

Does Privatization Improve Productivity? Empirical Evidence from Ethiopia

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Abstract

Theoretically, it is posited that privatization enables the private sector to play a dominant role in the economy by enhancing competition, productivity and efficiency. When evaluated using these criteria, privatization of the manufacturing industries has failed in Ethiopia. Our empirical results show that, at best, privatization did not result in improving productivity, and at worst, it led to a decline in productivity. We argue that the main reason for this outcome is the unique economic and business environment prevailing in Ethiopia, which does not allow the standard economic assumptions of market competition to hold. Ethiopia's 'private sector' can be described as a 'duopoly' market where two powerful players dominate every sector of the economy: the ruling party's parastatals and a family business conglomerate. The results of this paper should not be surprising as the majority of the firms in this study operate under such an unfavorable business environment. The paper employs 15 years of panel data constructed from the Large and Medium Scale Manufacturing Industries Surveys conducted by the Central Statistical Agency of Ethiopia between 1996 and 2010.

Keywords: privatization, productivity, party parastatals, median absolute deviation, MAD, generalized method of moments, GMM, Ethiopia, state owned enterprises.

JEL Classification: C23, L32, L33

Introduction

Between 1974 and 1991, Ethiopia was ruled by a socialist government operating under a strict centrally planned economy, with state owned and controlled manufacturing activities. It is argued that the socialist policies resulted in market rigidity and economic distortions leading to inefficiencies in every sector of the economy. The socialist economic policies, coupled with almost two decades of war, left the country in shambles. By the end of 1991, the country has a manufacturing industry dominated by inefficient state-owned enterprises, which were managed by loyalists instead of business minded professionals. Some of the enterprises owed their existence to their monopoly positions while others depended on the subsidies from the government (Asrat & Shiferaw, 2009).

Under this economic background and upon the fall of the socialist regime, the current government, which took power in 1991, started implementing the Structural Adjustment Program (led by the World Bank and the International Monetary Fund), whose core policy prescription was

privatization of state owned enterprises. From the World Bank's standpoint, privatization was part of an efficient and equitable economic growth that focuses on poverty reduction and protection of the environment. More specifically, the three main reasons for privatization are improving the use of public resources, operating efficiency and dynamic efficiency (Shirley, 1992). The World Bank set the Structural Adjustment Program, and hence privatization, as a key condition for extending loans to third world countries (Noorbakhsh & Paloni, 1999).

Despite the World Bank's conditions, different countries, however, were engaged in privatization for varying reasons. As stated in Proclamation No. 146/1998, the Ethiopian government identified the following three objectives of privatization: 1) generating revenue required for financing development activities to be undertaken by the government; 2) changing the role and participation of the government in the economy to enable it to exert more effort on activities requiring its attention; 3) promoting the country's economic development through encouraging the expansion of the private sector. Tadesse (1996) argues that the main motive for Ethiopia's privatization seems to be generating revenue from the sale of the state enterprises, making the first objective the most important of the three.

However, the government also decided to keep the majority of state owned enterprises while privatizing others of them. According to Proclamation No. 37/1996, areas of investment exclusively reserved for the state-owned enterprises include production and supply of electrical energy with installed capacity of above 25 megawatts, air transport services using aircraft with a seating capacity of more than 20 passengers or with a cargo capacity of more than 2,700 kg, rail transport services, and telecommunication and postal services with the exception of courier services. Although the government allowed for foreign investment, it was with some exclusions, barring foreigners from 19 areas of investment that were reserved only for domestic investors. Examples include: construction, tanning, radio/television broadcasting services, and commercial road transportation.

The main objective of this paper is analyzing the level of productivity before and after privatization. This involves examining the impact of privatization on a firm's level of employment, wages, resource utilization, and output using data from the Large and Medium Scale Manufacturing (LMSM) Industries Surveys conducted by the Central Statistical Agency (CSA) of Ethiopia from 1996 to 2010.

The Economic and Business Environment in Ethiopia

It is important to understand the economic and business environment under which privatized and state enterprises are operating in Ethiopia. The "private sector" in Ethiopia can be divided into three categories exhibiting complex relationships among each other. The first major category includes the business empires owned by the ruling party, the Tigrayan People's Liberation Front (TPLF), through the Endowment Fund for the Rehabilitation of Tigray (EFFORT). It is very difficult to find the exact asset or net worth of the TPLF owned companies. However, Abegaz (2013) compiled data from different sources and reported that EFFORT had a seed capital of about \$500 million dollars by mid 1990s, and about \$1.25 billion dollars in 2013. The second category

includes an equally compelling conglomerate belonging to the Mohamed International Development Research Organization Companies (MIDROC), owned by the billionaire Sheikh Mohammed Al Amoudi, an investor with Saudi Arabian and Ethiopian heritage. These two groups seem to be operating like a 'duopoly' dominating every sector of the country's economy. Finally, those newly privatized enterprises not owned by MIDROC or not affiliated with EFFORT companies fall under a third category which we call "the rest." This third category has remained small and marginalized, operating in areas left out by the two major economic powers (Milkias, 2003; Negash, 2008; Sutton & Kellow, 2010).

EFFORT was formed, as soon as the current government came to power, by its leading party - the TPLF, using a seed capital generated by dissolving the nonmilitary assets acquired during their war effort and from other undisclosed sources (Vaughan & Gebremichael, 2011; Milkias, 2013). This made the ruling party the richest political party in Africa (Abegaz, 2013). According to Vaughan and Gebremichael (2011), the main objectives behind establishing EFFORT were promoting industrialization in Tigray and advancing the standard of living of the ethnic Tigrayan people (which constitutes about 6 percent of the Ethiopian population as of 2016). In addition, the TPLF allocated a portion of its funds to the other parties that constitute the ruling coalition to help them create their own endowment and party businesses. Under this arrangement, the Amhara National Democratic Movement's (ANDM) endowment was named "Tirit" while the Oromo People's Democratic Organization (OPDO) formed "Dinsho," and the Southern Ethiopian People's Democratic Movement (SEPDM) set up "Wendo Trading" (Abegaz, 2013). These party businesses collectively operate on a smaller scale compared to EFFORT, which controls 70 percent of the current estimated net assets of \$1.25 billion (Abegaz, 2013).

