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Which firms drive employment growth in Sub-Saharan Africa? Evidence from Kenya

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Abstract Using firm-level data from Kenyan manufacturing firms, we evaluate the hotly debated and popular view that small firms create the most jobs and are the primary source of employment growth. Using the methods of ordinary least squares and feasible generalized least squares, findings reveal that the relationship between firm dynamics and employment growth varies systematically across firm size and age. The results show that, although large firms appear to drive employment growth, this growth is driven by very young firms (0–5 years) that are large rather than the size of the firm per se. Results indicate that it is age that matters since very young firms (0–5 years) contribute the highest rates of employment growth than any age category. At the policy level, addressing soaring unemployment in the Sub-Saharan Africa requires creating a business environment that supports the growth of very young firms.

Plain English Summary Young firms play an instrumental role in creating more jobs and driving employment growth in Sub-Saharan Africa. Using firm-level data from Kenyan manufacturing firms, we evaluate the hotly debated and popular view that small firms create the most jobs and are the primary source of employment growth. We find evidence of systematic differences in how firms create jobs in Sub-Saharan Africa. There is evidence that the age of the firm rather than its size is important in job creation. We find that it is young firms that are large (in terms of employment level) that drive employment growth in Sub-Saharan Africa. These results imply that; firstly, addressing unemployment in Sub-Saharan Africa requires creating enabling business environment that supports very young firms. Secondly, research on small and medium enterprises (SMEs) should focus on understanding the theoretical mechanisms that help young firms to create more jobs than any firm category.

Keywords Employment · Job creation · Firm age · Firm size · Manufacturing

JEL Classifications E24 · J20 · J23 · L25 · L60

1 Introduction

Do firm characteristics like size and age of the firm raise employment growth? To what extent do firm size classification measures affect the robustness of the research findings? These questions have dominated the discussions among policy makers and academics for a long time, with analysts disregarding the common and popular thesis that small businesses[1]

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[1] In this paper, we use firm(s) to mean business (es) and vice versa.

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are the principal creators of most jobs as was first suggested by Birch (1981). Birch's seminal work provides evidence of the existence of a systematic inverse relationship between firm size and employment growth — that small firms, rather than large firms, are the key drivers of employment growth. This conclusion supports the view that firm growth falls with firm size as was first suggested by Evans (1987). Following Birch's findings, there is renewed interest in reexamining this evidence using firm-level data in other countries, especially from Sub-Saharan Africa as scanty empirical work has been done on this region. Although recent studies show that Sub-Saharan Africa is growing faster than was earlier thought, this growth, in most cases, is not accompanied by employment growth that absorbs the workforce (Rodrik, 2016; Africa Economic Outlook 2018; ILO, 2014). For instance, it is estimated that Sub-Saharan Africa has grown by nearly 6% per annum between 2000 and 2010, yet youth unemployment rate remained prevalent during the same period (ILO, 2014). The region seems to experience rapid growth with dismal structural change, away from traditional agricultural sector to the industrial sector (Rodrik, 2016). Consequently, employment growth tends towards what is generally known as *jobless growth*; with the youth and women being the most affected. The evidence shows that, during the past decade and half, the rapidly growing countries in the continent are actually creating fewer jobs than is expected and compared to countries elsewhere that grew more slowly over the same period. If this is the case, then this reflects the view that sectors like manufacturing presumed to be engines of employment growth are not creating enough jobs to absorb the increasing population. Accordingly, Bigsten and Gebreeyesus (2007) provide evidence that the manufacturing industry in Sub-Saharan Africa is not creating enough jobs to absorb the unemployed population, as is the case with some regions and countries of the world. Consequently, some analysts seem to suggest that the region is experiencing deindustrialization as evidenced by dismal contribution of the manufacturing sector to job creation and employment growth.

Overall, employment growth is crucial for any country to maintain economic growth and offer its citizens a modest standard of living. However, this seems to be elusive in most Sub-Saharan African economies because of high rates of job creation and job destruction episodes which affect most sectors (Esaku, 2020c; Esaku & Krugell, 2020; Shiferaw & Bedi, 2013). Globally, there is evidence that small firms are making a significant contribution to job creation at higher rates compared to large firms. Recently, Neumark et al. (2011) provide evidence of the significant contribution of small firms towards job creation in the United States of America. Some other studies too have analyzed the role of small firms and find similar results (see de Wit & de Kok, 2014; Dogan et al., 2017; Hijzen et al., 2010; Huber et al., 2017; Ma et al., 2015; Picot & Dupuy, 1998). However, some studies present findings that contradict the popular view that small firms are the main job creators (Cho et al., 2017; Davis et al., 1996; Kerr et al., 2014) while others have argued that it is not firm size per se that drives job creation but rather the start-up businesses (Haltiwanger et al., 2008, 2013; Klapper & Richmond, 2011; Lawless, 2014).

