models. Not surprisingly, it is not theoretically evident whether the intensification of market competition would induce managers to exert more efforts. In spite of the ambiguity of theoretical predictions, empirical studies have tried to test the hypothesis that market competition would increase the efforts of managers, and thus lead to higher performance, including higher productivity. Empirically, the extent of competition has been captured by several variables; concentration ratio, above normal rent, market share and questionnaire based results.

3.2 Some Empirical and Theoretical Literature

There is a strong body of evidence that competition enhances productivity. Nickell, Nicolitsas and Dryden (1997) obtained the result that higher average rents normalized on value added tend to reduce productivity growth. Green and Mayes (1991) claim that the extent of competition is among the important variables that significantly explain the difference in efficiency other scholars claim that deregulation, which is expected to intensify competition, raises productivity of firms. For example, Olley and Pakes (1996) show that in telecommunications equipment industry in the US, productivity growth accelerated after the deregulation of the industry. Similarly, the positive impact of deregulation in transition economies was reported by Li (1997) for China, by Djankov and Hoekman (2000) for Bulgaria, and by Grosfeld and Tressel (2002) for Poland. Nickell, Wadhwami and Wall (1992) show that the increase in market shares of a firm reduces its productivity growth. The effect of turnover on

performance has been examined by, among others, Dunne, Roberts and Samuelson (1988), Baily, Hulten and Cambell (1992), Baldwin (1995), Baily and Gersbach (1995), Bartesman and Doms (2000), Aw, Chen and Roberts (2001). All of them indicate that the turnover plays a critical role in the increase in the productivity of industries.

The study by Haskel (1991) provides one of the first studies to exploit micro level data to explore the effects of competition on productivity. He uses UK panel data from 1980-1986 to investigate the role that changes in the product market have on productivity growth. He finds that high levels of market concentration and market share have an adverse effect on total factor productivity. Another study in this area was conducted by Nickell in 1996. In such study, the author examined competition in product markets also using micro-data. The study reports high rent firms had consistently lower productivity growth than low rent firms. Specifically the study report that a ten per cent increase in price mark-ups resulted on average in a 1.3-1.6 percent loss in TFP growth. Blanchflower and Machin (1995) measure competition as reported by participants in a market using data from the Workplace Industrial Relations Survey (WIRS). Their results prove largely inconclusive. Whilst they find a positive relationship between labour productivity and competition in Australian manufacturing, they are unable to show this result in Britain. These findings must be considered in light of the large amounts of subjectivity inherent in using management surveys to measure of competition.

Griffiths and Harrison (2004) provide a good overview of studies which explore this connection. The list below is indicative of the findings in the area. Ehrlich et al. (1994) investigate 23 international airlines with varying levels of state ownership. They estimate that complete privatization of an airline increases the annual rate of TFP growth by 1.6-2.0 percent on average in the long run. Boylaud's (2000) analysis of the liberalisation of the road freight industry in OECD countries, and Olley and Pakes' (1996) survey of deregulation in US telecommunications, both identified productivity gains. Similarly, Gort and Sung (1999) were able to identify TFP growth rates between seven and 14 times higher in competitive US telecoms markets than in regional telecoms monopolies, during 1985-1991. Nicoletti and Scarpetta (2003) find that product market regulation (PMR) slows down catch-up growth.

The theoretical literature on the effect of market competition does not clearly accord with this casual argument. One of the reasons for this is that there are various definitions of competition in the theoretical literature. Intensification of market competition is captured by, for instance: the change in the mode of competition, from monopoly to perfect competition (for example, Arrow, 1962) and from cartel to Cournot to Bertrand competition (for example, Horn, Lang and Lundgren, 1994); increase in the number of firms (for example, Loury, 1979; Lee and Wilde, 1980; Dasgupta and Stiglitz, 1980a,b; Reinganum, 1982, 1985; Spence, 1984; Martin, 1993; Krishna, 2001); the number of other managers to whom each manager is compared (for example, Holmstrom, 1982; Nalebuff and Stiglitz, 1983; Mookerjee, 1984; Hermalin, 1992); increase in the price elasticity of demand (for example, Willig, 1987); reduction of the size of demand (for example, Willig, 1987; Hermalin, 1992); decrease in profits (for example, Schmidt, 1997); increase in the substitutability between products (for example, Aghion, Dewatripont and Rey, 1997); reduction in the gap between a leader and a follower (for example, Harris and Vickers, 1987); forward movement towards goal by one of rivals (for example, Harris and Vickers, 1987); the increase in the ratio of entrepreneurial firms relative to managerial firms (for example, Hart, 1983; Scharfstein, 1988); existence of a potential rival (for example, Gilbert and Newberry, 1982; Nalebuff and Stiglitz, 1983).