These party parastatals are run by a 'board of governors' that is not only high-ranking leaders of their respective political parties, but also high-ranking government officials (Negash, 2013; Vaughan & Gebremichael, 2011). The party owned businesses are involved in every sector of the economy. For example, the official EFFORT website lists companies operating under manufacturing, services, merchandise, construction, mining and agriculture (EFFORT, n.d.). It is also reported that these party parastatals receive preferential treatment (even more than those of state owned enterprises) when it comes to bank credits, access to foreign exchange, import/export licenses, government contracts or bids, tax treatments, and customs clearance to cite a few. The parastatals also work independently or jointly with other private domestic or foreign companies. In such instances, the preferential treatment extends to businesses operating as joint ventures with the party parastatals (Milkias, 2003; Plummer, 2012; U.S. Department of State, 2014).

From the economy-wide point of view, Plummer (2012) reports on the level of corruption existing in health, education, water, land management, justice, telecommunications, and the mining sectors. In addition, Schwab and Sala-i-Martin (2015) identify corruption to be the fourth most problematic factor for doing business in Ethiopia, next to inefficient government bureaucracy, foreign currency regulations, and access to financing, in that order. Both studies raise serious concerns regarding the business environment in Ethiopia. GAN (2016) also provides summary information on Ethiopia's corruption profile by listing the level of corruption in the

various government entities, including judicial, police, public service, land, tax and customs administration, public procurement and legislation.

MIDROC Ethiopia Investment Group, founded in 1994, is the other powerful player in the Ethiopian economy. As of mid-2017, the Investment Group controlled about 80 groups and affiliate companies operating in agriculture and the agro-industry, construction, hotel and tourism, manufacturing, mining, oil and gas distribution, real estate development, transportation (including air transport), trade and commerce, healthcare, and education and training. All these companies are operating under two major groups, namely: MIDROC Ethiopia Investment Group and Affiliate Companies and MIDROC Ethiopia Technology Group Companies. In 2013, the total investment of all MIDROC companies was reported to be between \$1 and \$4 billion dollars (or between 2 and 11 percent of Ethiopia's GDP in 2013) (Negash, 2013; Sutton & Kellow, 2010).

Data provided by the Ethiopian Privatization Agency (EPA) in the late 1990s revealed that the majority of the state-owned enterprises were sold to one buyer - the MIDROC Group. This information was later removed from the EPA website as the Ethiopian Privatization Agency (EPA) was recently merged with the Ministry of Public Enterprises to form the Privatization and Public Enterprises Supervising Agency (PPESA). As of the writing of this paper, no past data from the EPA about the privatized state-owned enterprises has been made available on PPESA's website. By the turn of the century, the government had privatized 254 state owned enterprises. MIDROC alone purchased 21 of the 254 enterprises. Although these account for only 8.3 percent of the total number of privatized enterprises, they are comprised of enterprises with the most significant economic and strategic importance compared to all privatized enterprises since the start of the privatization process. In addition, they account for at least 60 percent of the market value of the enterprises privatized by the government up to that point. The trend of selling to a single buyer had not changed by the mid-2000s because a study conducted in 2005 confirms that out of 25 enterprises privatized to foreigners, 23 were sold to one buyer (Hailu, 2005). In this regard, the privatization process has turned out to be a mere transfer of enterprises from state ownership to a single private ownership (wikiLeaks, 2008).

The privatization process has also been rolling out very slowly in Ethiopia. After nearly a decade since the privatization process started, the state-owned enterprises were still the dominant forces of the economy. In 2004, state-owned enterprises accounted for 72% of the total manufacturing value added, 62 percent of the gross value of production, 57 percent of the manufacturing labor force, and 64 percent of wages and salaries (World Bank, 2004).

In addition, even from the start, the privatization process was riddled with issues of corruption, forcing the government to halt the privatization process in the early 2000s. This event led to re-nationalization of some of the privatized companies. Examples of re-nationalized enterprises include a soap factory, a printing press, and a flour mill (USITC, 2004). Subsequently, the government resumed the privatization process under a new director. This incident was captured during the 15 years Large and Medium Scale Manufacturing (LMSM) Industries Survey data was employed in this study. As shown in Figure 1, the Ethiopian privatization process can be

characterized by two waves: the first wave of privatization peaked in 1996 before it slowed down in late the 1990s and early 2000s, and the second wave of privatization peaked again in 2007.

Finally, the privatization process in Ethiopia seemed to suffer from a lack of transparency, as it was conducted clandestinely without involving stakeholders (Hailu, 2005). It was also not clear whether political decisions or economic conditions were dictating the privatization process that involved identifying the firms to be privatized, conducting market valuation of the firms, and determining the factors that govern the bidding processes.

Given the privatization process outlined above, this paper attempts to study the impacts of privatization on the productivity of firms by using 15 years of LSM survey data collected by the Central Statistical Agency (CSA) between 1996 and 2010. In addition, the paper makes comparisons of productivity differentials before and after privatization to investigate to what extent privatization has impacted the level of employment, wages, and resource utilization.