Although there has been a thorough examination of job creation and employment growth in the literature, most of these studies have concentrated on developed countries with little attention paid to developing and Sub-Saharan African countries, like Kenya. Moreover, there is a mixed classification of which firms should be classified as small, because enterprise survey data from the World Bank use a different size classification of firms. The enterprise survey data classify small firms as those that employ less than twenty employees (workers < 20); which also includes micro firms (less than 10 workers) leaving out the most important size class — micro firms (less than 10 workers). Accordingly, identifying the role of micro firms towards employment growth is important as this size classification would fit well with the size distribution of Sub-Saharan African firms (Rijkers et al., 2014). Relatedly, one limitation of the literature on Sub-Saharan Africa is that the evidence presented using firm-level data from the region excludes the role of micro firms in employment growth. This paper therefore is an attempt to fill this gap by examining firm employment growth dynamics in Sub-Saharan Africa, with special focus on micro firms (those that employ 1–9 workers).

In this paper, using a unique dataset containing information on firm size that captures micro firms, we analyze whether firm characteristics shape employment growth in Sub-Saharan Africa, taking Kenya

as a case. Our dataset covers a period of eight years (1992–1999). This dataset is ideal for answering the research question and providing insight into employment dynamics in Sub-Saharan African region. To motivate our empirical analysis, we structure our work around three questions: (1) which firms generate employment growth in Sub-Saharan African countries? (ii) Does firm age matter for firms to generate employment growth? (iii) To what extent do measurement and statistical errors bias estimates in favor of small firms when firm size in the base year is used? Therefore, we evaluate the hotly discussed and popular thesis that "small firms create the most jobs and are the principal source of employment growth." We pay keen attention to the firm size classification and correct our results for statistical and measurement error as discussed by Davis et al. (1996).

Kenya, a small open East African country, is chosen because it provides a relevant context to examine the issues of employment growth since it has a relatively large manufacturing sector in the region. Like most African countries, Kenya has had high levels of unemployment despite registering strong economic growth outcomes in the East African region (Africa Development Bank Group, 2018). Kenya's economy grew at an approximately 5.6% per annum between the period 1990 and 2000, yet unemployment hovered between 16 and 14% in part because the labor force expanded by 1.9%. Moreover, Kenya is interesting because the government has undertaken crucial steps towards industrializing the economy, through creating enabling policies that enhance the growth of the manufacturing sector (Esaku, 2020b). Additionally, choosing Kenya as a case is majorly driven by data availability. We build on a growing body of literature showing the importance of firm size and age towards job creation and employment growth in developed countries like the United States of America (Haltiwanger et al., 2013; Neumark et al., 2011) and Ireland (Lawless, 2014). The literature on firm dynamics and employment growth has ably focused on developed countries, with little attention paid to developing countries. These countries (developed countries) have social safety nets and unemployment insurance designed for workers who lose their jobs due to various reasons. Given that this paper focuses on Kenya, a Sub-Saharan African country with no social safety nets and unemployment insurance schemes, our objective is to assess whether the findings from studies conducted in developed countries can hold for Sub-Saharan Africa, using Kenya as a case.

Our findings are remarkable. We find that the relationship between firm size, age, and employment growth varies systematically across firm size classifications. Large firms contribute disproportionately to high rates of employment growth, with firm age playing a crucial role in shaping the final results. We further analyzed whether these results are driven by firm size or firm age. We find that both firm size and age are important towards employment growth. Overall, our results indicate that very young firms (0–5 years) generate the highest rates of employment growth than any age category. Conclusively, this paper documents the importance of firm age, rather than firm size, in shaping employment growth in the Sub-Saharan African context, and in Kenya as a country. At the policy level, addressing soaring unemployment in the region might require creating a business environment that supports the growth of very young firms (0–5 years).

This paper provides an elaborate evidence of firm size and employment relationship for the East African region. To the best of our knowledge, this paper is the first to analyze this relationship using a unique dataset that has information on micro businesses. Although, this paper may be similar to the Rijkers et al. (2014), it is different in terms of its focus and context. This paper provides alternative definition of small firms — treating firms that employ 1–9 workers as micro, while Rijkers et al. (2014) use a different classification.

The rest of this paper is organized as follows: "Section 2" presents the review of related literature. "Section 3" provides an overview of the data, the empirical framework, and econometric methods. "Section 4" presents and discusses the results. "Section 5" concludes.

2 Review of related literature

Following the first evidence that small firms are the primary source of most jobs (Birch, 1981), there is growing interest to examine Birch's evidence using firm-level data from other countries. Globally, there is evidence that small firms are making significant contributions to job creation compared to large firms.

Neumark et al. (2011), using a new database from the United States of America, assess the role small businesses play in job creation and find evidence that small firms indeed are the principal contributors of most jobs created. Similarly, Klette and Mathiassen (1996) study job creation and job flows in Norvegian manufacturing and find similar evidence. Moreover, they also report that entry and exit are significant sources of job reallocation in the long run than in the short run. Furthermore, Ma et al. (2015) analyze patterns of job flows in China from 1998 to 2007 and find the existence of an inverse relationship between firm size and employment growth. Their study provides more evidence on the role of business start-ups. They find evidence that start-ups make significant contributions to job creation and employment growth, consistent with the findings of Haltiwanger et al. (2013).