3.3 Models Specification and Data

The empirical strategy of the paper is to investigate if measurable aspects of competition can explain observed changes in firm level performance. The most straightforward measure of performance is productivity. It

is important to note that in measuring productivity per labor the model estimated should display existence of constant returns to scale. This can be easily tested using appropriate diagnostic tests after estimations. The measure adopted for labor productivity is using log of labor productivity in *(Y/L)* is defined as real gross output per person hour. In principle Y and L are the total output and labor respectively. Total factor productivity is the most appropriate way of trucking changes in firm level performance after changes in the economic environment and structure in which a firm operates. Such measure can be easily obtained as a residual after estimating a gross output or net output productivity equation. Thus, stating from a production function model shown below:

$$\text{In} \quad InY_{it} = \alpha_K InK_{it} + \alpha_L InL_{it} + \alpha_M InM_{it} \tag{1}$$

Where InY_{it} is log of output;

InK_{it} is log of capital;

InL_{it} is log of labor;

InM_{it} is log of raw materials.

To assess the productivity effect of competition policy on the manufacturing sector, we estimate the production function as follows:

$$Q_t = A_t K_t^{\beta 1} L_t^{\beta 2} COM_t^{\beta 3} \tag{2}$$

Where COM is a measure of market power or competition.

This amounts to re specifying our equation 1 as follows:

$$\text{In} \quad InY_{it} = \alpha_K InK_{it} + \alpha_L InL_{it} + \alpha_M InM_{it} + \alpha \text{ COM} \tag{3}$$

Nonetheless, it is important to note that estimates of the market competition using econometrics methods faces estimation problems. The effects of omitted variable, simultaneity and measurement error are observed in almost all variables. For, instance the major concern in applying OLS to estimate the competition effect is that, the disturbance term captures unobservable (omitted) individual effects that also might influence the firms performance or competition. Therefore, when estimating the impact of market competition on Tanzania firms, the precise measurement of the economic effect is plagued by difficulties in isolating the causal effect of competition and performance. There are a number of approaches available to deal with such econometrics problems. The use of survey data that combines both time and individual dimension is the most critical pre-requisite for the solution to the problem. Using such information it is possible to account for the time invariant unobserved effects that are likely to influence competition and performance and yet correlated with the error term. Data available for this paper has panel dimension. The paper uses such information to account for the major sources of endogeneity in this paper.

3.4 Data and Measurement Issues

The data used in this study is from the annual surveys of Tanzanian manufacturing firm surveys. These surveys are collected each year by the National Bureau of statistics using a country representative sample that covers all establishments employing five people and above. The data contains nearly 534 firms over five years from 2000 till 2006. The data was collected from various sources including Tanzania Manufacturing Surveys, Investment Climate and Annual Surveys of Industrial Production for the period 2001 till 2008. Rich panel data is obtained by combining unique firm specific identifier with information from the annual data. In the production functions presented using value added, we have excluded a small number of outlying values. These include negative value added observations, which tend to be associated with recent firm entrants or impending exits and

which do not represent the steady state performance of the firm in question. We also exclude observations where the ratio of value added to capital is greater than 50 or less than 0.01 since these are believed to be driven by measurement errors in these two variables, particularly the firm's physical capital stock (due for example to the use of tools or machinery which does not belong to the firm). The real capital stock series used here is based upon a firm's replacement value of plant & machinery which is augmented with subsequent investments in plant & machinery made by the firm during the period. We also allow for 5% depreciation per annum of per period capital stock. Other variables such as sales, raw materials, and intermediate cost are a direct reporting from companies on the cost incurred in such items during the period of one year.

