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Determinants of labor productivity among SMEs and large-sized private service firms in Kenya

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Abstract

Using the 2018 World Bank enterprise data, this study sought to establish whether the determinants of labor productivity in the Kenyan private service sector varied with the size of the firm. Unlike previous studies that just focus on the determinants of labor productivity among manufacturing firms; this study employed the two-stage switching regressions model to correct for the firm-size effect. The findings revealed that capital intensity, employee wage, high school education, and managers' experience impacted positively and significantly on labor productivity while tax burden and power outages significantly decreased labor productivity across all firms. The differences in the determinants of labor productivity across both firms were, however, found to be negligible and insignificant. With the political uncertainty and tax burden constraints perennially defining the Kenyan economy, the study recommended the provision of a favorable business environment and investment in human capital as key channels of optimizing service sector productivity. The selectivity variable was also significant across both firms, hence supporting the role of self-selection in labor productivity studies. Correcting for the firm-size effect was very crucial; something that has been largely ignored in previous studies on labor productivity.

KEYWORDS

labor productivity, service sector, two-stage switching regression, Kenya

JEL CLASSIFICATION

D24; E23; J01

1 | INTRODUCTION

The profitability and survival of any firm are determined by its performance. To a large extent, this depends on labor productivity. Labor productivity is a measure of efficiency in the production process and refers to a firm's generation of higher value-added per unit of labor (Heshmati & Rashidghalam, 2018). High labor productivity implies that a firm can produce at least the same amount of output with fewer laborers. With increased output, a firm can benefit from economies of scale and, thus, increase its profit potential (Kenya National Bureau of Statistics, 2017).

Kenya is among the fastest-growing economies in sub-Saharan Africa. As recent publications show, political and economic reforms boosted the expansion and creation of local businesses and increased international trade. The services sector is of paramount importance to the Kenyan economy as it accounts for more than half of the gross domestic product (GDP) and employs more than a third of the active labor force (Kenya National Bureau of Statistics [KNBS], 2017; World Bank, 2019a, 2019b, 2019c). Critical for further expansion of the sector is its labor productivity, which has, however, decreased in the past 10 years, undermining potential future growth. This study, thus, aims at identifying which firm characteristics determine higher labor productivity. Differently from other studies, the research focuses on the labor productivity differences between small and medium-sized enterprises (SMEs) and large firms and the extent of this variation in their perception of the role and quality of institutions.

More concretely, this study examines how tax burden and political uncertainty affect firms' productivity. The heavy tax burden has continuously resulted in tax avoidance as well as shut down of key firms over the last decade (Kenya Revenue Authority, 2019). Kenya has also had to grapple with the post-election violence crises that surface over each electioneering period due to highly contested and disputed elections (notable in the 2007–2008, 2013, and 2017 election periods). These periods normally culminate in the destruction of property, theft, and deaths of its citizens; with the result being the closure of important businesses and more particularly the service-providing industries. It is worth noting that even though the unfavorable business environment poses a massive threat toward service industries' productivity, no studies have been undertaken to deal with the same in the Kenyan service sector context.

This paper makes a major contribution by also acknowledging the fact that labor productivity determinants are likely to vary depending on the size of the firm. Even though this is true, many existing works do not explore them separately. Studies that attempt to distinguish between SMEs and large firms tend to pool the entire data after which they introduce a firm-size variable. This implicitly treats the size distribution of SMEs as that of the entire population yet the size distribution of SMEs is in effect truncated. This makes it impossible to clearly and accurately distinguish the effects of other independent variables on the two different types of firms. There is a need to correct for this effect of sample selection problem and thus the variant of the two-stage estimation technique from Heckman (1979) becomes imperative. Surprisingly, previous studies have, however, failed to take cognizance of the fact that augmenting firm size through sample selection indeed helps to address the selectivity bias problem.

Many studies on productivity in both developed and developing countries have entirely focused on the manufacturing sector. The few that look at the service sector either combine both manufacturing and service sectors or tend to align the service sector toward total factor productivity and or employment growth. Concerning labor productivity, the service sector has been largely ignored. Understanding the drivers of labor productivity in the service sector would, thus, provide astute policies on the role of institutions in enhancing labor productivity. High labor productivity stimulates a firm's growth since high revenue enables re-investment from the surplus generated. There is more return from this re-investment on the factors of production with a rapid increase in both domestic and private consumption (KNBS, 2017). The service sector plays a key role both directly through job creation and revenue generation and indirectly through fostering forward and backward linkages to other sectors in an economy (Were, 2016). According to the World Bank (2019a, 2019b, 2019c), the agricultural sector in Kenya is the largest employer at 57.03% while the industry and manufacturing sector employs the least at 7.67% (see Table 1).

According to KNBS (2016), the private sector outshines the public sector in terms of service sector employment creation (see Table 2).

Table 2 shows that the number of employed persons (in thousands) in the service industry has been progressively increasing across the private and public sectors from 2011 to 2015. The private sector also created more job opportunities than its public counterpart over the same period. The wholesale, retail trade, and education sectors are the largest employers for the private sector while education and public administration employ the largest number in the public sector (KNBS, 2016).

