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Haroon Bhorat
Tim Köhler
François Steenkamp
Mphatso Kumwenda

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Haroon Bhorat[1], Tim Köhler[2], François Steenkamp[3], and Mphatso Kumwenda[4]

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Abstract

This paper measures firm dynamics and job flows in Rwanda's formal economy using annual, firm-level administrative tax panel data covering the universe of registered firms from 2010 to 2023. We estimate rates of total job reallocation, job creation, and job destruction over time, and decompose these flows into extensive (entry and exit) and intensive (incumbent expansions and contractions) margin components. We find that job flows have stabilised at approximately 30% in recent years, which is high by international standards, pro-cyclical, and creation-led, with job creation and destruction rates of 21% and 10%, respectively. Despite frequent entry and exit, decompositions show that intensive-margin adjustments overwhelmingly drive job flows with incumbent firms accounting for up to 90% of all flows in recent years. We further show that the magnitude of job flows decline and its composition varies across the firm size distribution, with very small firms adjusting more than their larger counterparts on the extensive margin, but also often experiencing net losses due to incumbent contractions, while larger firms drive net gains. Sectorally, job flows are net positive and incumbent-driven, with primary and tertiary sectors shifting from early entry-led spikes to incumbent-led growth, and the secondary sector displaying steadier incumbent dominance. These findings highlight the importance of policies that strengthen incumbent firm growth while supporting smaller firms' survival and capacity to scale.

[1] Development Policy Research Unit, School of Economics, University of Cape Town, South Africa.

[2] Development Policy Research Unit, School of Economics, University of Cape Town, South Africa.

[3] Development Policy Research Unit, School of Economics, University of Cape Town, South Africa.

[4] International Growth Centre, Rwanda.

1 INTRODUCTION

The Schumpeterian process of creative destruction is a critical process behind the dynamism of a modern market-based economy. The reallocation of factors of production – such as labour – is key in driving productivity growth (Olley & Pakes, 1996; Bartelsman, et al., 2004; McMillian, Rodrik & Verdasco-Gallo, 2014). This process involves job flows from low productivity economic activities toward high productivity economic activities. New firms enter and create new jobs, while unprofitable firms exit and contribute to job destruction. Similarly, incumbent firms able to adapt to changing market conditions and remain profitable expand, while less dynamic firms contract. This distinction between extensive and intensive margin adjustments holds important implications for understanding the underlying sources of employment growth. Overall, this process of job creation and job destruction deals with the misallocation of resources, thereby advancing aggregate productivity growth. Job flow patterns are pro-cyclically tied to economic growth (Davis & Haltiwinger, 1996), and understanding these patterns offers insight into how firm dynamics shape patterns of structural change and employment growth.

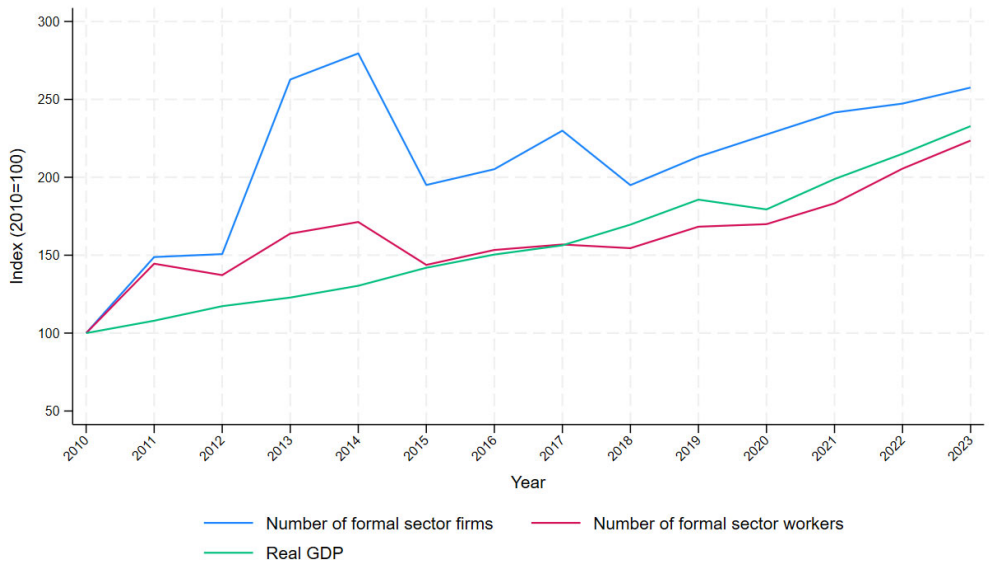
The Rwandan economy is instructive here. From 2010 to 2023, Rwanda experienced rapid economic growth averaging around 6.2% per year. By way of comparison, the Sub-Saharan African region, on average, grew by 3.2% per annum over the same period – half of that achieved by Rwanda – and low-income countries, on aggregate, grew at a rate of 1.2 percent per annum over the same period.[1] This relatively rapid economic growth has been accompanied by an evolving labour market where both the number of firms and the number of workers has grown substantially over the period. As shown in Figure 1, both the number of formal sector firms and workers have tracked closely with economic growth, growing on average at a rate of approximately 7% and 6% per year, respectively. However, growth along these two margins has not been symmetric. As we show later, the growth of the firm population has been driven by growth in the number of micro firms, while the growth in employment has been driven by an expansion of workers within a relatively small number of large firms. We thus have a rapidly growing low-income African economy that offers a unique case study on how firm dynamics, and the churning of the labour market, have evolved during this relatively rapid period of economic growth.