However, Birch's evidence is contested by some studies that show the absence of a systematic inverse relationship between firm size and employment growth. Notably, Davis et al. (1996) contest the role of small firms as the principal contributors of job creation. They argue that the results are driven by methodological flaws. They argue that using the initial size (base-year size of the firm over which employment growth is estimated), as used by Birch, biases the estimates in favor of small firms because of *regression-to-the-mean fallacy*. They propose a better option of using average size of the firm between the starting and ending periods, that is, average size between starting year t-1 and current year *t*, to circumvent the issue of *regression-to-the-mean fallacy*. Nonetheless, some studies that use average size method find results similar to those first presented by Birch (1981), for example, Davidsson et al. (1998) for Sweden, Neumark et al. (2011) for USA, de Wit and de Kok (2014) for European Union, Klette and Mathiassen (1996) for Norvegian manufacturing, Yasuda (2005) and Genda (1998) for Japan, Huber et al. (2017) for Australia, and Picot and Dupuy (1998) for Canada.

On the African continent, there is little examination of firm size and employment dynamics compared with empirical work elsewhere. However, there is growing interest towards the examination and treatment of the debate on the role of firm size in job creation and employment growth. For instance, Klapper and Richmond (2011) study patterns of business creation, survival, and growth using data from Ivory Coast and find that firm dynamics of entry and exit play significant role in job creation and destruction. Their study, like Haltiwanger et al. (2013), clearly shows the contribution of newly formed firms towards job creation, rather than small firms. Similarly, Kerr et al. (2014) study job flows in the South African labor market from 2005 to 2011 and find high rates of job creation in large firms compared to small firms. Additionally, Sandefur (2010) uses data from Ghanaian manufacturing firms to study firm dynamics and finds evidence of higher job reallocation in small firms. Most importantly, Sandefur's findings show that small firms do indeed create more jobs compared to large firms. Similar findings are obtained by Esaku (2020c) for Kenya.

This paper examines how firm characteristics shape employment growth in Sub-Saharan Africa, with special focus on micro firms (those that employ from 1 to 9).

3 The data and empirical strategy

3.1 The data

The data we use for the empirical work are from a panel survey of firms operating in textile industry, wood industry, furniture industry, garment industry, metal, machinery and chemical industry, and food and bakery industry, spanning eight years (1992–1999). The data were collected under the Regional Program on Enterprise Development (RPED) organized by the World Bank, jointly by the Center for the Study of African Economies (CSAE)[2] and University of Oxford, using stratified sampling strategies within each country and firm size. Moreover, the data have the advantage of showing firms of all sizes, where size is measured using employment level — transformed into logarithm of number of workers employed by the firm. To guide the analysis, we implement two improvements to the data: first, we use the European Union

[2] We thank the Center for the Study of African Economies for making the data available for download for free to researchers. We are grateful to you for this assistance without which, it would not have been possible to conduct this study.

Table 1 Firm size and employment distribution — 1992–1999 (annual average)

Size class	No. of firms	(%) of firms	Total # workers	Average # workers	Share of employment (%)
Micro (emp < 10)	409	32.23	1,732	4.24	1.30
Small (emp ≥ 10 < 50)	381	30.02	9,540	25.04	7.14
Medium (emp ≥ 50 < 100)	192	15.13	12,625	65.76	9.45
Large (emp ≥ 100)	287	22.62	109,689	282.19	82.11
Total	1,269	100	133,586	442.40	100

Note: This table presents annual averages of firm size and employment distribution for the period 1992–1999. For each firm, size is measured as the sum of all paid employment. Columns 1–6 denote the size classification of firms, # of firms, % of firms, sum of all workers, average # of workers, and % share of employment by each firm. We delete missing values of observations in size when calculating final results

categorization[3] of firms, with some modifications, to classify the manufacturing firms into four sizes or classes: the micro firms, being firms that employ 1–9 workers; small firms, those that employ from 10 to 49 workers; medium firms that employ from 50 to 99 workers, and the large firms, those that employ 100 or more employees. This classification is similar to one used in Esaku (2020b) and Esaku (2020d) and is ideal for answering the research question because it is possible to recognize the role of each size class to job creation and job destruction in the analysis. The dataset was downloaded from CSAE at Oxford University website and contains 3240 observations based on more than 628 manufacturing firms. However, the data have one major limitation of having sampled only firms in the manufacturing sector that are formally registered and exclude firms in the informal sector of the economy. This may be a limitation because Kenya, like most developing countries, has a large informal sector which contributes to job creation for a sizeable workforce. The details of data and variable definition are included in Table 7 in the appendix.