TABLE 1 Employment creation as a percentage of total employment; both private and public sectors

Sector	%
Agriculture	57.03
Services	35.30
Industry and manufacturing	7.67
Total	100

Source: World Bank (2019a, 2019b, 2019c).

TABLE 2 Private and public sectors: employment by service subsector (2011–2015)

	Year									
	2011		2012		2013		2014		2015	
Subsector	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
Retail and wholesale trade, repair of motorcycles and vehicles	189.6	0.8	197.1	0.9	210.9	1.3	218.9	1.3	230.7	1.6
Storage and transportation	56.1	16.8	58.1	17.1	58.8	17.2	62.1	17.6	64.8	17.8
Food and accommodation	64.2	1.4	67.6	1.3	72.1	1.4	71.7	1.4	74.7	1.4
Information and communication technology (ICT)	78.8	1.7	83.9	1.8	90.6	1.8	97.3	1.8	103.8	1.9
Insurance and financial activities	48.5	7.9	51.3	8.6	56.3	9.0	58.1	9.4	62.7	10
Real estate	3.6	–	3.7	–	3.8	–	3.9	–	4.0	–
Scientific, professional, and technical activities	55.6	5.7	56.9	5.8	59.4	5.8	60.7	5.9	62.6	5.9
Education	100.9	281.2	106.9	289.5	142.5	293.0	166.7	302.3	189.1	318.6
Social work and human health activities	68.9	29.0	73.8	30.4	80.1	30.7	85.2	31.1	91.3	32.7
Entertainment, arts, and recreation	3.9	2.2	4.0	2.4	4.3	2.4	4.3	2.4	4.5	2.5
Defense, public administration, and compulsory social security	–	206.0	–	208.2	–	222.4	–	226.9	–	222.0
Other service activities	27.3	–	28.2	–	29.2	–	30.5	–	31.7	–
Total	697.4	552.7	731.5	566	808	585	859.4	600.1	919.9	614.4

Source: KNBS (2016).

The service sector is a key driver to Kenya's economy. The sector contributed 47% of Kenya's GDP in 1980. It accounted for 51% in 1990, with the figure remaining constant in 2000. It then rose significantly to 58% in 2011 with a further increase to 62.5% in 2015 (World Bank (IBRD-IDA), 2015). This sector continues to play a crucial role in the acceleration of growth for the Kenyan economy with several of its intensive-knowledge subsectors—such as telecommunications, tourism, finance, and business—showing continued prosperity over the past decade. In fact, from the period 2006 to 2013, 72% of the increase in Kenya's GDP emanated from the services sector (World Bank (IBRD-IDA), 2015).

Kenya's service exports have grown very fast over the previous decade, with tourism and transport being the two largest contributors. The services exports have also been growing faster than goods exports since 2005, accounting for more than half of the increase in total exports (World Bank (IBRD-IDA), 2015). This could be attributed to the fact that this sector, in contrast to manufacturing and agriculture, is less dependent on the high cost of raw materials such as energy and land. Second, services are less susceptible to volatile commodity prices. And third, it has a smaller physical footprint than its counterparts that have to rely on the land, physical equipment, and plants.

Generally, the sector performs comparatively better than the industry, manufacturing, and agricultural sectors (see Table 3).

TABLE 3 Sectorial contributions to Kenya's gross domestic product (GDP), both private and public (2007–2017)

	Yearly % contribution to GDP										
Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Agriculture	20.59	22.20	23.36	24.83	26.30	26.21	26.44	27.45	30.19	32.14	31.52
Service	50.23	50.12	49.32	47.11	58.00	47.80	48.01	47.98	62.50	44.74	50.70
Industry and manufacturing	19.30	18.58	18.75	18.55	18.91	18.63	18.02	17.44	17.30	17.46	17.50

Source: KNBS (2007–2010, 2012, 2017), World Bank (IBRD-IDA) (2015).

Despite the service sector's largest share of contribution to GDP, it is also clear that this share has not hit its maximum potential. With 58% and 62.5% contributions in the year 2011 and 2015, respectively, the service industry can hit a target of 70% only through adequate value addition (World Bank Kenya Country Economic Memorandum, 2016).

The service sector is divided into various subsectors, with each one of them contributing to a certain share of Kenya's GDP (see Table 4).

Table 4 reveals that real estate makes up the largest contribution to GDP at 8.9%, closely followed by the wholesale and retail subsector at 8.8%. Health and information and communication technology (ICT) contribute the lowest at 1.8 and 1.6, respectively. Even though the service sector does outperform the industry, manufacturing and agricultural sectors as revealed by Table 3, within the service sector itself, the value-added as a percentage of GDP has consistently shown both an upward and downward swing from 2007 to 2017; a worrying trend that informs the low labor productivity pattern in this sector (KNBS, 2007–2010, 2012, 2017; World Bank (IBRD-IDA), 2015) (see Figure 1).

From Figure 1, it is evident that this consistent decline in value-added informs the low labor productivity in the service sector.

The rest of the paper is organized as follows: Section 2 will review the existing literature. Section 3 will discuss the methodology, data and variables used. Section 4 will provide econometric estimates. Section 5 will discuss the findings, with the final section providing conclusions and policy implications.