3.5 Measure of Competition

In order to ascertain whether or not economic reforms in the market have been of any effect at the firm level, the paper uses measures of changes in market power as one of the explanatory variables in the Total factor productivity equation indicated above. In order to investigate changes in market power or concentration, we specify a concentration measure. There are a variety of indices that can be used. Most concentration measures are based on the shares of an individual firm. If we denote the number of firms in the sector as n and q represents the share of sales of an I firm at time t, then the sum of q from 1 to n will be q and the share of each firm in the market for a specified time period, say year t, would be expressed as:

$$P_{it} = \frac{q_{it}}{q_t} \quad \text{i=1 ,….., n and t = 1, ….., T}$$

The market share is then measured using either concentration ratio or Herfindhal Hirschman index (HH). Concentration ratios are measures of the total output that is produced in an industry by a given number of firms in the industry. The most common concentration ratios are the CR_4 and the CR_8, which means the 4 and the 8 largest firms. Concentration ratios are usually used to show the extent of market control of the largest firms in the industry. It is presented below as follows:

$$CR(k)_t = \sum_{i=l}^{k} p_{it}, \qquad k < m$$

Hence, the Concentration Ratio shows the percentage of market share held by the largest firms (m) in an industry.

$$CR_m = \Sigma^{n}_{i=1}\, x_i$$

Therefore it can be expressed as:

$CR_m = s_1 + s_2 + ... + s_m$ where s_i is the market share and m defines the i^{th} firm

The other common index for measuring market power is Herfindahl index also known as Herfindahl Hirschman Index (named after Orrris C. Herfindahl and Albert O. Hirschman. It is defined as the sum of the squares of the market shares of the 50 largest firms (or summed over all the firms if there are fewer than 50) within the industry, where the market shares are expressed as fractions.

$$HH_t = \sum_{i=l}^{m} p_{it}^2$$

The result is proportional to the average market share, weighted by market share. As such, it can range from 0 to 1.0, moving from a huge number of very small firms to a single monopolistic producer. Increase in the Herfindahl index implies a decrease in competition and increase in market power of a few. On the other hand a fall in HH index value suggests an increase in competition and reduced power of a few firms.

3.6 Profit Function

The other model estimated empirically in this paper is a profit function. The analysis begins by considering operation of a firm after competition and relates its profit to a competitive regime. In particular we consider a competitive firm with the profit function that considers the difference between total sales and total cost.

4. Quantitative Assessment of Competition within Domestic Industries in Tanzania

4.1 Concentration in Tanzania Manufacturing Sectors

Overall, the level of competition is still limited among Tanzanian manufacturing industries. The most of the manufacturing sectors have are highly concentrated as reflected in concentration indices such as Herfindahl-Hirshman Index (HHI) and top 3 or top 4 concentration ratios (CR-3, CR-4). Based on 2007–2008 average, ISIC Group 2 (coke) is dominated by one firm and Group 29 (machinery and equipment), Group 33 (medical, precision and optical instruments, watches and clocks), Group 35 (other transport equipment) are also highly concentrated with top three firms in each industry occupy almost all production in each industry. ISIC Group 16 (tobacco products), Group 17 (textile), Group 18 (apparel), Group 19 (leather, luggage, footwear), Group 26 (other metallic mineral products), Group 27 (basic metals), Group 31 (electronic machinery and apparatus), Group 33 (motor vehicles) are also relatively concentrated. Only Group 15 (food products and beverage), Group 20 (wood products), Group 21 (paper and paper products), Group 22 (publishing and printing), Group 24 (chemical), Group 25 (rubber and plastics), Group 28 (fabricated metal products), Group 36 (furniture) show HHI less than 0.2. In all manufacturing groups except for food products and beverages, top 3 or top 4 firms in each group produce more than 50 percent of total production.