3.2 Descriptive statistics

To have a clear picture of the variables of our interest, we present descriptive statistics of firms by size. Previous studies have extensively discussed the contribution of micro and small firms in the creation of jobs, as shown in Ayyagari et al. (2014) and Haltiwanger et al. (2013). Table 1 presents firm size and employment distribution. The descriptive statistics present a number of stylized facts present in firm-level data for Sub-Saharan Africa. Firstly, our results show that firm size distribution is skewed towards micro and small firms. During the period 1992–1999, 32.23% of firms were classified as micro firms, while small firms constituted 30.02% of firms. This result seems to portray what is generally observed in African firm-level data (Rijkers et al., 2014) as these firms start small and stagnate over long periods of time. Secondly, large and medium firms constitute a small minority (22.62% and 15.13%, respectively) but, on average, employ more workers (282 and 66 workers, respectively), than any firm size class. These firms contribute the most shares, 82.11% and 9.45%, respectively, of employment in the Kenyan manufacturing sector over the period 1992–1999. Thirdly, we also observe that employment is disproportionately concentrated in large firms suggesting that employment growth could be driven by large firms.

In Table 2, we report annual averages of employment distribution by firm size and age. Our results show that very young firms (0–5 years) and young (6–10 years) that are micro constitute the biggest percent (70.94% and 59.77%, respectively) of all firms in our sample. We note that the distribution of firms is still skewed towards micro, but most importantly, this is more concentrated in very young firms. We also observe that very young firms are a minority among the medium and large firms. This may be attributed to the fact that most of the very young firms are start-ups, because few firms ever start with characteristics similar to those of large firms. Overall, our findings seem to suggest that employment is concentrated in old firms, with employment share of 43.99%.

[3] See http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en

Table 2 Employment distribution by firm size and age — 1992–1999 (annual averages)

Firm age in years	Firm size class				Total (%)	Total # of workers	Share of employment (%)
	1–9	10–49	50–99	100 +			
Very young (0–5 years)	70.94	17.95	4.27	6.84	100	117	9.56
Young (6–10 years)	59.77	20.11	8.62	11.49	99.99	174	14.23
Mature (11–20 years)	24.37	37.82	13.71	24.11	100.01	394	32.22
Old (21 + years)	19.70	30.86	21.00	28.44	100	538	43.99
Total						1,223	100

Note: This table presents annual averages of employment distribution by firm size and age. Age is measured as the difference between the current year and the year when the firm was established. We drop missing values in size and age to get the final results. Column 1 is firm age in years, column 2 is firm size class, column 3 is the total in percentage, column 4 is total no. of workers, and column 5 is the share of employment in percent

3.3 Empirical strategy

In this section, we present the estimation strategy of examining how firm size and age shape employment growth in Kenya, paying attention to the measurement and statistical pitfalls that affected previous studies. Davis et al. (1996) observed that using initial (base year) firm size to analyze the relationship between firm size and employment growth is prone to statistical pitfalls that bias the estimation results due to the *regression-to-the-mean* effects. For instance, firms that recently emerged from adverse transitory shocks are more likely to grow and expand their operations while those that recently experienced favorable transitory shocks will be more likely to contract. When this effect is not taken into account in the analysis, it leads to an inverse relationship between size and growth. Consequently, Kongings (1995) notes the above spurious relationship as a prevalent regression fallacy when working with economic data to examine the relationship between firm size and growth. This effect arises from the approach used to classify firms into size classes in most data sources, as cited in the early work by Birch (1981). Birch (1981) classified firms into size classes using initial year firm size (measured in number of employees) and used this classification to examine the relationship between size and growth of employment. However, this method is now understood to give estimation results that are biased and unreliable because of *regression-to-the-mean fallacy*. Davis et al. (1996) propose a better approach of circumventing this problem. They propose using firm size classification—where current average size (the average employment in year *t-1* and *t*) is used to examine the above relationship instead of the initial size of the firm.

Conversely, Picot and Dupuy (1998) and Davidsson et al. (1998) argue that the measurement error observed by Davis et al. (1996) does not alter the final results significantly. Consequently, using initial or average firm size should yield the same estimation results. To this end, we use two econometric methods to examine the relationship between firm size, age, and employment growth. First, we follow the tradition documented by Birch (1981) who uses the base-year size classification to estimate employment growth. More formally, using the base-year classification, employment growth at the firm level between periods *t-1* and *t* can be expressed as follows:

$$\Delta E_{it} = \frac{E_{it} - E_{it-1}}{E_{it-1}} \tag{1}$$

where E_{it-1} is the base year, denoting the beginning period of measurement.

However, this approach is criticized because it tends to generate biased estimates leading to regression fallacy (Davis et al., 1996). The second approach, which is now considered the standard method in the literature, is using the average size instead of the initial size of the firm. This method was used by Davis and Haltiwanger (1992), Davis et al. (1996), and Haltiwanger et al. (2013) to examine firm and employment dynamics in the United States of America.

Following their method, we derive our measure of employment growth, g_{it}, for firm *i* between periods *t-1* and *t*. To guide the analysis, let E_{it} denote employment stock in year *t* for firm *i*, which represents the number of employees on the payroll during the survey period, and g_{it} denote employment growth rate, employment growth rate can be expressed as follows:

$$g_{it} = \frac{\left(E_{it} - E_{it-1}\right)}{0.5^{*}\left(E_{it} + E_{it-1}\right)} \quad (2)$$

Specifying the employment growth rate measure as the ratio of the difference between current and previous sizes and average size of total employment has become the standard method in the analysis of firm dynamics. This is advantageous because it accounts for both entry and exit.