2 | LITERATURE REVIEW

Productivity is a measure of efficiency in the production process—that is, how much output is produced from a given set of inputs—and is expressed as an output-input ratio (Jehle & Reny, 2011). Many studies have analyzed labor productivity and its determinants from the developed economies' context with a few targeting the developing economies. The determinants of labor productivity stem from both theory and empirical evidence.

The theoretical literature identifies capital and labor (Cobb & Douglas, 1928) as key drivers of productivity. To accommodate more variables that positively influence firm-level productivity, Koss and Lewis (1993) propose energy, material, fixed and working capital, labor quality, and management. The human capital theory of labor productivity identifies education level, formal training, managers' experience, and R&D as prime drivers of firm-level productivity (Becker, 1964; Mincer, 1974; Schultz, 1961; Welch, 1970). These studies assert that education and training transmit vital knowledge and skills, which in turn raise a worker's marginal productivity.

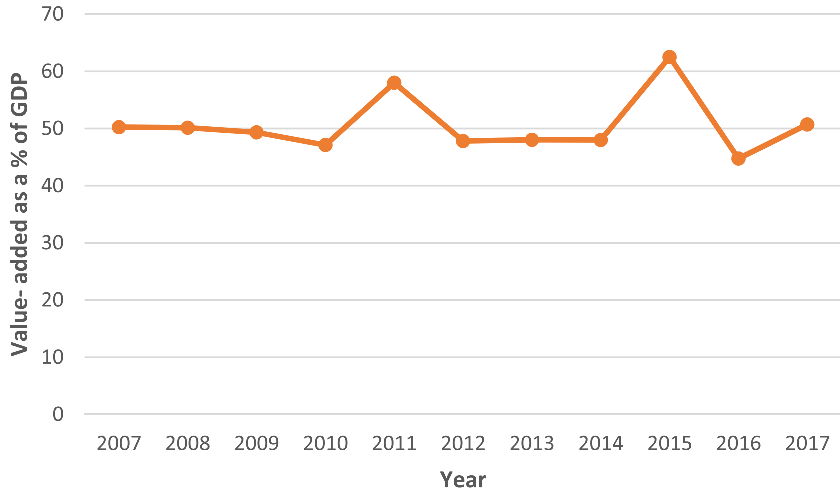
Several empirical studies further attest to the role of human capital in enhancing labor productivity. Corvers (1997) finds a significant increase in labor productivity among employees with university or college qualifications when compared to those with primary and secondary school education levels. Work experience and formal training are found to positively and significantly determine labor productivity among Tanzanian enterprises (Goedhuys, Janz, &

TABLE 4 Composition of the service sector in Kenya, both public and private

Subsector	% contribution to GDP
Real estate	8.9
Wholesale and retail	8.8
Travel and tourism	8.2
Finance	7.4
Education	6.1
Public administration	5.4
Liberal professions	2.5
Health	1.8
ICT	1.6
Total percentage	50.7

Notes: GDP: gross domestic product; ICT: information and communication technology.
Source: KNBS (2017).

FIGURE 1 Service sector's value-added as a percentage of Kenya's gross domestic product (GDP) [Color figure can be viewed at wileyonlinelibrary.com]



Mohnen, 2008). The same study finds political instability as a factor that significantly reduced firm-level labor productivity. According to Makochekanwa and Nchake (2019), geographical location proves pivotal in determining the contribution of a female manager to firm productivity.

There exists a consensus in the developed world that innovation enhances labor productivity (as documented in the works of Adegboye and Iweriebor, 2018; Griffin, Huego, Mairesse, & Peters, 2006; Organization for Economic Cooperation and Development, 2009). Empirical evidence in the developing economies is, however, rather contradictory. For instance, in sub-Saharan Africa (SSA), Chowdhury and Wolf (2003) argue that innovation (proxied by ICT) dampens labor productivity among SMEs. On the other hand, the study by Heshmati and Uwitonze (2016) reveals that innovating service firms boast of a competitive advantage over the non-innovating firms. Okumu and Buyinza (2018) rather find a neutral relationship between a firm's engagement in any kind of innovation and labor productivity ceteris paribus. This implied that irrespective of a firm's level of labor productivity, firms that engaged in only one innovation were not significantly different from non-innovating firms.

Investment in fixed assets and the average wage for labor are found to impact positively and significantly on labor productivity (Mawejje and Okumu, 2018; Rath, 2006). Surprisingly, Heshmati and Rashidghalam (2018) find capital intensity to have an insignificant effect on labor productivity among Kenyan manufacturing and service firms. Firms that invest heavily in fixed assets realize a higher value-added since capital provides labor with the tools necessary to make it efficient and productive. Similarly, well-remunerated employees are self-motivated, hence, more productive.

Mensah (2016) finds a significant and robust negative effect of power outages on firm-level productivity among 15 SSA countries. The poor business environment has been associated with reduced enterprise productivity and growth among formal African firms (Arnold, Mattoo, & Narciso, 2008; Dethier, Hirn, & Straub, 2011; Eifert, Gelb, & Ramachandran, 2008; Ishengoma & Kappel, 2011). The high tax rate was found to negatively impact on firm productivity among Ugandan enterprises (Mawejje & Okumu, 2016). Nagler and Naude (2014) find a decline in labor productivity for firms located in rural areas, highlighting the role of proximity to infrastructural amenities in enhancing productivity.