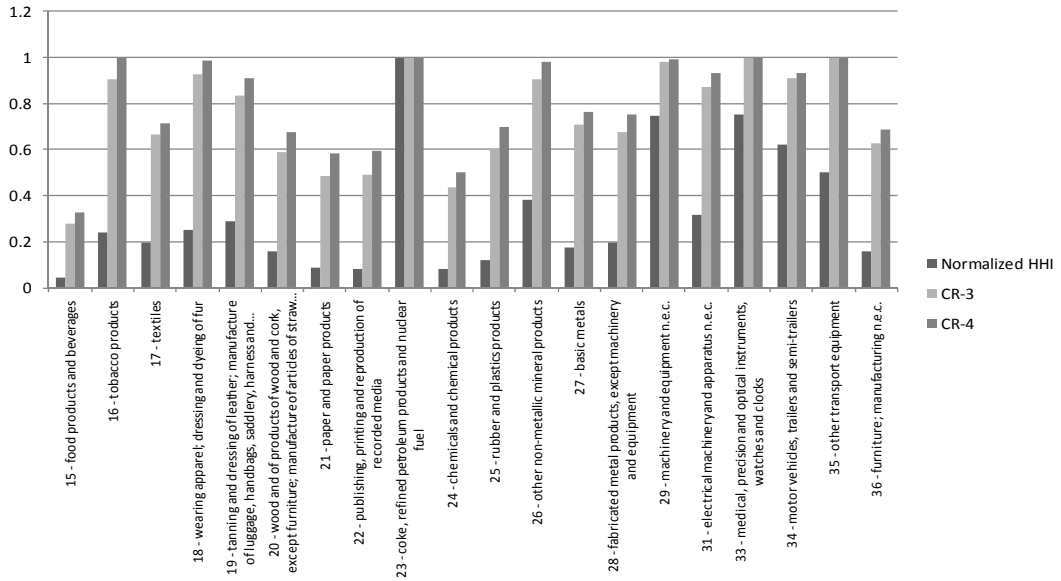

Figure 1 Normalized HHI, CR-3, and CR-4 of ISIC 1 Digit Industrial Groups in Tanzania: 2007
Source: Tanzania Annual Survey of Industrial Production

Although still concentrated in absolute term, the most of the manufacturing sectors have recorded decreases in concentration over time, particularly since 2001. With exceptions of textile (17), apparel (18), coke (23), other non-metallic mineral products (26), all manufacturing sectors in Tanzania have seen their levels of concentration

decreased between 2001–2002 and 2006–2007.

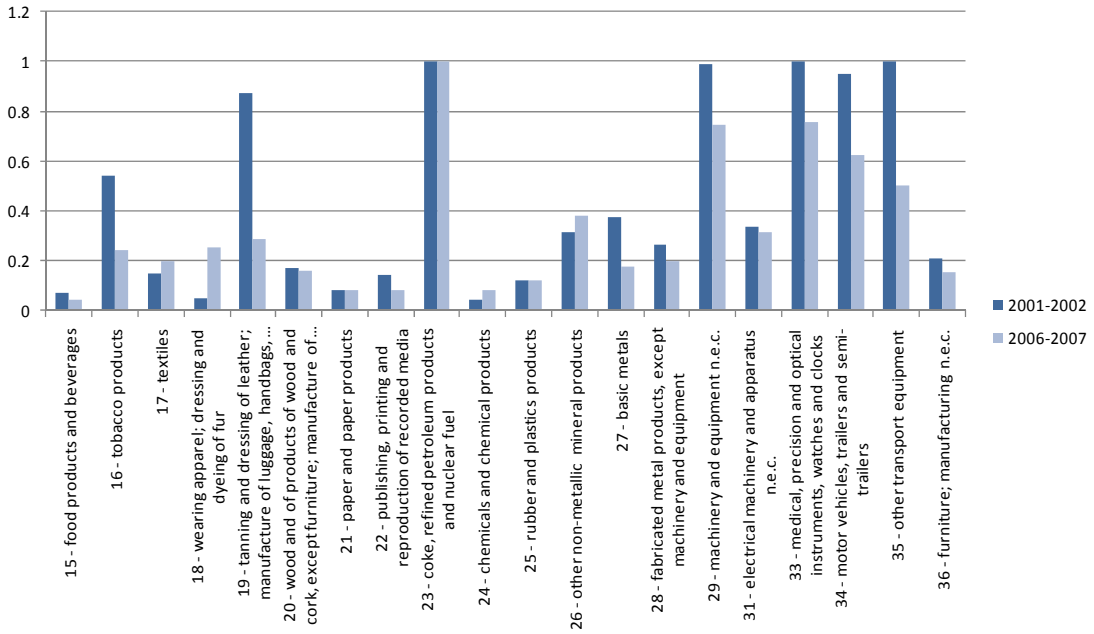

Figure 2 Normalized HHI: 2001-2002 Average vs. 2006-2007 Average

Source: Tanzania Annual Survey of Industrial Production

However, within more recent years, more industries have increased the level of concentration. In addition to the above three industries, tobacco (16), machinery and equipment (29), electronic machinery and apparatus (31), motor vehicles (33), and other transport equipment (35) have increased their levels of concentrations from 2004 to 2007. A similar pattern of increasing levels of concentrations can be also observed in CR-3.