In this paper, we provide estimates of firm dynamics and job flows in Rwanda's formal economy. While representing only about 10% of total employment, the formal labour market plays a disproportionately important role in driving productivity growth and fiscal revenues (La Porta & Shleifer, 2014; Keen, 2012; Besley & Persson, 2014), and serves as a key channel through which structural transformation occurs

[1] To calculate GDP growth we use measures of real GDP (constant 2015 US dollars) taken from the World Bank Development Indicators (The World Bank, 2025).

(Herrendorf et al., 2014). The paper's analytical framework follows the established job flows literature (Davis et al., 1996; Haltiwanger et al., 2008; Huzen et al., 2010, among others), focusing on both the scale and composition of job creation and destruction over time. Using annual firm-level administrative tax panel data that covers the universe of Pay-As-You-Earn (PAYE)-registered firms in Rwanda from 2010 to 2023, we begin by mapping the distribution of employment across firms along various characteristics over time. Exploiting the panel nature of the data, we then quantify the magnitude of job flows by providing estimates of job reallocation, job creation, and job destruction. We decompose these estimates to distinguish between the contributions of extensive margin adjustments – arising from firm entry and exit – and intensive margin adjustments – arising from expansions and contractions within incumbent firms – to identify the underlying sources of churn. This decomposition allows us to directly assess whether employment growth is driven by the creation of new firms or, alternatively, the scaling-up of existing firms, with distinct implications for firm-support and job creation policies. Throughout, we present results both in aggregate and disaggregated by firm size and sector to reveal underlying heterogeneity. In doing so, we extend the scarce evidence base on job flows in Africa, adding to earlier work for Ethiopia (Shiferaw & Bedi, 2009), Côte d'Ivoire (Klapper & Richmond, 2011), Ghana (Sandefur, 2010), Kenya (Esaku, 2020), and South Africa (Kerr et al., 2014; Kerr, 2018; Visagie et al., 2026).

Figure 1: Growth in real GDP, formal sector employment, and number of formal sector firms



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority and real GDP data from World Bank (2025).

We show that employment growth has been rapid. Between 2010 and 2023, formal employment more than doubled and the number of registered firms nearly tripled. While micro firms have grown in prevalence, employment remains highly concentrated with large firms representing just 1 percent of all firms, accounting for 60% of all jobs by 2023. While this net growth is impressive, it masks substantial underlying churn. Gross job reallocation has stabilized around 30% – in line with rates evident in developed country economies (Davis & Haltiwinger, 1996; Halitiwinger et al., 2008) – and is indicative of a dynamic formal economy experiencing constant change. Consistent with the strong employment growth, these job flows are creation-led, with job creation rates averaging around 21% and job destruction rates around 10% in recent years. Hence, job creation accounts for more than 60% of all job flows. While Rwanda's job destruction rate lies within typical international ranges, its job creation rate is notably higher by global standards. We show that job flows are pro-cyclical, with job creation (destruction) tending to rise (fall) with higher economic growth, and that both are driven not by entrants and exiters, who are frequent but tend to be small, but instead by incumbent adjustments who account for up to 90% of all job flows in recent years.

Across firms, the magnitude of job flows declines with firm size, while their composition varies. Smaller firm flows are more extensive margin (entry and exit) heavy, while larger firm flows are more intensive margin (incumbent expansions and contractions) heavy. In contrast to larger firms, very small "micro" firms often experience net job losses, which we show are due to incumbent contractions rather than exits. With respect to sector dynamics, job flows are net positive across all sectors and incumbent-driven, though their composition varies over time. The primary and tertiary sectors exhibit early entry-led spikes that later give way to incumbent-led growth, while the secondary sector shows steadier patterns of incumbent dominance. Beneath these sectoral trends lies pronounced industry-level heterogeneity, reflecting variation in the intensity and sources of job reallocation across activities.

The remainder of the paper is structured as follows. Section 2 describes the data, while Section 3 presents several key descriptive statistics. Section 4 outlines the empirical methodology, while Section 5 reports the main results. Section 6 concludes with a discussion of the key findings and their policy implications.

2 DATA

We use annual, firm-level administrative tax panel data from the Rwanda Revenue Authority (RRA) covering the universe of registered firms that file Pay-As-You-Earn (PAYE) payroll taxes in Rwanda. These data are generated by employers who are legally required to withhold and remit PAYE taxes to the RRA

as part of their statutory tax obligations.[2] The availability of such administrative microdata for research in Africa is rare, with only a small number of countries having developed comparable datasets that permit detailed analysis of labour markets.