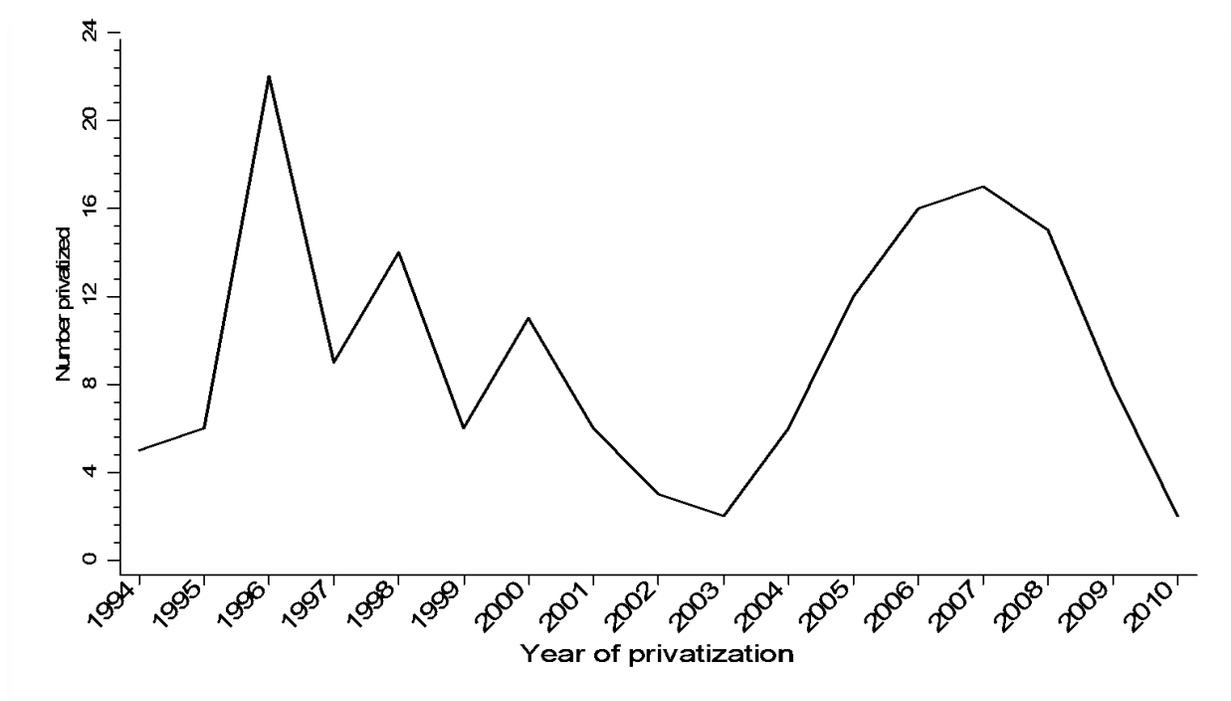


Figure 1. Trend of privatization in LSM industries (1994–2010)

Our findings show that privatized firms exhibit no notable productivity (measured as firm output per employee) gains in absolute terms. In terms of marginal productivity gains resulting from the use of various factor inputs, we observe that privatized firms tend to exhibit no or small productivity differentials. However, the magnitude and statistical significance of these marginal productivity gains depend on the type of estimation method employed. The marginal gain in productivity estimated using the median absolute deviation (MAD) method is higher after privatization for the use of raw materials per employee, indirect inputs per employee, or the rise

in wage rates. In contrast, the marginal productivity gains resulting from using more capital per employee or employing more workers tend to be not statistically significant after privatization.

It is also important to note that the level of employment, the use of indirect inputs, and wage rates are observed to decline after privatization. A small-scale study conducted by Wolde (2010) partly corroborates our findings. He surveyed six privatized firms and found mass layoffs after transfer of ownership. He also reported that the workers who became unemployed due to privatization did not receive any training for re-entry to the labor market or any other safety net services either from the government or the new owners.

In summary, the economic and business environment in Ethiopia has not improved during the last 25 years as hoped by either the advocates of the Structural Adjustment Program of the early 1990s or the IMF and World Bank recommendations in recent years. Instead, the economy remains dominated by the ruling party-owned business empires acting as private corporations and competing for financial and other resources with the other equally powerful family conglomerate - the MIDROC Group. Our data do not specifically indicate who the new owner(s) of the privatized firms are. The data do not provide information on the dollar values of the state-owned enterprises upon privatization either. Nonetheless, based on the pattern and conditions of privatization discussed above, we assume that only a small fraction of the LMSM firms (but with significant economic and strategic importance) in our data are privatized to the MIDROC Group. This implies that the majority of the LMSM firms covered by this study are those privatized to other owners who are forced to operate under the unfavorable business environment described above.

Model Specification and Estimation Methods

Model Specification

Firms are engaged in the process of transforming inputs into outputs via a certain production process (technology). This process is captured by the general functional form

$$\text{Equation 1: } Y_{it} = A_{it}f(Z_{it})$$

where Y_{it} is level of output and Z_{it} is vector of inputs used in the production process. A_{it} denotes the total factor productivity (TFP) which captures all the factors other than the measurable inputs such as labor and capital (e.g., level of technology and externalities) which are designated in most studies as the major determinants of a firm's productivity (Ozyurt, 2009; Soderbom & Teal, 2004) as well as a source of economic growth (Chen 2002; Krugman, 1994; Lucas, 2002).

Equation 1 can be estimated using the standard Cobb-Douglas production function. Hence, firm i 's production at time t is captured by:

$$\text{Equation 2: } Y_{it} = K_{it}^{\alpha}(A_{it}L_{it})^{\beta}e^{u_{it}}$$

where Y_{it} and A_{it} are as defined above, K_{it} is the stock of physical capital, L_{it} is 'undifferentiated' labor, and u_{it} is the error term. The term 'undifferentiated' labor is used (in contrast to human capital augmented labor) to indicate labor with no education or experience (Hall & Jones, 1999). Since the Ethiopian LMSM industries surveys do not collect data on workers' education and experience, we employ the standard production function expressed only by capital and labor inputs.