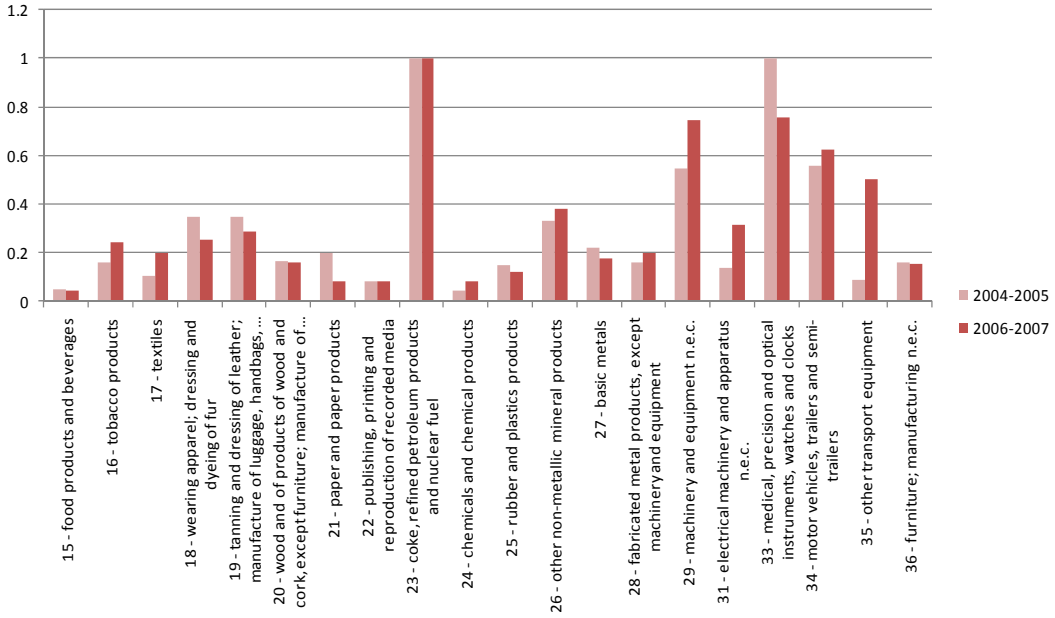

Figure 3 Normalized HHI: 2004-2005 Average vs. 2006-2007 Average

Source: Tanzania Annual Survey of Industrial Production.

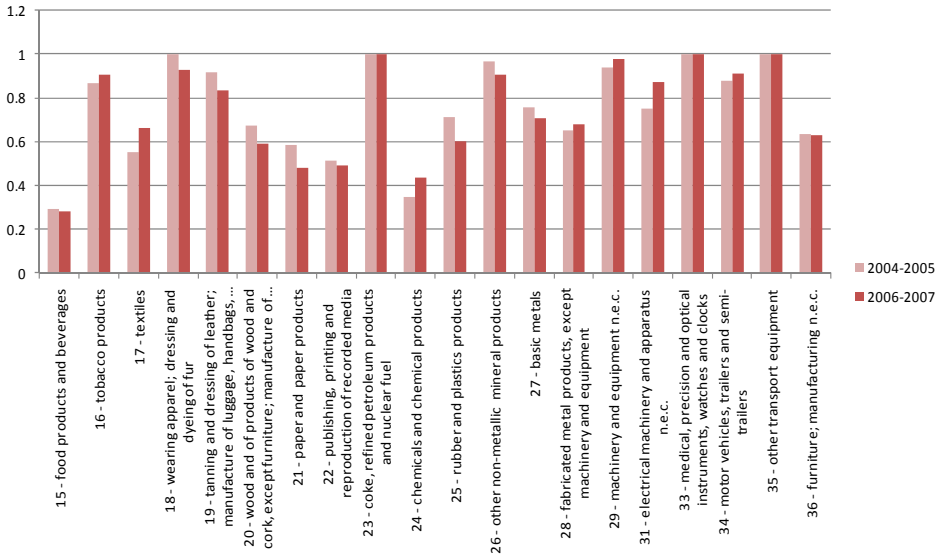

Figure 4 Top 3 Concentration Ratio: 2004-2005 Average vs. 2006-2007 Average

Source: Tanzania Annual Survey of Industrial Production.

4.2 Concentration and Productivity

The data show industries which reduced their levels of concentrations have become more productive. Measured by both sales per worker and value-added per worker, labor productivity has increased from 2004-2005 to 2006-2007 among those industries whose levels of concentration, either in terms of HHI or CR-3Level of concentration is inversely related to productivity. In fact, the less concentrated industries have become, the more productive they have become.