The dataset contains 241 590 firm-year observations comprising 42 079 unique firms from 2010 to 2023. It includes information on firm employment, earnings, main industry, age, sector (public or private), geographic location (province), and trade status. We merge in additional firm characteristics that are not reported in the PAYE filings using data provided from RRA's tax register, which provides a master list of all formal sector firms. Worker-level characteristics are not observed. For variables with occasional missing values within a firm over time, we impute data using the closest available observation. We collapse the data to annual frequency and report earnings in real terms, adjusted for inflation and expressed in constant 2023 RWF.

The sample comprises all registered firms with paid employees, and thus excludes registered firms without employees (the formal self-employed) as well as all informal sector firms.[3] Firms therefore appear in the data for one of two reasons: the creation of new formal firms or the formalisation of previously informal firms. Conversely, firms leaving the data may reflect formal firm closure or a transition back into informality. As such, our analysis captures changes in formal employment only and cannot distinguish between the creation of new formal firms and the formalisation of previously informal firms, nor between exit due to firm closure and exit due to informalisation.

One concern when using such administrative data is that observed firm entry and exit may partly reflect reporting or compliance behaviour rather than true firm dynamics. While this is true, we find limited evidence in support of this concern. Although the firm panel is unbalanced – with the median firm being observed for four years and only 17% being present across the entire 14-year period – less than 5% of firms exhibit multiple non-consecutive reporting spells, and the vast majority of observed exits (around 90%) are terminal. As a robustness test, however, our main results are insensitive to excluding firms with any intermittent reporting histories.[4] Taken together, this suggests that the findings we present

[2] Under Rwandan tax law, employers must withhold PAYE from employees' wages, declare it, and remit the tax to the RRA within 15 days after the end of the month in which the income was paid. Employers are responsible for maintaining proper books of account to support correct withholding and remittance. Failure to comply with filing or payment requirements can trigger penalties and fines, including administrative fines for late or incorrect filings, interest on late payments, and other sanctions comparable to those for other domestic taxes.

[3] Formal sector employment represents approximately 9.6 percent of total employment in the Rwandan economy in 2021 (NISR, 2022). This share of formal sector employment is in line with that evident in Sub-Saharan Africa (10.5%), Western Africa (7.1%), Eastern Africa (9.6%), and Central Africa (6.3%) – see Appendix Figure A1.

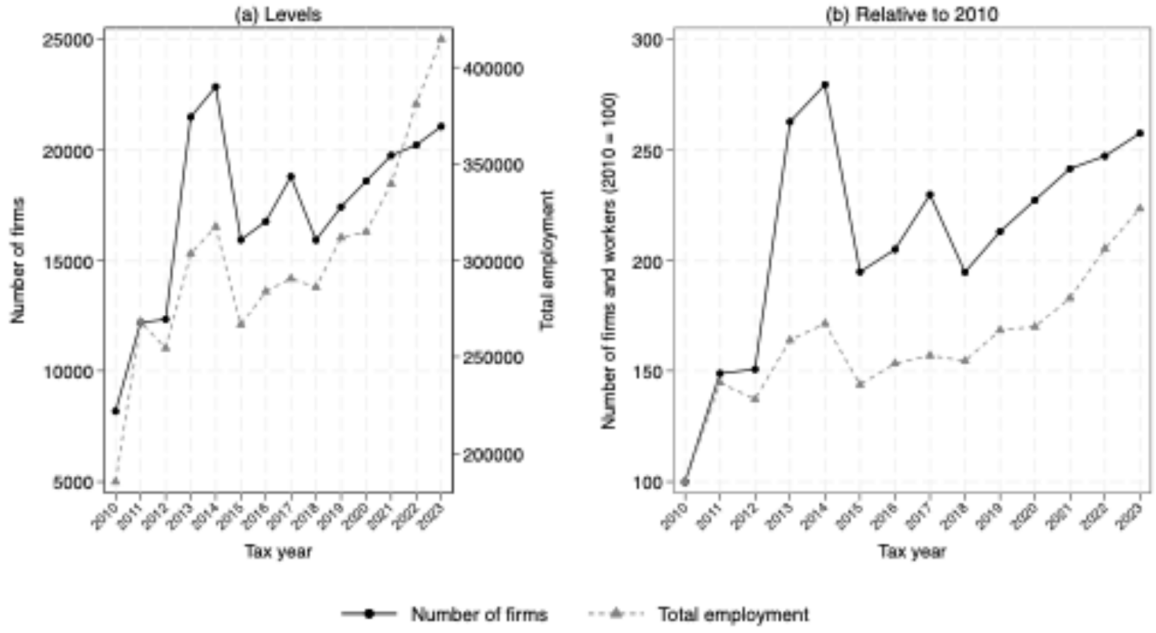
[4] We do not report these results here for brevity, but they are available upon reasonable request.

below predominantly reflect genuine labour market dynamics rather than systematic reporting inconsistencies.