To calibrate the production function in Equation 2 for estimation purposes based on variables available in the Ethiopian LMSM industries data, we incorporate such factor inputs as raw materials, M_{it} , and indirect inputs, I_{it} (e.g., fuel and lubricating oil, electricity, water, and rented structures and equipment).

$$\text{Equation 3: } Y_{it} = K_{it}^{\alpha} M_{it}^{\gamma} I_{it}^{\varphi} (A_{it} L_{it})^{\beta} e^{u_{it}}$$

By linearizing, collecting constant terms and rearranging, we obtain the final estimation equation,

$$\begin{aligned} \text{Equation 4: } \ln Y_{it} &= \beta \ln A_{it} + \alpha \ln K_{it} + \gamma \ln M_{it} + \varphi \ln I_{it} + \beta \ln L_{it} + u_{it} \\ \ln Y_{it} &= C + \alpha \ln K_{it} + \gamma \ln M_{it} + \varphi \ln I_{it} + \beta \ln L_{it} + u_{it} \end{aligned}$$

where the constant term $C = \beta \ln A_{it}$. In Equation 4, TFP (i.e., A_{it}) is considered a constant term since it governs the shift of the production function. Equation 4 is used to estimate the productivity of the Ethiopian LMSM industries in this study. This estimation equation quantifies the marginal contribution of each of the factor inputs to the productivity of state-owned and private firms. In other words, the estimation shows the percentage change in productivity (i.e., firm output per employee) in response to a one percent increase in each factor input.

Estimation Methods

As documented in many studies, several biases arise when a production function such as Equation 4 is estimated using the simple ordinary least squares (OLS) method. The biases may result from omitted variables, simultaneity, measurement error, and autocorrelation. To overcome such endogeneity problems, multiple estimation techniques have been proposed in the literature. Examples include the fixed effects (FE) estimator (Mundlak, 1961), instrumental variables (IV) (Angrist & Krueger, 2001), the semiparametric proxy estimator (Levinsohn & Petrin, 2003), structural identification (Ackerberg, Caves & Frazer, 2006), median absolute deviation (MAD) estimation (Buchinsky, 1998), and the generalized method of moments (GMM) panel data estimator (Arellano & Bond, 1991).

Although there is no consensus in the literature regarding the successfulness of these methods in solving the endogeneity problems, we employ MAD and GMM estimations as the best alternatives for dynamic panel models. The MAD estimation (or median regression) has been proposed as an alternative to OLS estimation. While the OLS method minimizes the sum of squared deviations from the mean, the MAD method minimizes the sum of absolute deviations from the median. As a measure immune to outliers, the latter estimation is expected to provide a robust estimation compared to the former which is highly sensitive to outliers. In addition, given the fact that the Ethiopian LMSM industries data are considerably affected by extreme values, the MAD estimation can serve as a plausible alternative to OLS estimation.

On the other hand, GMM estimation is probably the most widely used method for dynamic panel models. However, the standard GMM (also known as difference GMM) estimators are found to suffer from weak instrument problem in dynamic panels with high autoregressive coefficient and small-time periods, T . Consequently, an extended version of the standard GMM (known as

system GMM) has been proposed to overcome the observed problems (Blundell & Bond, 1998; Griliches & Mairesse, 1995).

The system GMM has also been employed as the best alternative estimator in recent studies (Blundell et al., 2001; Griffith et al., 2006; Levinsohn & Petrin, 2003 Wooldridge, 2001) in providing more reasonable results for dynamic panels with small T and large N (i.e., fewer time periods and many firms as in our case). These studies show that the system GMM improves the estimation results by adding extra moment conditions on the standard first-differenced GMM estimator as it uses the lagged differences of the endogenous variables as instruments. We employ the system GMM to exploit the additional efficiency gains from the extended GMM model and use it as a robustness check for the MAD estimation results. For comparison purposes, we present estimation results from all three estimation techniques (i.e., OLS, MAD and system GMM).

Source of Data and Distribution of Firms in LMSM Industries

Source of Data and Definition of Variables

The data used in this study are drawn from the 1996–2010 Large and Medium Scale Manufacturing (LMSM) Industries Surveys conducted by the Central Statistical Agency (CSA) of Ethiopia. CSA (2011) defines LMSM industries as establishments, both state and private, which engage ten persons and above and use power-driven machinery. Each year, the surveys cover establishments operating in all regions of the country under licenses issued by the Ministry of Trade and Industry and corresponding bureaus of the Regional States. CSA's annual surveys gather basic quantitative and qualitative information relating to the structure and performance of the country's LMSM industries.

CSA surveyed a total of 4,303 manufacturing firms from 1996–2010 obtained after dropping those employing less than 10 workers (as per CSA's definition of LMSM industries) as well as those reporting extremely small or no capital. These firms constitute an unbalanced panel data comprised of 160 firms that have been transferred from state to private ownership, 371 firms that have remained under state control, and 3,772 firms that have been privately owned since their commencement (Table 1).

The variables used in the description of the distribution of manufacturing firms in Ethiopia and in the estimation of the production function are defined in Appendix A1. To make variables expressed in monetary terms comparable across time within the country and to those of other countries, we deflated and then converted them to an international dollar. We first deflated all values using their respective deflators, which were taken from the World Bank Report and computed using 2000 as a base year, and then expressed them in 2005 local currency units (LCU). While output and capital are deflated by the GDP deflator, the private consumption deflator was used for material inputs, indirect inputs and wages.