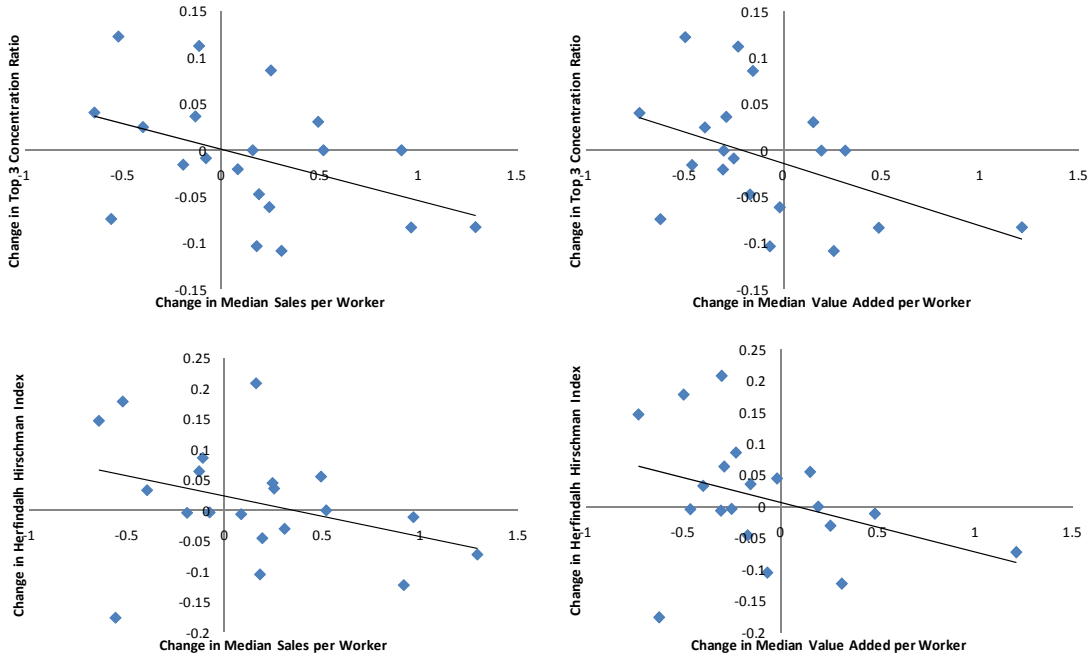

Figure 5 Changes in Concentration and Labor Productivity: 2004/05-2006/07

Source: Tanzania Annual Survey of Industrial Production.

5. Has Competition Enhanced Firm Level Performance in Tanzania Manufacturing?

It will be recalled that one of the major hypothesis tested in this paper is whether there is any evidence of positive correlation between competition and growth. The strategy of estimate is to assess the relation between competition and productivity. The results are presented in Table 1. The first and second column estimates our production function using Ordinary Least Square and panel data estimates of fixed effects and GMM. In the first column of the Table 1, we present estimates of the production function in which the competition variable measured using Herfindhal Hirschman is a proxy for competition. The results indicate a positive correlation between competition and productivity. In particular it is indicated that 1 percent increase in competition results into 0.4 percent increase in productivity. However, the results are weakly statistically significant. When the panel estimates are introduced the correlation between competition and productivity disappear. In particular, the fixed effects estimates and GMM estimates show that competition has no productivity effect among the manufacturing firms. The results suggest that OLS estimates reported in columns [1–2] are biased. In fact the firm specific characteristics or attributes have a lot to influence the observed competition effect. There is no causal relationship between competition and productivity except that more productive firms are likely to self select into more competitive firms. This partly address our question on why trickle down might be hard to observe when one start from macro-economic environment. Specifically, this is due to the fact that policy actions to address the weaknesses at firm level that influence productivity must be introduced to reinforce the effectiveness of the functioning of improved competitive environment.

There is a question on what determines the competition at firm level. Table 2 attempts to address such question. The results in this second table confirm that competition measured using market share HH index is influenced by the output per employee, exports intensity in input usage and firm size. However, when the estimates control for firm fixed effects it is only export that appears to have a strong positive correlation with competition. The implication of the results is that our estimates strongly support the hypothesis of export led growth as a way forward to strengthen performance of manufacturing sector of Tanzania. In Table 3 we carry further analysis of the link between competition and performance of manufacturing sector of Tanzania by assessing the profit effect of competition. The anticipation of the analysis is that if competition has been positive to influence firm behavior such as investing in more efficient production then profit must be positively correlated with competition. The OLS results indicated in the Table 3 shows a positive correlation between profit and competition in Tanzania manufacturing firms. The results are strongly significant suggesting that 1 percent increase in competitiveness measured by market share of firm results into more than 1 percent increase in profit. But when firm specific characteristics are controlled for, the results suggest no correlation between profit and competition. We discuss such findings that our OLS results are biased such that they pick positive correlation between omitted firm specific aspects with competition and ultimately profit. While in reality there are firm specific characteristics that are correlated with firm market share which also influence profit. It could for instance be the fact that companies that are well connected to reliable markets will sell more and also will be more profitable. Finally, the study assesses the impact of competition on total factor productivity of firms. The same strategy of estimating a production function is adopted here.