3 DESCRIPTIVE STATISTICS

Over the period 2010 to 2021, the Rwandan economy has experienced relatively rapid formal sector employment growth. This is evident in panel a) of Figure 2 (and Appendix Table A1), where we observe that employment more than doubles from 185 375 workers in 2010 to 414 474 workers in 2021. This corresponds with an average annualised growth rate of just under 7% over the 12 year period. Notably, this growth is high compared to that achieved by other countries within the eastern (4%), central (2%), northern (-1%) and southern (1%) African regions.[5] Given this rapid pace of growth, the analysis to follow unpacks how firm-level labour market churn has shaped the growth of the formal labour market.

Figure 2: Trends in the number of formal sector firms and employment in Rwanda, 2010 – 2023



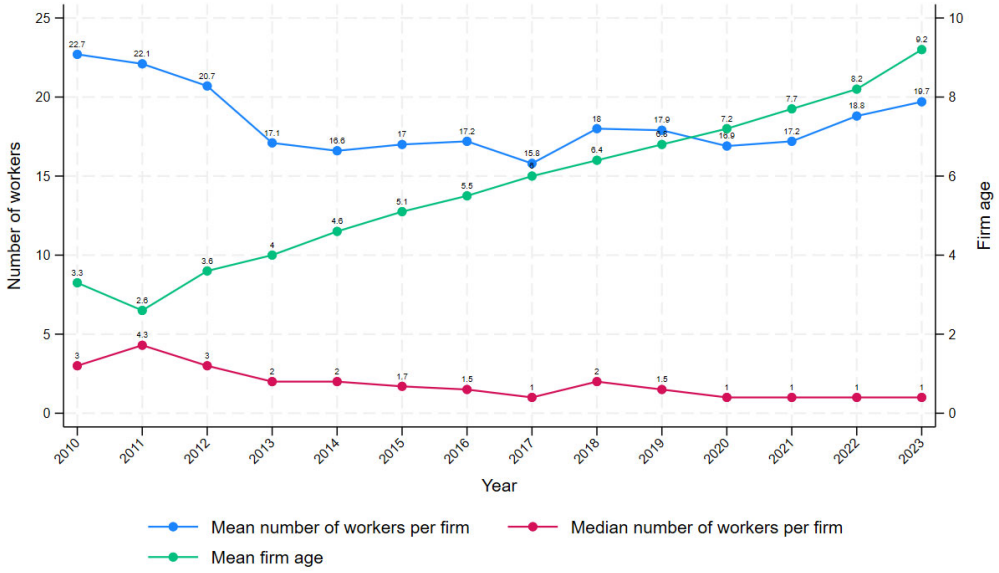
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Number of workers refers to permanent workers only.

While we observe relatively rapid formal sector employment growth, we see that the number of formal sector firms has also expanded rapidly over the period. This is evident in Figure 2 (and Appendix Table

[5] These formal sector annualized growth rates are summarized in Appendix Figure A1. These regional estimates from the ILO are drawn from survey data estimates and not firm-level data**Error! Reference source not found.**.

A1), which show that the number of formal sector firms almost tripled from 8 178 firms in 2010 to 21 065 firms in 2023. We also note – looking at panel b) of Figure 2 – that the growth in the number of firms – expanding at an average annualised rate of 7% – aligned closely with the corresponding growth in employment. Nevertheless, drawing on Figure 3, we observe that both the mean and the median firm size has declined over the period, and given this, it is instructive to examine changes in the distribution of firms by firm size.[6]

Figure 3: Mean and median number of workers per firm, 2010-2023



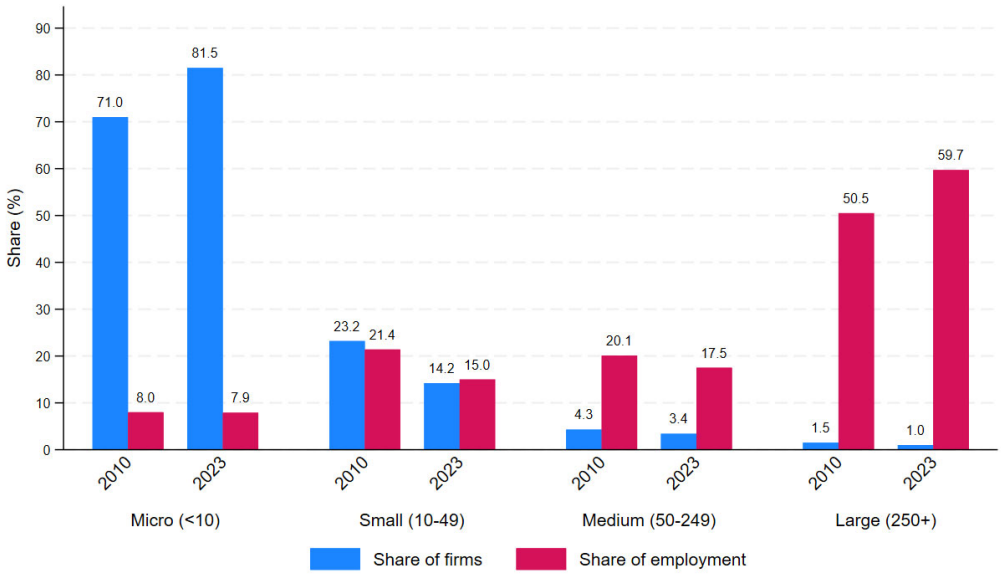
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Number of workers refers to permanent workers only.