To examine to what extent the perceived relationship between firm size and employment growth is due to firm size per se rather than other observable firm characteristics, we follow Ayyagari et al. (2014) and write our general specification as follows:

$$g_{it} = \beta_0 + \beta_s \text{size}_{it} + \beta_a age_{i,t-1} + \beta_a age^2_{i,t-1} + \beta_w w_{i,t-1} + \beta_k \kappa_{i,t-1} + \gamma_{i,t-1} + \sum_j Z_j + \varepsilon_{it} \quad (3)$$

where g_{it} is employment growth, size_{it} is a vector of size dummies for current year, age is the firm's period t-1, $w_{i,t-1}$ denotes log of wages lagged one period, $\kappa_{i,t-1}$ is the log of capital labor ratio (capital intensity), $\gamma_{i,t-1}$ is ownership dummy, Z_{it} is a vector representing industry dummies and year dummies, and ε_{it} is the error term.

Estimation of Eq. (3) may lead to dummy variable trap unless one dummy becomes the reference variable. We accordingly drop medium firms from the estimation of the above equation and make them our reference variable. To address some problems of simultaneity, we include capital intensity and ownership, lagged one period as shown by Bernard and Jensen (2004).

We estimate Eq. (3) using ordinary least squares (OLS) method and feasible generalized least squares (FGLS) technique which gives estimates that are efficient in the presence of correlated heteroscedastic errors. In line with Haltiwanger et al. (2013), we conduct the analysis in a systematic manner; first, we estimate employment growth in Eq. (3) above by including size and then later consider joint estimation — where both size and age dummies are estimated jointly. We use average size (Haltiwanger et al., 2013 method) and regress firm-level employment growth on size, and then size and age jointly. We report and discuss our results in Table 3. We also use initial size (Birch, 1981 method) to estimate the employment growth. We report these results in Table 3 for purposes of comparison. Our discussion of the results will be on coefficients estimated using the average size method. We use three size dummies, that is, micro firms (1–9 workers), small firm (10–49 workers), and large firms (100 and more workers), while medium firms (50–99 workers) are our reference group. This classification is consistent with the observed size pattern in the data, with the advantage that micro firms are clearly captured. To ascertain whether there is a systematic inverse relationship between size and growth, we control for age because previous studies have shown contradictory results, except for studies using US data (Haltiwanger et al., 2013).

Similarly, we use firm age to categorize firms as follows: (i) very young (youngest) firms (0–5 years old), (ii) young firms (6–10 years old), (iii) mature firms (11–20 years old), and (iv) old firms (21 years and above). We then estimate the effect of firm size and firm age on employment growth; because there is considerable evidence that firm age and firm size are correlated, as such, they influence employment growth (Lawless, 2014).

We write our general specification as follows:

$$g_{it} = \beta_0 + \beta_s size_{it} + \beta_a age_{it} + \beta_w w_{i,t-1} + \beta_k \kappa_{i,t-1} + \gamma_{i,t-1} + \sum_j Z_j + \varepsilon_{it} \quad (4)$$

The rest of the terms are defined as in Eq. (3). We first estimate Eq. (4) for the whole sample and later estimate the effect of firm age on employment growth and present the results on Table 5.

4 Empirical results

4.1 Employment growth by firm size

We estimate Eq. (3) in a regression framework using both OLS and FGLS to examine employment growth. Firstly, we use the average size of the firm to measure employment growth and report the results in the first four columns, models (1)–(4). Models (5)–(6) report estimates of employment growth using initial firm size. In Table 3, model (1), using OLS, shows that the contribution of large firms towards employment growth is significant at 1% and higher than that of other size

Table 3 Employment growth and size

Variables	Average size measure used				Initial size measure used			
	(1) OLS	(2) FGLS	(3) OLS	(4) FGLS	(5) OLS	(6) FGLS	(7) OLS	(8) FGLS
Micro	0.252***	0.252***	0.253***	0.253***	0.476***	0.476***	0.480***	0.480***
	(0.024)	(0.018)	(0.024)	(0.018)	(0.054)	(0.040)	(0.054)	(0.040)
Small	0.230***	0.230***	0.230***	0.230***	0.475***	0.475***	0.476***	0.476***
	(0.020)	(0.016)	(0.020)	(0.016)	(0.044)	(0.034)	(0.044)	(0.034)
Large	0.277***	0.277***	0.277***	0.277***	0.479***	0.479***	0.479***	0.479***
	(0.020)	(0.807)	(0.020)	(0.017)	(0.041)	(0.037)	(0.041)	(0.037)
Ln(K:L) t-1	0.016***	0.016***	0.016***	0.016***	0.038***	0.038***	0.037***	0.037***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.009)	(0.009)	(0.009)	(0.008)
Age t-1	−0.001*	−0.001*	0.008	0.008	−0.002**	−0.002**	0.014	0.014
Ln(wages) t-1	(0.000)	(0.000)	(0.007)	(0.006)	(0.000)	(0.000)	(0.014)	(0.014)
	0.008	0.008			0.014	0.014		
	(0.007)	(0.006)			(0.014)	(0.014)		
Age^2 t-1			−0.001*	−0.001*			−0.001**	0.001**
			(0.000)	(0.000)			(0.000)	(0.000)
Constant	−0.367***	−0.366***	−0.373***	−0.373***	−0.779***	−0.809***	−0.796***	−0.824***
	(0.041)	(0.046)	(0.041)	(0.023)	(0.090)	(0.101)	(0.090)	(0.102)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ownership	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	787	787	787	787	787	787	787	787
R^2	0.628		0.628		0.628		0.628	