Table 1 Productivity Effect of Competition on Tanzanian Firms

Dependent Variable				
Log of output	OLS	OLS	F-Effect	GMM
Log Capital	0.076	0.076	0.076	0.073
	(6.68)**	(6.68)**	(6.73)**	(7.81)**
Log Labor	0.374	0.308	0.300	0.312
	(15.89)**	(11.75)**	(11.48)**	(10.17)**
Raw Materials	0.523	0.514	0.509	0.493
	(32.77)**	(31.35)**	(31.31)**	(44.25)**
Competition	0.418	0.422	-0.374	-0.197
	(1.50)	(1.52)	(0.50)	(0.28)
Exports		0.000	0.000	
		(2.39)*	(3.34)**	
Micro	0.493	0.486	0.500	
	(1.82)	(1.77)	(2.34)*	
Small	-0.327	-0.349	-0.364	
	(3.64)**	(3.88)**	(3.74)**	
Medium	-0.150	-0.151	-0.157	
	(2.48)*	(2.51)*	(2.34)*	
round1	-0.176	-0.188	-0.174	-0.197
	(2.37)*	(2.54)*	(2.35)*	(2.84)**
round2	-0.213	-0.226	-0.212	-0.236
	(2.85)**	(3.03)**	(2.85)**	(3.40)**
round3	-0.173	-0.174	-0.159	-0.177
	(2.43)*	(2.46)*	(2.24)*	(2.80)**
round4	-0.148	-0.151	-0.137	-0.155
	(2.01)*	(2.05)*	(1.87)	(2.42)*
Constant	2.985	3.487	3.535	3.675
	(22.62)**	(17.62)**	(17.85)**	(18.39)**
Observations	1926	1926	1926	1926
R-squared	0.81	0.82	0.82	
Number of firm	534			
Robust t-statistics in parentheses				

Note: * significant at 5%; ** significant at 1%.

6. Conclusion

The paper set out to analyses the impacts of market competition on performance of Tanzanian manufacturing. The backdrop for this analysis is the persistent low level of development of manufacturing sector despite comprehensive economic reforms launched over two decades ago. This is a puzzle because some sectors such as mining and tourism have shown impressive performance after taking advantage of reforms, whereas Tanzania

manufacturing still lags behind. The critical empirical question addressed by the paper was the question 'Why competition has not boosted firm level performance in Tanzania?' The analysis also indirectly addressed the most outstanding question of why poverty has not disappeared despite the impressive macro economic performance in recent years. The paper addressed such questions by using panel data to estimate productivity effects of competition controlling for firm fixed effects and other determinants of productivity. The specific estimation strategy involved estimates of a Cobb Douglas production function.

Table 2 Determinants of Competition in Tanzanian Firms

	OLS	OLS	F-Effects	GMM	GMM
Log Output/employee	0.003	0.005	0.001	0.001	0.000
	(1.32)	(1.68)	(0.36)	(0.21)	(0.35)
Log Capital/employee	-0.003	-0.005	-0.001	-0.001	0.000
	(1.81)	(2.05)*	(0.42)	(0.13)	(0.17)
Log Raw materials	0.001	0.001	0.000	0.000	0.000
	(1.52)	(1.57)	(1.29)	(0.35)	(0.53)
Log of Cost/Employee	0.000	0.001	-0.000	-0.000	-0.000
	(0.29)	(1.12)	(0.60)	(0.11)	(0.67)
Micro	-0.002	0.000	-0.000		
	(1.89)	(0.03)	(0.03)		
Small	-0.002	-0.000	0.000		
	(2.23)*	(0.08)	(0.23)		
Medium	-0.001	0.001	0.001		
	(0.44)	(0.65)	(0.69)		
Exports	0.000	0.000	0.000		
	(2.58)**	(13.72)**	(3.12)**		
round1	-0.010	-0.010	-0.008	-0.007	
	(2.12)*	(2.12)*	(1.84)	(3.42)**	
round2	-0.010	-0.010	-0.008	-0.007	
	(2.12)*	(2.12)*	(1.85)	(3.41)**	
round3	-0.010	-0.009	-0.007	-0.007	0.000
	(2.18)*	(2.17)*	(1.90)	(3.51)**	(0.78)
round4	-0.010	-0.009	-0.007	-0.007	
	(2.17)*	(2.17)*	(1.90)	(3.60)**	
Constant	0.004	0.003	0.006	0.006	0.001
	(1.61)	(1.17)	(1.58)	(1.24)	(13.10)**
Observations	2032	2032	2032	2032	2032
R-squared	0.3	0.23	0.30		
Number of firm		534			
Robust t-statistics in parentheses					

Note: * significant at 5%; ** significant at 1%.