Table 1

Distribution of Firms in LMSM Industries

Type of Manufacturing Industry	Privatized (1994 – 2010)		Not privatized		Private since commencement		Total		% Privatized [†]
Food products, beverages and tobacco	71	44.4%	101	27.2%	916	24.3%	1,088	25.3%	41.3%
Textile and wearing apparel, except fur	24	15.0%	30	8.1%	161	4.3%	215	5.0%	44.4%
Tanning and dressing of leather and foot wear	10	6.3%	15	4.0%	215	5.7%	240	5.6%	40.0%
Wood and paper, and wood and paper products	4	2.5%	34	9.2%	108	2.9%	146	3.4%	10.5%
Publishing and printing services	3	1.9%	17	4.6%	146	3.9%	166	3.9%	15.0%
Chemicals and chemical products	13	8.1%	24	6.5%	135	3.6%	172	4.0%	35.1%
Rubber and plastics products	3	1.9%	17	4.6%	179	4.7%	199	4.6%	15.0%
Other non-metallic mineral products	15	9.4%	60	16.2%	870	23.1%	945	22.0%	20.0%
Basic metals and fabricated metal products, except machinery and equipment	5	3.1%	31	8.4%	316	8.4%	352	8.2%	13.9%
Machinery and equipment	0	0%	1	0.3%	40	1.1%	41	1.0%	0%
Batteries, motor vehicle bodies, parts and accessories	1	0.6%	8	2.2%	55	1.5%	64	1.5%	11.1%
Furniture	11	6.9%	33	8.9%	631	16.7%	675	15.7%	25.0%
Total	160	100%	371	100%	3,772	100%	4,303	100%	30.1%

Source: Authors' estimations using panel data constructed from LMSM Industries Surveys: CSA 1996-2010.

[†]Indicates the proportion of privatized firms out of the total firms which have been under state ownership. E.g., for the first industry: $[71/(71+101)]*100\% = 41.3\%$.

Finally, all variables expressed in 2005 LCU were converted to their equivalent 2005 international dollar values using the 2005 purchasing power parity (PPP) conversion factor for GDP, PPP conversion factor for private consumption, and market exchange rate ratio for wages. Appendix A2 shows the deflators and conversion factors used together with the list of variables on which they are applied. Note that henceforth all monetary values will be expressed in PPP adjusted 2005 international dollars (denoted as 2005 PPP \$). An international dollar has the same purchasing power as the U.S. dollar has in the United States.

Distribution and Characteristics of Firms in LMSM Industries

Table 1 shows the distribution of firms in LMSM industries in Ethiopia. The LMSM firms have been categorized into three groups in this study: privatized (i.e., those transferred from state to private ownership); not privatized (i.e., those who remained under state control); and private since commencement. The CSA surveys reveal that there are over four thousand LMSM firms operating in the country, and out of 531 LMSM firms that were under state control, about 30% (160) have been privatized in the span of seventeen years (1994–2010). A review of the percent of privatized firms (out of the total number of firms under state ownership and captured by the CSA survey) in Table 1 reveals that privatization seems to have focused primarily on four industries: textile and wearing apparel (44.4%), food, beverage and tobacco (41.3%), tanning and dressing of leather and foot wear (40%), and chemicals and chemical products (35.1%). In the remaining industries, the government has privatized a relatively small number of firms compared to the total number of firms remaining under its control.

Table 2

Number of Privatized Firms by Year of Transfer

Type of Manufacturing Industry [†]	1994- 1995	1996- 2000	2001- 2004	2005- 2010	Total	%
Food products, beverages and tobacco	7	31	11	22	71	44.4
Textile and wearing apparel, except fur	0	7	0	17	24	15.0
Tanning and dressing of leather and foot wear	0	3	1	6	10	6.3
Wood and paper, and wood and paper products	0	1	1	2	4	2.5
Publishing and printing services	0	3	0	0	3	1.9
Chemicals and chemical products	1	5	0	7	13	8.1
Rubber and plastics products	0	1	1	1	3	1.9
Other non-metallic mineral products	0	1	3	11	15	9.4
Basic metals and fabricated metal products, except machinery and equipment	0	2	0	3	5	3.1
Batteries, motor vehicle bodies, parts and accessories	0	0	0	1	1	0.6
Furniture	3	8	0	0	11	6.9
Total	11	62	17	70	160	100
%	6.9	38.8	10.6	43.8	100	

Sources: Authors' estimations using panel data constructed from LMSM Industries Surveys: CSA 1996-2010.

[†] The surveys captured no privatized machinery and equipment industry, if any (see Table 1).

Table 2 exhibits the years in which privatization has taken place in various LMSM industries. The privatization episodes seem to have taken place in two waves. The first wave of privatization took place from 1996 to 2000 and the second from 2005 to 2009. In both waves, a

total of 130 (81.3%) firms were privatized, representing 62 (38.8%) and 68 (42.5%) firms in the first and second waves of privatization respectively. As indicated above, issues primarily related to corruption might have caused the slowdown in the privatization process in the early 2000s, which forced the government to assign a new director to the EPA and re-nationalize some of the privatized firms (WikiLeaks).

The CSA surveys do not provide information on the factors driving the privatization process, nor do they outline the criteria the government is using when privatizing firms in the LMSM industries. However, the surveys gather information on the performances of both state and privately-owned firms. The surveyed firms reported on their rates of production and possible reasons for underutilization of their resources. Table 3 summarizes this information.

Table 3
Mean Rates of Capacity Utilization and Reasons for Underutilization

Type of firm	Output as % of production at full-capacity	Three top reasons for capacity underutilization (% of firms)			Number of firms	Number of observations
		1 Shortage of raw materials, spare parts and working capital	2 Difficulty in market competition and lack of market demand	3 Government rules and regulations		
Privatized	59.9 (28.5)	61.4 (48.7)	36.1 (48.1)	33.4 (47.2)	160	767
Not privatized (stay state owned)	62.1 (37.3)	64.5 (47.9)	35.3 (47.8)	27.3 (44.6)	371	1,748
Private since Commencement	58.1 (59.6)	64.2 (47.9)	42.5 (49.4)	43.0 (49.5)	3,772	10,422
Weighted mean [†]	58.8	64.1	41.1	40.3	4,303	12,937

Sources: Authors' estimations using panel data constructed from LMSM Industries surveys: CSA 1996-2010.