Notes: We include ownership, industry, and year dummies in all the models. The dependent variable is employment growth (average size method). The robust standard errors in parentheses; significance levels are * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

classes. We observe that it is the large firms that are the source of employment growth, closely followed by micro firms. Our results show that a 1% rise in jobs created in large firms significantly (significant at 1% level) leads to employment growth of 27.7%, higher than medium firms and any other firm size class. Similarly, using FGLS does not change the results. The two estimation methods (OLS and FGLS) lead to similar results. This observed contribution of large firms to employment growth might be a result of exclusion of informal firms from the sample or a result of the size advantage and possible access to credit that helps them expand their operations and create more jobs in the process. More recently, Iacovone et al. (2014) analyze patterns of growth in African firms and suggest that firm growth in African firms is different from that in other regions of the world. The authors show that small firms rarely expand their operations due to fear of dealing with burdensome government regulations that require filing of tax returns. These authors also show that low access to credit and market distortions that lead to misallocation of resources act as barriers to the growth of small firms.

Despite being dominant in the market, small firms remain small across all quintiles (Iacovone et al., 2014) and experience a number of barriers to growth. Recently, Gelb et al. (2013) show that costs of production in Africa are high for small firms which dampens any prospects of firm growth. If this is the case, then small firms indeed may not expand their operations as large firms would. Some studies have also shown that large firms have relatively better access to external financing than other firm sizes (Bigsten et al., 2003; Lashitew, 2017). Conclusively, our results seem to suggest that large firms contribute to high employment growth due to the size advantage that they possess because they are more likely to access financing easily than other firms. However, earlier studies showed that small firms seem not to be expanding their size because they are more concerned about ensuring steady incomes for their businesses and family and not growing their size (see Storey, 1994). Indeed if this

Table 4 Collinearity diagnostic test

Variable	VIF	SQRT VIF	Tolerance	R-squared		Eigen value	Condition index
Micro	1.43	1.20	0.6981	0.3019	1	4.6346	1.0000
Small	1.25	1.12	0.7971	0.2029	2	1.1506	2.0070
Large	1.31	1.15	0.7625	0.2375	3	1.0028	2.1498
Age t-1	1.14	1.07	0.8738	0.1262	4	0.6062	2.7650
Ln(K:L) t-1	1.44	1.20	0.6956	0.3044	5	0.3623	3.5766
Ln(wages) t-1	1.13	1.06	0.8846	0.1154	6	0.2030	4.7782
Ownership	1.15	1.07	0.8666	0.1334	7	0.1277	6.3642
					8	0.0267	8.1643
Mean VIF	**1.27**				**Condition number**		**8.1643**

Note: Author's calculations from CSAE data. Ln(K:L) t-1 is capital intensity, and Ln(wages) t-1 is wage rate, all in natural logarithms, lagged one period

is the cause, the argument that small firms are stagnant might be misplaced since expanding their size is not a business objective for these firms.

Next, we jointly estimate the effect of size and firm age, by including age and squared term of age. We can clearly observe from models (3) and (4) that the effect of firm age on employment growth is negative and statistically significant at 1% level. This seems to suggest an inverse relationship between the firm's age and employment growth. This implies that the firm's age influences job creation to some level. However, the coefficient on large firms is still significant at 1% implying that these firms (large) could be driving employment growth.

However, one wonders whether size per se is the driving factor in employment growth or there is yet another underlying factor(s). The question we ask is whether employment growth is coming from size per se or from the age of the firms. In the next section, we examine this possibility by isolating firms by age and examining their contribution to employment growth according to age classification.

4.2 Robustness check for results in Table 3

We present the results of the collinearity test of the main variable in Table 4. We can note that the variance inflation factor and the R-squared are within acceptance ranges indicating that our estimation model in Table 3 gives us the valid estimates. Further, we also observe that the condition index is within the recommended range of below 10. This shows that our estimation model is stable. Further, this gives credence to our results and confirms that there might not be any concerns for multicollearity issues in our estimation.