Generally, there are limited empirical studies on what factors determine labor productivity distinctly in the service sector. No evidence has been provided on the impact of tax burden constraints and political uncertainty on firm-level productivity in the Kenyan service sector context. This study will, thus, incorporate these variables into the labor productivity model. Also, the study will show that the determinants of labor productivity may not be identical across the SMEs and large-sized firms and even if they were, then the magnitude of the impact of a given variable on labor productivity may vary. Therefore, this calls for the essential need to control for firm-size effect when studying labor productivity among different firm-sized enterprises; something that has largely been previously ignored. Equally, the majority of the previous studies have focused on labor productivity among the manufacturing firms. No single study has distinctly investigated the drivers of labor productivity within the Kenyan service sector, hence, the need for this study.

3 | METHODOLOGY

Consider a random sample of N firms in which M firms are SMEs and the rest are large firms. Given that the entire sample combines both SMEs and large firms, then firm size for a firm can be defined as $i = 1, 2, ..., N$ to be a dichotomous outcome I_i represented by:

$$I_i = \begin{Bmatrix} 1 \text{ if the number of employees} \leq H_i^* \\ 0 \text{ otherwise} \end{Bmatrix} \tag{1}$$

whereas H_i^* denotes the firm size threshold.

To compare the differences in the determinants of labor productivity among SMEs and large firms, the equations for firm i's labor productivity are specified as follows:

$$\left(\frac{Y}{L}\right)_{S_{i=1}} = \beta_0 + \beta_s X_{S_i} + \mu_{S_i} \tag{2a}$$

$$i = 1, 2, ..., M,$$

$$\left(\frac{Y}{L}\right)_{l_{i=0}} = \beta_0 + \beta_l X_{l_i} + \mu_{l_i} \tag{2b}$$

$$i = M + 1, M + 2, ..., N,$$

where $\left(\frac{Y}{L}\right)_{S_{i=1}}$ and $\left(\frac{Y}{L}\right)_{l_{i=0}}$ denote labor productivity for SMEs ($i = 1$) and large firms ($i = 0$), respectively. X_{S_i} and X_{l_i} represent the explanatory variables for SMEs and large firms, respectively. β_s and β_l are the population parameters and μ_{S_i} and μ_{l_i} denote the error terms for the SMEs and large firms, respectively. The error terms are assumed to be normally distributed with zero mean and constant variance.

The reviewed literature identifies various factors that influence labor productivity. They range from the capital intensity, wage per employee, education level, managers' experience, formal training, and energy (measured by power outages). Also, to account for structural differences between different sectors within the service industry, a sectoral categorical variable will be included in the model as shown in Equation (3).

$$\left(\frac{Y}{L}\right) = f\left(\frac{K}{L}, \frac{W}{L}, H, M, T, P, S\right) \tag{3}$$

where $\frac{K}{L}$ is capital intensity, $\frac{W}{L}$ represents average wage per employee, H is high school education, M is managers' experience, T represents formal training, P denotes power outages, and S represents the sectoral variable.

Rewriting Equation (3) into semi-logarithmic form and taking into account the use of cross-sectional data yields the labor productivity model; where productivity is studied in different firms at the same point in time; in this case 1 year.

$$\ln\left(\frac{Y}{L}\right)_{S_i} = \beta_0 + \beta_1 \ln\left(\frac{K}{L}\right)_i + \beta_2 \ln\left(\frac{W}{L}\right)_i + \beta_3 \ln H_i + \beta_4 M_i + \beta_5 T_i + \beta_6 P_i + \beta_7 S_i + \mu_{S_i} \tag{4a}$$

$$\ln\left(\frac{Y}{L}\right)_{l_i} = \beta_0 + \beta_1 \ln\left(\frac{K}{L}\right)_i + \beta_2 \ln\left(\frac{W}{L}\right)_i + \beta_3 \ln H_i + \beta_4 M_i + \beta_5 T_i + \beta_6 P_i + \beta_7 S_i + \mu_{l_i} \tag{4b}$$

This study will contribute to the existing literature by examining the influence of tax burden constraints and political uncertainty on firm-level productivity among the Kenyan service sectors.

$$\ln\left(\frac{Y}{L}\right)_{S_i} = \beta_0 + \beta_1 \ln\left(\frac{K}{L}\right)_i + \beta_2 \ln\left(\frac{W}{L}\right)_i + \beta_3 \ln H_i + \beta_4 M_i + \beta_5 T_i + \beta_6 P_i + \beta_7 S_i + \beta_8 D_i + \beta_9 U_i + \mu_{S_i} \tag{5a}$$

$$\ln\left(\frac{Y}{L}\right)_{l_i} = \beta_0 + \beta_1 \ln\left(\frac{K}{L}\right)_i + \beta_2 \ln\left(\frac{W}{L}\right)_i + \beta_3 \ln H_i + \beta_4 M_i + \beta_5 T_i + \beta_6 P_i + \beta_7 S_i + \beta_8 D_i + \beta_9 U_i + \mu_{l_i} \tag{5b}$$

whereby D_i denotes tax burden constraints while U_i denotes a firm's political uncertainty status.