Notes: Numbers in parentheses are standard errors.

[†]The level of production and the three reasons are weighted by the number of observations.

Overall, the country's LMSM firms were able to realize slightly higher than half (58.8%) of their full-capacity production. Nearly two-third of these firms reported a 'shortage of raw materials, spare parts and working capital' as the first major reason for their capacity underutilization. About 40 percent of the firms also identified 'market related factors' and 'government rules and regulations,' as the second and third top reasons for operating under-capacity. On the other hand, it is the private firms (both the newly privatized firms (33.4%) and firms that have been private since commencement (43.0%)) that were most dominantly affected by government rules and regulations compared to the state-owned enterprises. This is reflective of the double standard business environment prevailing in Ethiopia, which is described by Mikias

(2003) as an environment riddled with preferential treatment, favoritism, kickbacks and connections with the ruling party officials or their business conglomerates.

In addition, the problem of under-capacity production is relatively higher in the private than state owned manufacturing firms, as private firms are producing at rates 2 to 4 percentage points lower than state-owned firms. Comparisons among the privately-owned firms reveal that the newly privatized firms have had marginally better performance records than the firms that have been private since commencement.

Estimation of Productivity in LMSM Industries

To capture the impacts of privatization properly, we estimated and compared the productivities of the newly privatized firms before and after they had been privatized. For such analyses, we further subdivided the 160 privatized firms into two groups: those that had been surveyed *both* before and after privatization (68) and those surveyed *only* after they have been privatized (92) (Table 4). The firms in the first group provided additional information on how they were performing while under state control. In contrast, as the CSA surveys fails to capture the firms in the second group prior to being privatized, we only know their performance after they have been privatized. As a result, no separate analysis is conducted for firms in this group. Hence, emphasizing only on the 68 firms with before-and-after privatization data, we were able to estimate their productivity differentials and present the results. We believe that the number of privatized firms (with the combined panel data of 392 observations) is large enough to enable us to generate valid statistical estimates and make inferences on the impacts of privatization on the performances of Ethiopia's LMSM industries.

Descriptive Statistics of Estimation Variables

Table 4 presents descriptive statistics of the variables used for estimation of productivity differentials. Comparisons of the means and medians of the variables in each group reveal that each variable is highly skewed to the right. Such skewed distribution in the data indicates that all the estimation variables exhibit very high extreme values that affect the mean values, confirming that the median values may be the best measures in such cases.

Comparing the changes in the use of factor inputs before and after privatization, we observe that despite employing more capital, raw material and indirect inputs per employee after privatization, the firms do not seem to register a significant increase in productivity. In particular, notice that the firms are investing substantially more amounts of money on capital, by a mean difference of 18,580 or a median difference of 14,800 (2005 PPP \$) per employee per year, after they have been privatized. Nevertheless, output per employee either has remained nearly the same or showed a slight decline. On the other hand, the median wage has significantly declined after privatization by 220 (2005 PPP \$) per employee per year. In addition, the most characteristic feature of the privatized firms is a substantial reduction observed in the level of employment after privatization.

Table 4

Descriptive Statistics - Privatized Firms Surveyed Before vs. After Privatization

Variables	Before privatization		After privatization		Difference in mean [†]	Difference in median ^{††}
	Mean	Median	Mean	Median		
Output per employee	56.27 (7.969)	39.76	57.60 (7.095)	35.81	1.33 (7.88)	-3.95
Capital per employee	16.70 (3.572)	6.59	35.28 (5.322)	21.38	18.58*** (6.10)	14.80***
Raw materials per employee	24.23 (4.602)	11.13	25.56 (5.649)	12.57	1.33 (6.60)	1.44
Indirect inputs per employee	2.08 (0.332)	1.17	2.94 (0.551)	1.05	0.86* (0.48)	-0.12
Wage per employee	2.05 (0.087)	1.96	1.98 (0.115)	1.73	-0.07 (0.12)	-0.22***
Employment	363.6 (49.74)	212	277.0 (39.68)	145	-86.6** (38.37)	-67***
Number of firms ^{†††}	68		68			
Number observations	501		392			

Sources: Authors' estimations using panel data constructed from LSM Industries Surveys: CSA 1996-2010.

[†]t-test for difference in means between privatized firms (after privatization minus before privatization).

^{††}Non-parametric test for difference in medians between privatized firms (after privatization minus before privatization).

^{†††}Out of the 160 privatized firms only 68 firms have been surveyed both before and after they were privatized.

Notes: Differences are significant at *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The monetary values are in '000 of PPP adjusted 2005 international dollar. Numbers in parentheses are linearized standard errors.

Productivity Estimations

We have presented the productivity estimations for the privatized firms from the three estimation methods (i.e., OLS, MAD and system GMM). In all cases, the dependent variable has been log productivity (i.e., log of firm output per employee), and the independent variables are expressed in log, with the exception of the variable that captures the level of labor employment in these firms. As a result, the coefficients of the estimated variables (except for the level of employment) have been interpreted as percentage contributions to productivity.

Table 5 exhibits the productivity estimates of privatized firms when they were under state control and after they have become privatized. Despite the substantial increase observed in the use of capital per employee after privatization (Table 4), firms have not yet been able to attain significant marginal gains in productivity. This implies that privatized firms are still capital-starved

and could significantly boost productivity by increasing the level of their use of capital per employee.

Before privatization, the level of employment contributed negatively to productivity. This may be due to the inherent tendency of state owned firms to over-employ. This inefficiency has been corrected after privatization probably by laying off redundant workers as described in Hailu (2005) and Wolde (2010) where mass layoffs are characteristic of privatized firms in Ethiopia. It should be noted that over-employment in state owned firms is not unique to Ethiopia, as most state-owned firms have a tendency to over-employ (Celasun, 2013; Oberhofer, Cuaresma & Vincelette, 2012; Forster & Briceno-Garmendia, 2010). For instance, Crespo et al. (2012) identify labor hoarding as one of the causes for inefficiencies and productivity differentials in state-owned firms compared to the corresponding private firms in the Belarusian machine building industries.