4.3 Is it firm size per se or age that influences employment growth in Sub-Saharan Africa?

This section addresses the issue of firm age in employment growth, by investigating the role of age in influencing employment growth. We use average size definition of employment growth by estimating Eq. (4). We include wage rate, capital intensity, and ownership, all lagged one period in the estimation model. Moreover, we also control for year and industry effect on the results. The results are reported in Table 5. The results that emerge from our empirical work are remarkable. The overall picture is that very young firms (0–5 years) generate high rates of employment growth than any firm age category. This implies that a 1% change in the size of very young firms (0–5 years) significantly increases the rate of employment growth by 10.7%, statistically significant at 5% level. This result gives credence to the view that very young firms do indeed create jobs and drive employment growth (see Esaku (2020c). Our findings largely mirror what previous studies conducted in developed economies emphasized. For example, Huber et al. (2017) provide evidence of substantial contribution to job creation by young firms in Austrian economy. Similarly, Cho et al. (2017) also find results that confirm the importance of very young firms (0–5 years) in employment growth in the Korean economy. Further, Ayyagari et al. (2014) study job creation in developing countries and find that young firms play an important role in job creation. Correspondingly, Esaku (2020c) and Esaku (2019) reach similar conclusions for Sub-Saharan Africa. Moreover, Haltiwanger et al. (2013) study

Table 5 Employment and age

	(1) Whole sample	(2) Whole sample	(3) Age 0–5	(4) Age 6–10	(5) Age 11–20	(6) Age 21 +
Size	0.064***	0.062***	0.107**	0.059***	0.062***	0.071***
	(0.004)	(0.004)	(0.039)	(0.012)	(0.005)	(0.004)
Age $_{t-1}$	−0.001***					
	(0.000)					
Ln(capital intensity) $_{t-1}$	0.010***	0.012**	0.034**	0.670***	0.087**	0.009*
	(0.004)	(0.004)	(0.003)	(0.011)	(0.008)	(0.005)
Ln (wages) $_{t-1}$	0.004	0.010	0.044**	0.018	0.017*	0.033**
	(0.007)	(0.007)	(0.004)	(0.017)	(0.010)	(0.009)
Constant	−0.112**	−0.123**	−0.467**	−0.167*	−0.209***	−0.117**
	(0.033)	(0.043)	(0.143)	(0.054)	(0.067)	(0.054)
Industry dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies included	Yes	Yes	Yes	Yes	Yes	Yes
Ownership included	Yes	Yes	Yes	Yes	Yes	Yes
N	787	787	42	126	254	365
R^2	0.649	0.650	0.466	0.700	0.681	0.699

Notes: We include ownership, industry, and year dummies in all the models. The dependent variable is employment growth (average size method). Robust standard errors in parentheses; significance levels are * $p<0.05$; ** $p<0.01$; *** $p<0.001$

businesses in the USA and find absence of a systematic relationship between firm size and employment growth. In their study, the authors find that employment growth was mainly being driven by smart-ups, highlighting the importance of firm age in employment growth.

Our findings largely confirm the important regularity in employment dynamics. We find that very young firms (0–5 years) are playing an important role in the growth of employment opportunities in a developing country like Kenya. Therefore, it is firm age, and not firm size per se, that drives employment growth in Sub-Saharan African countries like Kenya. Turning to other firm age groups, we find significant rates of employment growth by these age groups. We observe in models (4)–(6) that young firms (ages 6–10), mature firms (ages 11–20), and old firms (age 21+) significantly raise the level of employment by 5.4%, 6%, and 7%, respectively. To analyze the implication of our findings, we turn to theories that emphasize firm learning (Arrow, 1962). According to Arrow, learning is important for young and small firms who find it challenging to absorb or adopt new knowledge. This might suggest a learning effect among these firms that generates improvements in productivity leading to increased profitability. As profitability increases, firm growth takes place as a consequence of learning mechanisms. If this is the case, then young firms might be contributing to high employment growth because of the learning mechanisms (Meinen, 2015; Timoshenko, 2015). Once they have repeatedly tried it and succeeded, these firms (young or small) should be able to grow and expand their operations. Expansion will entail recruiting or employing more workers. As recently shown by Esaku (2020a), experience is important in helping firms to overcome the burden of sunk costs of entry to the export markets. More recently, Arkolakis et al. (2018) present evidence suggesting that firm age and growth are negatively correlated. Growth rates decrease as the age of the firm increases, holding other factors like size constant. If this is the case, we should see growth rates begin to decline as a firm's age rises. Our results indicate that firm age is an important factor driving net employment growth in the Kenyan manufacturing sector and, possibly, in Sub-Saharan Africa.

To conclude, this study documents an inverse relationship between firm age and employment growth, in the Sub-Saharan African context. It is important to note that these findings are consistent with other findings that show the important role very young firms play in driving employment growth in Sub-Saharan Africa (see Kerr et al., 2014).

4.4 Robustness check for results in Table 5

We ascertain the validity of our estimation results by conducting a diagnostic test for multicollinearity.