Using the ordinary least squares (OLS) method to estimate the coefficients for SMEs and large firms in Equations (5a) and (5b) yields unbiased but inconsistent estimates. A sample selection problem arises since the separation of these two types of firms results in a truncated distribution. To control for this effect, a variant of the two-stage estimation method, after Heckman (1979), is employed. The sample selection or truncation is treated as a specification error. An equation for firm size determination is thus modeled and appended onto each of the labor productivity equations in Equations (5a) and (5b). The reason is that firm size is determined by the difference between the benefits and costs of becoming a particular size, which may not be observable even though size is. The benefits and costs are, however, affected by a given set of both the observable and the unobservable factors.

Furthermore, the Heckman model takes into account the difference between the probability that an enterprise operates as an SME or a large firm in the first stage (selection stage) and subsequently, the level of labor productivity for this particular firm (the outcome stage). This is crucial in understanding labor productivity differences between the two firms while at the same time controlling for selectivity bias problems. To formulate an equation for firm size, we proceed as follows:

$$H_i^* = \boldsymbol{W_i}\boldsymbol{\gamma} + \mu_i \tag{6}$$

where $\boldsymbol{W_i}$ is a vector of observable explanatory variables already specified in Equations (5a) and (5b) while $\boldsymbol{\gamma}$ denotes a vector of parameters. μ_i captures the unobservable variables and is assumed to be normally distributed with zero mean and constant variance. H_i^* shows the threshold of the number of employees in a firm. That is,

$$I_i = \begin{cases} 1 \text{ if the number of employees lies in the range } 5 \geq H_i^* \leq 99 \\ \quad\quad\quad\quad 0 \text{ otherwise} \end{cases} \tag{7}$$

We do not have to design the threshold for firm size since it is already specified in the data set, that is, (5 ≥ SMEs ≤ 99) and 100 or more employees for large firms. With two possible outcomes for the firm size H_i^* and assuming that the error term is normally distributed, then the resulting formulation gives rise to a probit model:

$$\begin{cases} \text{Prob}(I_i = 1) = \int_{-\infty}^{\boldsymbol{W_i}\gamma} \varphi(t)dt = \boldsymbol{\varphi}(\boldsymbol{W_i}\boldsymbol{\gamma}), \text{ for SMEs} \\ \text{Prob}(I_i = 0) = \int_{\boldsymbol{W_i}\gamma}^{\infty} \varphi(t)dt = 1 - \boldsymbol{\varphi}(\boldsymbol{W_i}\boldsymbol{\gamma}), \text{ for large firms} \end{cases} \tag{8}$$

where ϕ is the cumulative function of the standard normal distribution and $\boldsymbol{\phi}$ is its density function. The study does acknowledge that the distribution may be skewed in the probit model since the number of observations in one of the groups may be typically much smaller than the other. However, this usually changes the constant term but does not affect the slope coefficients in the probit or logit models (Maddala, 1992, pp. 330–332). Nevertheless, as the number of observations in both groups is large, the distribution approaches normal as per the central limit theorem. The estimation proceeds in two steps. The probit Equation (8) is first estimated using the maximum likelihood estimation (MLE) method to obtain estimates of $\boldsymbol{\gamma}$. The consistent estimators of the inverse of Mill's ratio for each observation i in the sample are then computed as follows:

$$\begin{cases} \hat{\lambda}_{s_i} = \dfrac{\varphi(\mathbf{W_i}\hat{\boldsymbol{\gamma}})}{\boldsymbol{\varphi}(\mathbf{W_i}\hat{\boldsymbol{\gamma}})} \text{ for SMEs,} \\ \hat{\lambda}_{l_i} = \dfrac{\varphi(\mathbf{W_i}\hat{\boldsymbol{\gamma}})}{1 - \boldsymbol{\varphi}(\mathbf{W_i}\hat{\boldsymbol{\gamma}})} \text{ for large firms,} \end{cases} \tag{9}$$

In the second stage, the variable $\hat{\lambda}_{s_i}(\hat{\lambda}_{l_i})$ is then added as a regressor onto the original labor productivity equations for SMEs (large firms). This yields the final labor productivity models for SMEs and large firms as follows:

$$\ln\left(\frac{\boldsymbol{Y}}{\boldsymbol{L}}\right)_{S_i} = \beta_0 + \beta_1 \ln\left(\frac{K}{L}\right)_i + \beta_2 \ln\left(\frac{W}{L}\right)_i + \beta_3 \ln H_i + \beta_4 M_i + \beta_5 T_i + \beta_6 P_i + \beta_7 S_i + \beta_8 D_i + \beta_9 U_i + \beta_{10}\hat{\lambda}_{s_i} + \mu_{s_i} \tag{10a}$$

$$\ln\left(\frac{Y}{L}\right)_{l_i} = \beta_0 + \beta_1 \ln\left(\frac{K}{L}\right)_i + \beta_2 \ln\left(\frac{W}{L}\right)_i + \beta_3 \ln H_i + \beta_4 M_i + \beta_5 T_i + \beta_6 P_i + \beta_7 S_i + \beta_8 D_i + \beta_9 U_i + \beta_{10} \hat{\lambda}_{l_i} + \mu_{l_i} \tag{10b}$$

Equations (10a) and (10b); now linear and free of selection bias, can then be estimated using OLS (Wooldridge, 2000). With the correction of the firm-size effect, the resulting estimated coefficients of the explanatory variables become consistent.