If we consider these trends in firm and employment growth across the firm size distribution, it emerges that the growth of the number of firms is driven by growth in the number of micro firms, while the growth in employment is being driven by the expansion of workers in large firms. Figure 4 stratifies firms in micro (less than 10 employees), small (10-49), medium (50-249) and large (250 or more) firm size categories, and reports the share of firms and the share of employment accounted for by each for the start and end period of our analysis. Most formal sector firms in Rwanda are micro firms, accounting for 81.5% of firms in 2023, which is up from 71% in 2010. This marked rise in the share of micro firms

[6] By way of comparison, Kerr (2016) shows that over the period 2011 to 2014, the median firm size for formal sector firms in South Africa average around 6 workers, and the corresponding mean estimate ranged between 37 and 40 (almost double that observed in Rwanda).

provides an explanation for the decline in mean and median firm size observed in Figure 3. The share of employment accounted for by micro firms, despite a small rise over the 2010s, has remained static at approximately 8% over the period (see Appendix Table A2). While large firms only represent about 1% of formal sector firms in Rwanda, these firms account for the bulk share of formal sector employment, and this relative share has expanded from 50.5% in 2010 to 59.7% in 2023, suggesting that much of the employment growth over the period has been driven by employment growth in large firms. Similar to the large firm size group, medium firms account for a disproportionate share of employment – accounting for 3.4% of firms and 17.5% of employment in 2023. These relative shares in the number of firms and employment accounted for by medium firms have both declined over the period. A similar pattern, although more acute, is observed among small firms. These firms accounted for 14.2% of firms in 2023, down substantially from 23.2% in 2010. Correspondingly, the employment share for this grouping declined from 21.4% in 2010 to 15% in 2023.

Figure 4: Firm size category share of firms and employment, 2010 and 2023



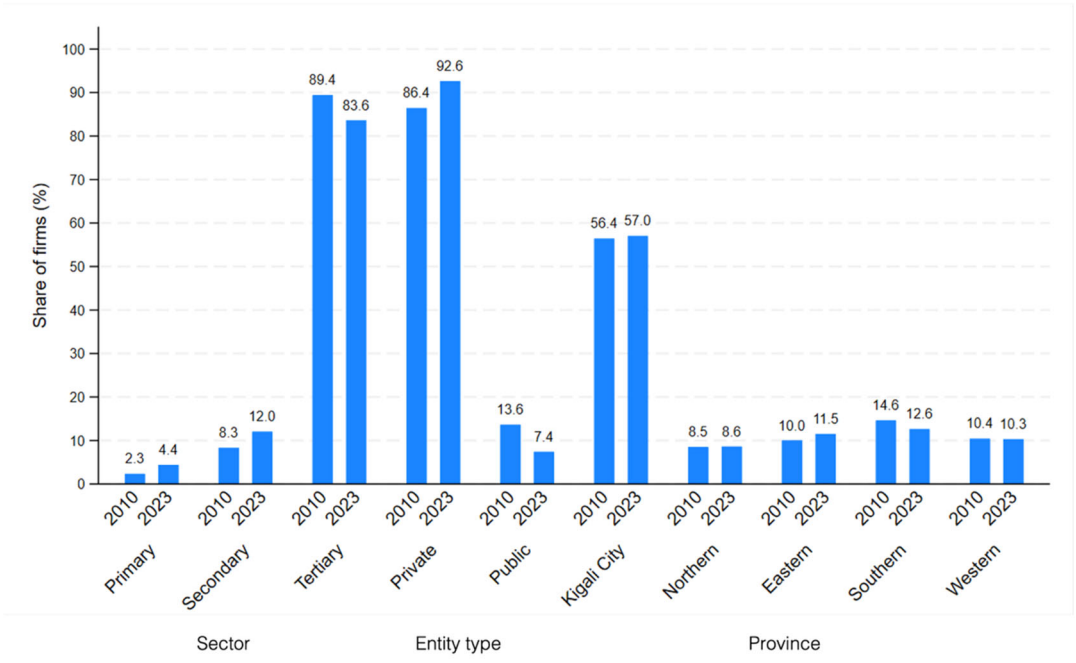
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Number of workers refers to permanent workers only.