Raw materials and indirect inputs contribute positively and significantly to productivity both before and after privatization. For instance, privatized firms could boost productivity by approximately 0.5 percent and 0.2 percent, respectively, by increasing the level of use of raw materials and indirect inputs per employee just by one percentage point. This partly compares to Arnold et al. (2008) who find consistently positive and significant relationships between such service inputs as communication, electricity and financial services and firm productivity in over 1,000 firms in ten Sub-Saharan African countries.

For the case at hand, while the percentage contribution of raw materials per employee is lower after privatization, that of indirect inputs per employee is higher after privatization. The latter may have resulted from the slight reduction observed in the level of indirect input utilization (Table 4). In contrast, the decline in the marginal contribution of raw materials to productivity may have been caused by diminishing marginal productivity resulting from the increased use of raw materials after privatization compared to before privatization (Table 4).

The positive and significant economic contribution of wage per employee observed before the firms were privatized seems to have been neutralized when the firms became privatized, with the exception of the MAD estimation where it remains positive and highly significant. This is in line with the significantly lower wage paid to employees after the firms have become privatized, as captured by the significant difference in median wage in Table 4.

Overall, it can be concluded that over-employment was prevalent in the LMSM firms prior to privatization triggering the condition for the significant reduction observed in productivity. However, the reduction in the labor force (in search of efficiency) after privatization did not result in higher productivity.

In summary, the results from our descriptive statistics reveal that productivity did not improve (it rather slightly declined) after privatization. The significant changes resulting from privatization were increase in capital per employee, and decline in wage per employee and the level of employment. The results from our estimations show that productivity could be improved in privatized firms by increasing the level of raw materials, indirect inputs and wage per employee.

Table 5

Estimations of Production Functions – Performance of Privatized Firms Surveyed Before vs. After Privatization

(Variables in log)	Before privatization			After privatization		
	OLS	MAD	GMM	OLS	MAD	GMM
Capital per employee	0.00958 (0.0321)	-0.000525 (0.0137)	-0.000271 (0.0430)	0.0801* (0.0459)	0.0296 (0.0250)	0.0712 (0.0460)
Raw materials per employee	0.619*** (0.0482)	0.631*** (0.0162)	0.641*** (0.0560)	0.495*** (0.0609)	0.587*** (0.0243)	0.526*** (0.0658)
Indirect inputs per employee	0.215*** (0.0354)	0.207*** (0.0165)	0.168*** (0.0479)	0.253*** (0.0521)	0.244*** (0.0214)	0.234*** (0.0522)
Wage per employee	0.310*** (0.0799)	0.271*** (0.0441)	0.199*** (0.0583)	0.00191 (0.0951)	0.132*** (0.0420)	0.00347 (0.0911)
Employment	-0.0888** (0.0362)	-0.0974*** (0.0195)	-0.0934** (0.0419)	0.00486 (0.0519)	0.000374 (0.0273)	0.00225 (0.0466)
Constant	2.262*** (0.265)	2.315*** (0.124)	2.328*** (0.303)	2.025*** (0.336)	1.894*** (0.185)	1.997*** (0.295)
R-squared	0.852	0.655	-	0.643	0.505	-
Number of observations	486	486	486	369	369	369
Number of firms		68			68	

Dependent variable: Output (value of production) per employee (in log)

Sources: All estimations using the panel data from Ethiopian LMSM Industries Surveys: CSA 1996-2010.

Notes: Robust standard errors in parentheses, Significant at *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Discussion of Results

Starting from the early 1990s, Ethiopia, like many African countries, embarked on economic reforms prescribed by the World Bank and the International Monetary Fund as conditions to continued economic assistance. One part of the reform prescription was privatization of state owned enterprises that were theoretically deemed inefficient and ineffective to bring about sustainable economic growth. The underlying assertion has been that when such firms are privatized, the economic incentives and profit motivation prevailing in the market economy can promote productivity and fuel the engine of economic growth. However, as shown above, privatization failed to produce substantial improvement in productivity in Ethiopia.

This goes contrary to most findings that document productivity improvements after privatization (Arnold et al., 2008; Brown et al., 2010; Chenm, 1997; Oberhofer et al., 2012; Noorbakhsh & Paloni, 1999). The above theoretical predictions of economic theory and empirical findings hold only under the core principles of competition governed by market forces and fair business environment (Hall & Jones, 1999; Megginson & Netter, 2001; Shirley, 1992). Therefore,

as a possible explanation for what went wrong in the case of Ethiopia, we looked at the prevailing market structure and business environment.

The business environment in Ethiopia does not seem to encompass the basic economic conditions postulated by economic theory as necessary for free market competition, which probably is the main factor impeding the success of privatized firms (Abegaz, 2013; Milkias, 2003; Negash, 2013; Schwab & Sala-i-Martin, 2015; Vaughan & Gebremichael, 2011). For example, Schwab and Sala-i-Martin (2015) rank Ethiopia as 130th of 144 countries on the overall Global Competitiveness Index (GCI). GCI is a comprehensive tool that measures the microeconomic and macroeconomic foundations of national competitiveness based on a weighted average of many different components grouped into 12 pillars of competitiveness, including, for instance, institutions, infrastructure, labor market efficiency, financial market development, market size, and business sophistication.

Ethiopia's market distortions and lack of competition seem to mainly arise from intervention of the government in the market. Leaders of the Tigrayan People's Liberation Front (TPLF)-led government, who has been ruling the country for the last 25 years, started directly engaging in the market by creating vast "private" business conglomerates under the name of EFFORT. These business conglomerates are owned by TPLF and run by the elites in the party. On the other hand, state owned enterprises with high monetary and economic significance (but small in number) have been selectively privatized to one private company - MIDROC Ethiopia Investment Group. Such transfer of firms with high monetary value and economic significance to a single company amounts to a change in hands from one owner (the government of Ethiopia) to another (the MIDROC Group) in the name of privatization.