3.1 | Descriptive statistics

This section presents a brief description of the variables employed in this study (see Table 5).

3.2 | Summary statistics

This is summarized in Table 6.

Table 6 shows that the service firm's value-added per unit of labor averaged 4,708, 211 Kenya shillings (KES). Labor productivity also exhibited the highest standard deviation of 10,100,000 around the mean value. The lowest labor productivity recorded by a service firm was KES 4,880 with the highest being KES 1.50 billion. The capital-labor ratio averaged KES 505,478.60 with a dispersion rate of 2,016,636 around the mean value. Service firms' annual employee wage averaged KES 1,083,914 with a dispersion of 2,808,492 and varied in the interval of 5,000 and KES 2.4 billion. On average the number of employees with high school education qualifications was approximately 86 per every service firm. The years of experience for a service firm's top manager approximately averaged 14 years. The variable exhibited a dispersion rate of 10.3303 and varied in the interval of 1 and 60 years.

The average weekly length of power outage duration experienced by service firms was approximately 9 hr. On average, 45.28% of the service firms provided formal training programs to their employees; 20.10% of the service firms reported the tax burden as a major obstacle; while 36.08% of the service firms reported political uncertainty as a major

TABLE 5 Descriptive statistics of the key variables

Variable	Description and measurement
Labor productivity	The ratio of the gross value-added per unit of labor, in KES. Value-added is measured by the log of a firm's total annual revenue less cost of raw materials and intermediate inputs.
Capital intensity	The total annual value of the entire tangible and intangible assets invested by the service firm less depreciation per unit of labor, in KES. It is computed as the net book value in the data set.
Wage per employee	The annual average wage per employee, in KES. It is expressed in a natural logarithm.
High school education	The number of workers with high school education qualifications. Education defines the quality of labor and is expressed in the natural log.
Manager's experience	The number of years of experience for the top manager, measured in years.
Formal training	Takes the value 1 if a firm's employees received formal training programs in the last fiscal year and 0 otherwise.
Power outages	The average weekly length of power outages, measured in hours.
Tax burden	The perception of the degree of the burden imposed by tax rates on a firm's productivity. Takes the value of 1 if a firm reports tax burden as a major obstacle and 0 otherwise.
Political uncertainty	The perception of the degree of the burden imposed by political uncertainty on a firms' productivity. Takes the value of 1 if a firm reports political uncertainty as a major obstacle and 0 otherwise.
Firm size	Measured by the number of employees in a firm: ($5 \geq$SMEs≤ 99) and 100 or more employees for large firms.
Sector	Categorical variable, i.e., Sector 0: Food. Sector 1: Chemical, pharmaceutical, and plastic. Sector 2: Textiles and garments. Sector 3: Retail. Sector 4: Tourism. Sector 5: Other services.

Source: Authors' description based on 2018 World Bank Enterprise data.

TABLE 6 Summary statistics of the key variables for the service sector ($N = 546$)

Variable	Mean	Std. dev.	Min.	Max.
Labor productivity	4,708,211	1.01E + 07	4,880	1.50E + 08
Capital intensity	505,478.6	2,016,636	3,428.572	3.84E + 07
Wage per employee	1,083,914	2,808,492	5,000	2.40E + 07
High school education	86.9834	27.704	0	100
Manager's experience	14.2203	10.3303	1	60
Formal training	0.4528	0.4984	0	1
Power outages	9.5814	14.502	0	59
Tax burden	0.201	0.4012	0	1
Political uncertainty	0.3608	0.4808	0	1
Firm size				
SMEs	0.9007	0.2994	0	1
Large	0.0993	0.2994	0	1
Sector				
Food	0.0508	0.22	0	1
Chemical, pharmaceutical, and plastic	0.0266	0.1612	0	1
Textiles and garments	0.0702	0.2558	0	1
Retail	0.3123	0.464	0	1
Tourism	0.247	0.4318	0	1
Other services	0.293	0.4557	0	1

Source: Stata computation.

obstacle. Of the total 546 service firms sampled, 88.28% were SMEs. That is, the number of large firms sampled was 64 while SMEs were 482.

3.3 | Measuring service productivity

The services sector comprises a very disparate group of subsectors with each bearing a slightly or wholly varied productivity performance. For instance, market services on average do possess as much fixed capital per employee as manufacturing. The only exception is that this stock of capital is more skewed toward buildings and ICT. Regarding intangible capital, high productivity in service sectors is realized through combining fixed capital, new computer software, and human capital to generate new business models or products. Therefore, service sectors equally require both the tangible and intangible capital to operate efficiently. Even though the intangible assets appear to be more paramount, service sectors cannot operate in a vacuum. There have to be physical components such as buildings, machinery, and equipment to aid service productivity (Diewert, 2003; Uppenberg & Strauss, 2010).