Further examination of the distribution of firms across sectors[7], entity type and geographic location reveals several additional points of interest. First, while the services sector accounts for the bulk share

[7] Sector refers to primary (agriculture; mining and quarrying); secondary (manufacturing; construction; utilities); and tertiary (services).

of firms, the primary and secondary sectors have expanded over the period. We observe in Figure 5 that the share of firms in the services sector declined slightly from 89.4% in 2010 to 83.6% in 2023. Given this relative decline, the share of secondary sector firms has grown from 8.3 to 12% over the same period. This is possibly driven by the expansion of manufacturing activity, pointing to a process of structural transformation and industrialisation. Similarly, the share of primary sector firms has risen from 2.3 to 4.4%. Second, the distribution of firms across the private and public sectors suggests that growth in the number of firms operating in the economy has been driven by the expansion of the private sector. Figure 5 shows that private sector firms constituted 92.6% of firms in 2023, which was up from 86.4% in 2010. Third, the majority of formal sector economic activity is concentrated around the capital, Kigali City, with more than half (57%) of all formal sector firms being based there. The distribution of formal sector firms across the other four provinces is fairly even and has remained relatively static over the period. Fourth, referring to Figure 3, we observe that on average, formal sector firms in Rwanda are getting older. The mean firm age among formal sector firms increased from 3.3 years in 2010 to 9.2 years in 2023. This indicates that firms are staying in business for longer on average.

Figure 5: Distribution of firms by sector, entity type and province, 2010 and 2023



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Number of workers refers to permanent workers only.

In Section 4 we examine how the dynamics of firm entry and exit impact on net job creation. In particular, and consistent with similar such studies (Haltiwinger et al., 2008; Huzen et al., 2010;

Haltiwinger et al., 2013), we consider the role that firm size plays in shaping these dynamics. It is thus informative to provide some initial insight into firm mobility in the Rwandan formal sector. To do this we generate a firm transition matrix, as displayed in Table 1. Here we show how the distribution of firms grouped according to firm size in the baseline period (2010) changed by the end period (2023). For example, taking the two rows for micro firms, we see that of the 5 636 micro firms in 2010: 1 757 (31.2%) were still present and remained micro sized firms by 2023; 367 (6.5%), 45 (0.8%) and 10 (0.2%) of these firms experienced employment growth and shifted to the small, medium and large firm size categories, respectively; and 3 457 of the micro firms in 2010 did not survive to 2023.[8]

Table 1: Firm size transition matrix for formal sector firms in Rwanda, 2010 vs. 2023

			Firm size, 2023					
			Micro (<10)	Small (10-49)	Medium (50-249)	Large (250+)	Did not survive	Total
Firm size, 2010	Micro (<10)	N	1,757	367	45	10	3,457	5,636
		%	31.2	6.5	0.8	0.2	61.3	100.0
	Small (10-49)	N	538	576	112	14	673	1,913
		%	28.1	30.1	5.9	0.7	35.2	100.0
	Medium (50-249)	N	57	67	134	47	120	425
		%	13.4	15.8	31.5	11.1	28.2	100.0
	Large (250+)	N	33	21	14	65	71	204
		%	16.2	10.3	6.9	31.9	34.8	100.0
	Did not exist	N	14,416	2,143	516	133	0	17,208
		%	83.8	12.5	3.0	0.8	0.0	100.0
	Total	N	16,801	3,174	821	269	4,321	25,386
		%	66.2	12.5	3.2	1.1	17.0	100.0

Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Firm size calculated using permanent workers only.

Several key insights emerge from this initial analysis of formal sector firm mobility in Rwanda: First, we observe high exit rates. Of the 8 178 active firms in 2010, only 47% (or 3 857 firms) survived to 2023, which suggests that 53% (or 4 321 firms) of the firms in our baseline period "died" at some stage before 2023. With 61.3% of the baseline cohort not being present in 2023, micro firms were the most likely to exit. We also note relatively high rates of exit in larger firms, were 28.2 and 34.8% of medium and large firms present in the base period did not survive to the end period. Nevertheless, these lower exit rates indicate that larger firms were generally more likely to survive. Second, while firms that survived tended to remain in the same firm size category, there is evidence of mobility across firm size categories. Conditional on survival, 80.6, 46.5, 43.9 and 48.9% of micro, small, medium and large firms remained as such over the period. This entails that over half of baseline small, medium and large firms – that

[8] These are most likely firm exits. However, there is the possibility that these firms merged with other firms, which would not constitute an exit.

survived – shifted to other firm size categories over the period.[9] Third, upward mobility is limited. We observe that approximately 7.5, 6.6 and 11.1% of baseline period micro, small and medium firms graduated to larger firm size categories. Conditional on survival, the corresponding upward mobility rates are 19.4, 10.2 and 15.4%, respectively.[10] Fourth, downward mobility exceeds upward mobility. Approximately, 28.1, 29.2 and 33.4% of small, medium and large firms contracted and shifted to smaller firm size categories, respectively.[11] In light of the rapid employment growth reported above, this suggests that employment growth is concentrated in a relatively small number of firms (we speak more to this when we discuss Figure 6). Fifth, firm entry is substantial. Of the 25 386 firms present in 2023, 17 208 of these firms did not exist in 2010. This in combination with the previous points comparing upward and downward mobility suggests that employment growth is driven by both growth of surviving firms and growth driven by the entry of new firms. The analysis in Section 4 provides a more nuanced perspective by examining how firm dynamics shape employment trends.