Table 3 The Impact of Competition on Firm Level Profit

Variable	OLS	OLS	GMM	F-Effects
Log Capital	0.077	0.077	0.078	0.075
	(5.54)**	(5.55)**	(5.65)**	(6.34)**
Log Labor	0.417	0.369	0.355	0.363
	(14.42)**	(9.42)**	(9.13)**	(9.38)**
Log Raw Material	0.321	0.315	0.308	0.295
	(17.44)**	(16.75)**	(16.74)**	(20.99)**
Competition	1.038	1.046	-0.222	-0.270
	(2.83)**	(2.61)**	(0.20)	(0.31)
round1	-0.871	-0.888	-0.865	-0.886
	(9.18)**	(9.37)**	(9.14)**	(9.99)**
round2	-0.847	-0.865	-0.842	-0.865
	(8.91)**	(9.11)**	(8.88)**	(9.74)**
round3	-1.006	-1.010	-0.986	-1.001
	(11.50)**	(11.56)**	(11.28)**	(12.39)**
round4	-0.786	-0.793	-0.771	-0.784
	(8.65)**	(8.75)**	(8.54)**	(9.58)**
Micro		0.739	0.727	0.701
		(2.46)*	(2.40)*	(2.59)**
Small		-0.257	-0.291	-0.311
		(2.05)*	(2.33)*	(2.52)*
Medium		-0.260	-0.263	-0.272
		(3.05)**	(3.09)**	(3.19)**
Exports			0.000	0.000
			(2.56)*	(4.77)**
Constant	8.026	8.439	8.515	8.648
	(48.31)**	(31.87)**	(32.14)**	(34.28)**
Observations	1942	1942	1942	1942
R-squared	0.63	0.63	0.64	
Number of firm		535		
Robust t-statistics in parentheses				

Note: * significant at 5%; ** significant at 1%.

Competition is measured using the Hirschman-Herfindahl Index (HH). The paper argued that in principal, there are three ways through which competition has proven to influence productivity; first within firm effect whereby firm specific aspects that influences productivity might be determined by trends in competition. The second most important vehicle that competition can influence productivity is via stimulating innovation. The study major findings indicate a positive correlation between competition and productivity. In particular it is indicated that 1 percent increase in competition results into 0.4 percent increase in productivity. But when the panel estimates are introduced the correlation between competition and productivity disappear. In particular, the fixed effects estimates and GMM estimates show that competition has no productivity effect among the manufacturing firms. The results suggest that OLS estimates reported in columns [1-2] are biased. In fact the firm specific characteristics or attributes have a lot to influence the observed competition effect. There is no causal relationship

between competition and productivity except that more productive firms are likely to self select into more competitive firms. This partly address our question on why trickle down might be hard to observe when one start from macro economic environment. Specifically, this is due to the fact that policy actions to address the weaknesses at firm level that influence productivity must be introduced to reinforce the effectiveness of the functioning of improved competitive environment.

There is a question on what determines the competition at firm level. The results confirm that competition measured using market share HH index is influenced by the output per employee, exports intensity in input usage and firm size. However, when the estimates control for firm fixed effects it is only export that appears to have a strong positive correlation with competition. The implication of the results is that our estimates strongly support the hypothesis of export led growth as a way forward to strengthen performance of manufacturing sector of Tanzania. The anticipation of the analysis is that if competition has been positive to influence firm behavior such as investing in more efficient production then profit must be positively correlated with competition. The OLS results show a positive correlation between profit and competition in Tanzania manufacturing firms. The results are strongly significant suggesting that 1 percent increase in competitiveness measured by market share of firm results into more than 1 percent increase in profit. But when firm specific characteristics are controlled for, the results suggest no correlation between profit and competition. We discuss such findings that our OLS results are biased such that they pick positive correlation between omitted firm specific aspects with competition and ultimately profit. While in reality there are firm specific characteristics that are correlated with firm market share which also influence profit. It could for instance be the fact that companies that are well connected to reliable markets will sell more and also will be more profitable.

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