In most measures of productivity, the output is related to labor input since labor is the most easily measured input. Labor hours can be used as an input measure since they are easily available (Heshmati & Rashidghalam, 2018). The problems encountered when measuring output are quite similar in both the goods and the service-providing industries. It is expected that the output indicator is quantifiable and independent of the input measure. If this is not the case, then we cannot ascertain any change in productivity (Mark, 1982). Mark (1982) observes that data on gross sales in Kenya shillings deflated by appropriate price indexes can be used to estimate real output in the retail trade sector as long as there are no shifts among services with different values. In the transportation sector, the output units are easily quantifiable as they reflect the amount and distance. For the communication services, revenue deflated by price indexes is used as the output measure. For the business and personal services (including education, social, and repair services), no physical quantity information is available. Therefore, price-deflated values can be used to measure the real output with the output indicators being aggregated using revenues and labor hours. Finance services could be measured by loans, deposits, and trust services extended by financial institutions to their clients, with liquidity and transaction approach being used as the productivity measure.

3.4 | Data

This study used the 2018 World Bank Enterprise Survey data. A total of 1,001 firms were selected using a stratified sampling technique of which 546 were service firms. This data covered the private firm enterprises in the country. The service sectors covered were comprised of retail, wholesale, ICT, restaurants and hotels, transport and construction, and motor vehicle services. The data were collected from 10 counties in the country (Nairobi, Kirinyaga, Kiambu, Nakuru, Mombasa, Kisumu, Kilifi, Machakos, Trans Nzoia, and Uasin Gishu).

4 | ESTIMATION RESULTS

The correlation matrix revealed a weak degree of association among the explanatory variables (see Appendix Table A1). A formal test using the Variance Inflation Factor method further indicated no multicollinearity problem since the mean VIF values of the explanatory variables (SMEs = 3.95 and large firms = 4.89) were less than the recommended threshold of 10 (Kennedy, 1992). The Breusch and Pagan (1979) heteroskedasticity test revealed that both models were homoscedastic (see Appendix Table A2).

The models were finally estimated with the econometric results then presented in Table 7.

5 | DISCUSSION AND INTERPRETATION OF RESULTS

5.1 | Firm size correlates

A 1% increase in employee wage significantly decreased the likelihood of a firm being an SME by 2.27% ceteris paribus. The higher the employee wage, the lower the likelihood of a firm being an SME. Larger firms are likely to generate higher returns due to a larger investment capacity, hence the tendency to reward their employees better than smaller firms. The rest of the variables insignificantly determined firm size.

5.2 | Determinants of labor productivity

A 1% increase in capital intensity significantly increased labor productivity by 0.573% for both the SMEs and large-sized firms ceteris paribus. Capital provides labor with the tools necessary to make it productive and should, thus, impact positively and significantly on labor productivity. This study implies that capital intensity is important regardless of firm-size. A 1% increase in employee wage significantly increased labor productivity by 0.374% for SMEs and 0.385% for large firms ceteris paribus. Consistent with the findings by Heshmati and Rashidghalam (2018), well-remunerated employees have the motivation to work and this increases their marginal productivity. The impact was found to be slightly higher for large firms than for SMEs. Large firms are highly capital intensive with a relatively higher profitability base. They are, thus, more likely to pay a higher wage to their employees when compared to smaller firms.

A 1% increase in the number of employees with high school education qualification significantly increased labor productivity by 0.424% for SMEs and 0.452% for large firms ceteris paribus. The impact was found to be slightly higher for larger firms than for SMEs. Large firms require more sophisticated skills, knowledge, and expertise to run as opposed to a majority of the SMEs. An additional year of experience for the top manager significantly increased labor productivity by 6.3% for both SMEs and large firms ceteris paribus. Work experience leads to a vast and diversified pool of knowledge, skills, and expertise in the accomplishment of a given task (Goedhuys et al., 2008). As a result, it should impact positively on firm-level productivity.

A one-hour increase in power outage intensity significantly decreased labor productivity by 0.84% for SMEs and 0.86% for the large firms ceteris paribus. Power outages constrain the production process and the productivity of factor inputs through machine and equipment break-ups, hence the negative impact on labor productivity (Mensah, 2016).