As noted above, there is preliminary evidence suggesting that a small number of firms are driving employment growth. We now investigate this further. Drawing from Table 1, 47% of the firms active in 2010 (3 857 firms) were still active in 2023. Of these surviving firms, 43% grew in size, 6% remained constant, and just over half (52%) shrunk. In panel a) of Figure 6 we present a scatter plot of the employment levels (expressed in logarithmic form) for these surviving firms in 2010 (x-axis) in relation to their employment levels in 2023 (y-axis). To depict this relationship more clearly, we provide a binned scatterplot.[12] We also include a regression line that yields a coefficient of 0.702, which implies that 10% higher employment in 2010 is associated with 7% higher emp in 2023. This indicates a degree of partial convergence where smaller firms are growing faster than larger firms, and so relative employment differences have shrunk.

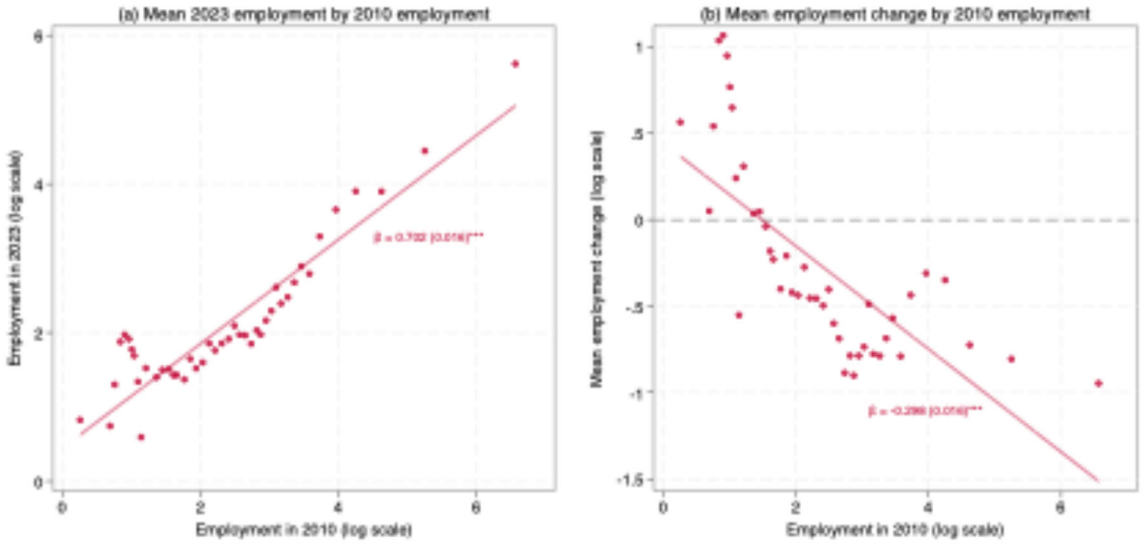
[9] When calculating job destruction, job creation and job reallocation rates, Davis et al. (1996) advise using the mean of base and end year employment levels for the denominator. They motivate for such an approach because the migration of firms across firm size categories can provide misleading estimates if not accounted for. The evidence here of Rwandan firm mobility across firm size categories means that we follow similar such approach. This is detailed in Section 3.

[10] Here we take the number of surviving firms and work out the mobility rates using this number as the denominator. For example, for micro firms, 2 179 firms survived (5 636 less 3 457), which means that 16.8 percent of surviving baseline micro firms graduated to small firms over the period (367/2179).

[11] The corresponding rates, conditional on survival, are 43.4, 40.7 and 51.1 percent for small, medium and larger firms, respectively.

[12] In Appendix Figure A3 we show the corresponding scatter plot where each marker represents one of the surviving firms as opposed to aggregating these firms into bins.

Figure 6: Employment levels for surviving formal sector firms in Rwanda, 2010 vs. 2023



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Employment refers to permanent workers only and is plotted on a log scale, using log(employment + 1) to include firms with zero employees (i.e., self-employed). Scatterplots overlaid with linear regression lines.

Panel b) of Figure 6 substantiates this point by presenting a binned scatterplot of mean log employment change (y-axis) in relation to baseline (2010) log employment levels. Firm bins below the regression line represent surviving firms that have shrunk in size, and as mentioned above, this represents 52% of surviving firms. Firm bins above the regression line represent surviving firms (43% of surviving firms) that experienced employment growth over the period. Focusing on these growing firms, it is evident that smaller surviving firms have grown faster than larger surviving firms, and are potentially driving job creation in Rwanda. In fact this is one of the key areas of contestation in the job creation and destruction literature: whether small firms are responsible for the major share of job creation (Kerr et al., 2014). In Section 4 we contribute to this debate by examining job creation and job destruction rates for Rwandan formal sector firms and assessing whether firm size plays a role in these job churn dynamics.