The two groups (EFFORT and MIDROC) have become powerful market players blanketing every single economic activity in the country, and creating what looks like a "duopoly" market structure. This limits the market landscape on which the rest of private businesses, which are substantially smaller in size and larger in number but with insignificant market shares, would be operating. Under this environment, it would then be hard to expect the predictions of theoretical economic models, which are based on competitive market conditions, to hold. The business environment in Ethiopia is rather predestined to create a market distortion that encourages rent-seeking behavior, political connections and preferential treatment, instead of furnishing the incentives for innovation or maximization of efficiency. Under these conditions, it should not be a surprise that productivity has either declined or at best showed no improvement after privatization for the majority of Ethiopia's LMSM firms.

Conclusion

In this paper, we analyzed the impacts of privatization on manufacturing firms' productivity, level of employment, wages, and resource utilization using 15 years of survey data on Ethiopia's Large and Medium Scale Manufacturing (LMSM) industries, that was gathered by the Central Statistical Agency (CSA) between 1996 and 2010. We identified 68 privatized firms

(constituting 392 total observations) with data capturing their performances before and after privatization.

Our findings show that privatization in Ethiopia seems to be ineffective as we were unable to find notable productivity (measured as firm output per employee) gains resulting from privatization. More specifically, while the mean difference in productivity shows a small and insignificant increase after privatization, the median difference in productivity shows slightly higher but insignificant decline after privatization. In terms of marginal analysis, we have observed that privatized firms tend to exhibit no or a small productivity differential (i.e., marginal gains in productivity) with respect to the majority of estimation variables.

As the estimation results show, the marginal gains in productivity resulting from additional units of raw materials and wages have been lower after privatization. In addition, employing more workers does not have significant impact on productivity after privatization. Based on these results, it may be possible to conclude that privatization does not seem to help the country expand the use of its local resources to enhance productivity, or generate job opportunities for the workforce, in the manufacturing sector. Neither can the workforce in the manufacturing sector be able to receive higher wages because a rise in wage rates provides less marginal return to the owners of the privatized firms.

Finally, we conclude with the following remarks regarding the economic and business environment in Ethiopia. First, the privatization process in Ethiopia seems to suffer from a lack of transparency, and is very slow and riddled with corruption. It is difficult to tell whether political decisions or economic factors are dictating which firms to privatize, how and by whom their market values are evaluated, and what factors govern the bidding processes, and when and to whom to privatize. Second, privatization does not seem to have achieved at least two of the objectives stated in Proclamation No. 146/1998: reducing government involvement in the economy and expanding the private sector. The creation of political party parastatals under EFFORT (and to some extent under Tirit, Dinsho and Wendo Trading), which are led by their respective party and government officials, has created an entirely new kind of participation and intervention of the government in the economy. The party parastatals and MIDROC Group are reported to have heavily dominated the various sectors of the economy leaving no or little space for the rest of the private sector to operate. State owned enterprises are still one of the major players in the manufacturing sector (besides EFFORT and MIDROC), further limiting the level of fair competition that enhances private sector development.

This study identifies the market structure and business environment prevailing in Ethiopia as the most probable factors for achieving no notable productivity gains from privatization. This conclusion is derived from the survey of literature on market structure and business environment in Ethiopia as well as the responses from a large number of surveyed firms (both private and state owned) that identified these factors as the dominant cause for their under-capacity utilization of resources.

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Appendix A1: *Definition of Variables*

Variable	Definition
Output (Y)	Total sales value + difference in inventory of semi and finished goods (end minus beginning period) + difference in inventory of raw materials (end minus beginning period).
Capital (K)	Total book value of fixed assets at the end of the year.
Employment (L)	Total number of permanent employees (administrative and production workers) in a year.
Indirect inputs (I)	Value of fuel and lubricating oil + value of electricity + value of water consumed + rental values for structures and equipment (in a year).
Raw materials (M)	Total value of raw materials consumed (local and imported) in a year.
Wages (W)	Total wages (annual)
Output per employee (Y/L)	Output divided by number of employees, gives the dollar value of output produced by a worker per year.
Capital per employee (K/L)	Capital divided by number of employees, captures the size of capital available per worker per year.
Indirect inputs per employee (I/L)	Indirect inputs divided by number of employees, captures the size of indirect inputs a worker can use per year.
Raw materials per employee (M/L)	Raw materials divided by number of employees, captures the size of raw materials at the disposal of a worker per year.
Wage per employee (W/L)	Wages divided by number of employees, captures the dollar amount a worker receives per year.

Appendix A2: *Deflators and Conversion Factors*

Deflators/Conversion factors	2003	2004	2005	Variables deflated or converted
GDP deflator	102.43	106.44	116.95	Y, K
Private consumption deflator (or CPI)	101.18	109.90	117.42	M, I, W
Market exchange rate (Birr per US\$, period average)	8.60	8.64	8.67	-
PPP conversion factor for GDP	2.10	2.12	2.25	Y, K
PPP conversion factor for private consumption	2.53	2.55	2.75	M, I
Market exchange rate ratio	0.24	0.25	0.26	W

Source: The World Bank, International Comparison Program database, 2000 – 2005.

Notes: The PPP conversion factor is the number of LCU (Ethiopian Birr) required to buy the same amounts of goods and services in the domestic market as a U.S. dollar would buy in the United States.

The PPP conversion factor for private consumption (i.e., household final consumption expenditure) is the expenditure in LCU (Ethiopian Birr) per international \$.

The market exchange rate ratio (or the national price level) is obtained by dividing the PPP conversion factor for GDP by the official market exchange rate.