Table 6 Collinearity diagnostic test

Variable	VIF	SQRT VIF	Tolerance	R-squared		Eigen value	Condition index
Size	1.18	1.08	0.8501	0.3019	1	4.5925	1.0000
Ln(K:L) t-1	1.38	1.17	0.7254	0.2029	2	1.0205	2.1213
Ln(wages) t-1	1.11	1.05	0.9032	0.2375	3	1.0005	2.1425
Age 0–5	2.60	1.61	0.3844	0.1262	4	1.0001	2.1429
Age 6–10	5.06	2.25	0.1978	0.3044	5	0.3123	3.8350
Age 11–20	7.61	2.76	0.1318	0.1154	6	0.1383	4.9782
Age 21 +	8.61	2.93	0.1162	0.1334	7	0.0553	8.1643
					8	0.0253	9.0454
Mean VIF	**3.93**				**Condition number**		**9.0454**

Note: Author's calculations from CSAE data. Ln(K:L) t-1 is capital intensity, and Ln(wages) t-1 is wage rate, all in natural logarithms, lagged one period

Analysis of the variance inflation factor, tolerance level, and R-squared show that the explanatory variables are not highly correlated with each other, giving credence to the results. Further, the condition number indicates that our estimation model is stable and the estimated coefficients might be valid (Table 6).

5 Conclusion

In this paper, we analyze firm size and employment growth in Sub-Saharan Africa, taking Kenya as a case study. Firstly, we evaluate the hotly debated and popular view that small firms create the most jobs and are the primary source of employment growth. We find some evidence that the contribution of large firms towards employment growth is significantly higher than that of other size classes. Secondly, using the average size of the firm to measure employment growth significantly confirms the dominant contribution of large firms towards employment growth. The results of average size classification significantly correct for any measurement errors as evidenced by increasing coefficient estimates, suggesting that the use of base-year classification might be underestimating the contribution of large firms towards employment growth. There is evidence that some statistical and measurement error may have been corrected when average firm size is used.

Thirdly, we further analyzed whether these results are driven by firm size or firm age. Our results indicate that the above results are driven by age rather than firm size per se. Indeed, very young firms (0–5 years) contribute the highest rates of employment growth than any age category. Conclusively, this paper documents the importance of firm age in shaping employment growth in the Sub-Saharan African context, and in Kenya as a country. Although several papers document the importance of small firms in job creation, we find that it is not the size of the firm that matters in employment growth in African manufacturing firms. We have shown that the much supported view that small firms contribute to employment growth does not hold, but rather, emphasis should be on the age of the firm since very young firms in Sub-Saharan Africa display a different growth path which highlights their importance in employment growth.

These findings have important policy implications which could be relevant for Sub-Saharan African countries looking for employment growth strategies. Firstly, addressing soaring unemployment in the region might require creating a business environment that supports the growth of very young firms (0–5 years) since these firms are a source of employment growth rather than size per se. One limitation of this study is that it mainly focuses on manufacturing firms without considering the role of the service sector in employment growth. Future studies that focus on both sectors (manufacturing and services) will greatly enrich our understanding of employment dynamics in Africa.

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Declarations

Conflict of interest The authors declare no competing interests.

Appendix

Table 7 Variable definition

Variable	Definition	Number of observations	Mean	Standard deviation
Employment (ll)	Number of workers (in logarithms) employed by the firm in period t	3239	1.26663	1.90644
Employment growth (gt)	The average change in employment between period t and t-1. Measured using the method proposed by Davis et al. (1996)	796	−0.47452	6.31944
Wages	Log of real monthly wages in US$	1,070	4.30055	0.92635
Wages t-1	Log of real monthly wages in US$ in period t-1	855	4.31005	0.92094
Capital intensity	Log of real US$ of capital: labor ratio	1195	8.50787	1.80365
Capital intensity t-1	Log of real US$ of capital: labor ratio in period t-1	978	8.48142	1.76736
Age	The age of the firm in period t	3,238	18.6584	14.5517
Age t-1	The age of the firm in period t-1	2,687	19.18385	14.20268
Age squared t-1	The square of firm's age in period t-1	2,687	569.661	842.9054
Ownership	Dummy equal one if the firm has some foreign ownership, zero otherwise	3,200	0.1525	0.35956
Ownership t-1	Dummy equal one if the firm has some foreign ownership in period t-1, zero otherwise	2,800	0.1525	0.35956
Micro	Firm size in period t, dummy equal one if number of workers is between 0 and 9, zero otherwise	3,240	0.12624	0.33216
Small	Firm size in period t, dummy equal one if number of workers is between 10 and 49, zero otherwise	3,240	0.11759	0.32217
Medium	Firm size in period t, dummy equal one if number of workers is between 50 and 99, zero otherwise	3,240	0.05926	0.23614
Large	Firm size in period t, dummy equal one if number of workers is 100 or more	3,240	0.08858	0.28418

Source: Author's calculation

Table 8 Correlation matrix of the key explanatory variable

	Capital intensity	Wages t-1	Age t-1	Age-squared t-1	Employment	Ownership t-1
Capital intensity t-1	1.0000					
Wages t-1	0.3113	1.0000				
Age t-1	0.3003	0.0793	1.0000			
Age squared t-1	0.2059	0.0604	0.9447	1.0000		
Employment	0.3517	0.1331	0.1183	0.0609	1.0000	
Ownership t-1	0.2054	0.1344	0.2362	0.1778	0.2247	1.0000

Source: Author's calculation

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