TABLE 7 Probit and labor productivity estimates

	(1)	(2)	(3)
Variables	Firm_size Marginal effects after probit	lnLabor_productivity (SMEs)	lnLabor_productivity (Large firms)
lnCapital intensity	−0.00158	0.573***	0.573***
	(0.0139)	(0.0584)	(0.0588)
lnEmployee Wage	−0.0227**	0.374***	0.385***
	(0.00947)	(0.0938)	(0.109)
lnHigh school education	−0.0362	0.424***	0.452***
	(0.0352)	(0.105)	(0.117)
Managers' experience	−0.00154	0.0611***	0.0611***
	(0.00157)	(0.00872)	(0.00929)
Formal Training	−0.0349	0.120	0.147
	(0.0349)	(0.183)	(0.201)
Power outage	0.00031	−0.00835*	−0.00857*
	(0.00113)	(0.00481)	(0.00488)
Tax burden	0.0322	−0.571***	−0.595***
	(0.0367)	(0.208)	(0.225)
Political uncertainty	0.0169	−0.251	−0.260
	(0.0333)	(0.154)	(0.160)
Sector			
Chemical, pharmaceutical, and plastic	0.00103	0.421	0.442
	(0.1259)	(0.466)	(0.469)
Textiles and garments	−0.1263	1.839***	1.889***
	(0.1786)	(0.509)	(0.555)
Retail	−0.0189	1.514***	1.523***
	(0.0970)	(0.322)	(0.327)
Tourism	−0.0813	0.803**	0.860**
	(0.1174)	(0.386)	(0.417)
Other services	−0.1044	1.707***	1.779***
	(0.1185)	(0.414)	(0.460)
$\hat{\lambda}$		−6.688***	−5.361***
		(1.857)	(1.720
Constant		0.313	−5.217
		(1.447)	(3.248)
Observations		482	64
R^2		0.513	0.508
Adjusted R^2		0.489	0.483

Note: Equation (1) is a probit model for firm size determination (i.e., 1 if the firm is an SME and 0 otherwise) and represents the coefficients of the first stage of Heckman selection. $\hat{\lambda}$ is the estimated inverse of the Mill's ratio and denotes the selectivity variable. Standard errors are in parentheses.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

A firm that reported tax burden constraints as a major obstacle registered a significant decline in its labor productivity by 77% for SMEs and 81.3% for the large firms ceteris paribus. The impact was highly felt by large firms due to the high tax rates, custom and compliance procedures they have to abide by, within their business operations.

The impact of formal training and political uncertainty on labor productivity was rather found to be insignificant. The coefficient of the selectivity variable was found to be negative and statistically significant for both the SME (−6.688) and large-sized (−5.361) models. This implied that selectivity bias was an issue in this study, hence controlling for firm size effect was indeed crucial when studying labor productivity across different-sized firms. The adjusted R^2 was found to be 48.9% for SMEs and 48.3% for the large-sized firms. This implied that the independent variables in each of the models explained 48.9% and 48.3% of the variations in labor productivity for the SMEs and large-sized models, respectively, when adjusted for the degrees of freedom.

More importantly, the general trend in the study revealed insignificant differences in the determinants of labor productivity among the SMEs and large-sized service firms. This implies that the factors under investigation were equally vital for both firms regardless of size.

6 | CONCLUSIONS AND RECOMMENDATIONS

Capital intensity, employee wage, high school education, and manager's experience significantly and positively influenced labor productivity. For capital intensity and managers' experience, the impact was equally felt by both firms. Tax burden and power outages were found to significantly constrain productivity across all firms with the impact being slightly higher among the large firms. With slight differences in the magnitudes of the coefficients, the study concluded that the differences in the determinants of labor productivity were negligible and insignificant across the SMEs and large-sized firms. The study also highlighted the significance of correcting for the firm-size effect when studying labor productivity across different sized firms; something that had been largely ignored in previous productivity studies.

To optimize labor productivity, the study recommended the enactment of favorable tax rates and less bureaucratic tax regulations by the Kenya Revenue Authority (KRA). High investment in human capital is also paramount. Tax institutions across the globe need to be aware of the welfare effects on productivity that are brought about by high tax rates coupled with bureaucracy in regulations. Governments, especially in developing countries, equally have the mandate of ensuring political stability even in tough times of political upheavals and uncertainty.

Finally, future studies on labor productivity in the service sector should attempt at distinctly studying each service subsector on its own; something that was not possible with the current data set. Furthermore, this study employed total revenue less cost of inputs as the service output measure and the net book value approach to measuring capital intensity. This remains a contested issue in light of the service sector that comprises many different subsectors that may follow varied paradigm measures, hence the need for an accurate and harmonized measurement index.

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APPENDIX

TABLE A1 Pairwise correlation matrix

	Capital intensity	Employee wage	High school education	Managers' experience	Formal training	Power outages	Tax burden	Political uncertainty	Firm size	Sector
Capital intensity	1									
Employee wage	−0.0103	1								
High school education	0.0486	0.1096	1							
Managers' experience	0.0304	0.0731	−0.0469	1						
Formal training	0.0789	0.2116	0.0588	0.086	1					
Power outages	−0.037	−0.1558	0.0022	−0.1349	−0.0387	1				
Tax burden	0.1024	0.0507	−0.193	−0.0491	0.0516	−0.0831	1			
Political uncertainty	0.0846	−0.0294	−0.0208	0.1349	0.0675	−0.0773	0.116	1		
Firm size	0.008	−0.3292	−0.0899	−0.1018	−0.1196	0.0396	0.0581	0.0214	1	
Sector	−0.0849	0.0197	0.0177	−0.1054	0.0184	−0.0056	−0.053	−0.0604	−0.0734	1

Source: Compiled from Stata.

TABLE A2 Heteroskedasticity test

Variables: fitted values of lnLabor productivity	
SMEs	**Large firms**
$\chi^2(1) = 2.02$	$\chi^2\ (1) = 1.60$
Prob $> \chi^2 = 0.1554$	Prob $> \chi^2 = 0.2063$
Ho: Constant variance	

Source: Stata computation.