4 METHODOLOGY

Following the descriptive overview presented above, our primary analysis focuses on a formal measurement of firm dynamics and job flows in Rwanda's formal sector. Our approach follows the standard framework developed and applied in the empirical literature on firm dynamics and job flows (for example, see David & Haltiwanger, 1992; Davis et al., 1996; Bartelsman et al., 2004; Haltiwanger et al., 2008; 2013). We begin by exploiting the panel nature of the data to identify firm births and deaths, both in absolute and relative terms, before examining job reallocation through job creation (JC) and job destruction (JD). We further distinguish between the contributions of firm entrants, exiters, and

incumbents to better understand the sources of reallocation. Throughout the analysis, we characterise these dynamics both on average and also by firm size and sector to capture sources of underlying heterogeneity, as is common in studies of job flows in both high-income and developing country contexts (for example, see Shiferaw, 2009; Kerr et al., 2014; Page & Söderbom, 2015).

First, we define firm birth (in other words, entry) as firms that are first observed in year *t* but not in *t-1*, while firm death (in other words, exit) refers to firms that are present in *t* but absent in *t+1*. The panel is unbalanced, so some firms enter and exit multiple times across the years, reflecting either genuine episodes of firm birth and closure or periods of registering and deregistering in the tax system. We report absolute counts of births and deaths by year, and formally, relative firm birth and death rates are calculated by normalising firm births and deaths to the stock of active firms in the previous year:

$$Birth\ Rate_t = \frac{Births_t}{N_{t-1}} \tag{1}$$

$$Death\ Rate_t = \frac{Deaths_t}{N_{t-1}} \tag{2}$$

where N_{t-1}refers to the number of active firms in year *t–1*. While this approach captures changes at the extensive margin – job creation through entry and job destruction through exit – it provides only a partial view of employment dynamics. A comprehensive approach must also account for adjustments at the intensive margin; namely, growth and contractions of employment within incumbent firms. Following the literature, we calculate the job creation rate as the employment gains summed across all firms that either start up in year *t* or grow between year *t-1* to *t*, and the job destruction rate as the employment losses summed across all firms that shut down or contract between year *t-1* and *t*. Let E_{it}denote employment in firm *i* and year *t*, and $\Delta E_{it} = E_{it} - E_{it-1}$ the change in employment across years. For continuing firms, a positive value of ΔE_{it} indicates job creation and a negative value job destruction. For entrants, all employment in the first year of appearance (E_{it}) is counted as job creation, while for exiters, all lagged employment (E_{it-1}) is counted as job destruction. Year-specific rates are then obtained by dividing aggregate job creation and destruction by the average of aggregate employment between *t* and *t-1*:

$$JC_t = \frac{\sum JC_{it}}{0.5(\sum E_{it} + \sum E_{it-1})} \tag{3}$$

$$JD_t = \frac{\sum JD_{it}}{0.5(\sum E_{it} + \sum E_{it-1})} \quad (4)$$

The job creation rate (JC_t) thus measures the share of average employment accounted for by new jobs due to either new or expanding firms in year t, while the job destruction rate (JD_t) measures the share accounted for by jobs lost due to either firm exits or contraction.[13] The job reallocation rate is then defined as the gross sum of absolute job creation and destruction, $RE_t = JC_t + JD_t$, and measures the total volume of job flows in a given period relative to average employment. It provides a summary measure of the intensity of labour market churn that is distinct from net employment change, which reflects only the difference between job creation and destruction.[14] To identify the sources of these dynamics, we further decompose job flows into components attributable to entrants, exits, and incumbent firms. Formally, total job creation and destruction in year t can be expressed as $JC_t = JC_t^{entry} + JC_t^{inc}$ and $JD_t = JD_t^{exit} + JD_t^{inc}$, respectively, where JC_t^{entry} denotes jobs created by new firms, JC_t^{inc} by growing incumbent firms, JD_t^{exit} jobs lost due to firm exits, and JD_t^{inc} from contracting incumbent firms.[15] This decomposition distinguishes between employment changes at both the extensive margin (entry and exit) and the intensive margin (adjustments among incumbents), allowing us to assess how much of overall job reallocation is driven by firm turnover versus changes within incumbents.

While this approach provides well-established measures of firm dynamics, several limitations are worth noting. As described in the previous section, the panel is unbalanced and, hence, is subject to endpoint censoring. This means that firm births in the first year (2010) and deaths in the final year (2023) cannot be identified, since the data do not extend far enough to observe firms' true first or last year of activity. As such, we only report measures for the "complete" years in between. More broadly, because these data are from administrative records covering the universe of PAYE-registered firms, the absence of a firm in the data does not necessarily imply that it does not exist, but rather that it may not have been registered – a common limitation of such data. Finally, because our analysis relies on firm-level panel data, we measure job flows rather than worker flows. The measures therefore capture the creation and

[13] We sum firm-level flows first and then divide by the summed denominator, as opposed to taking the average of firm-level rates.

[14] For example, even if net employment growth is close to zero, reallocation may still be substantial if large numbers of jobs are simultaneously being created and destroyed.

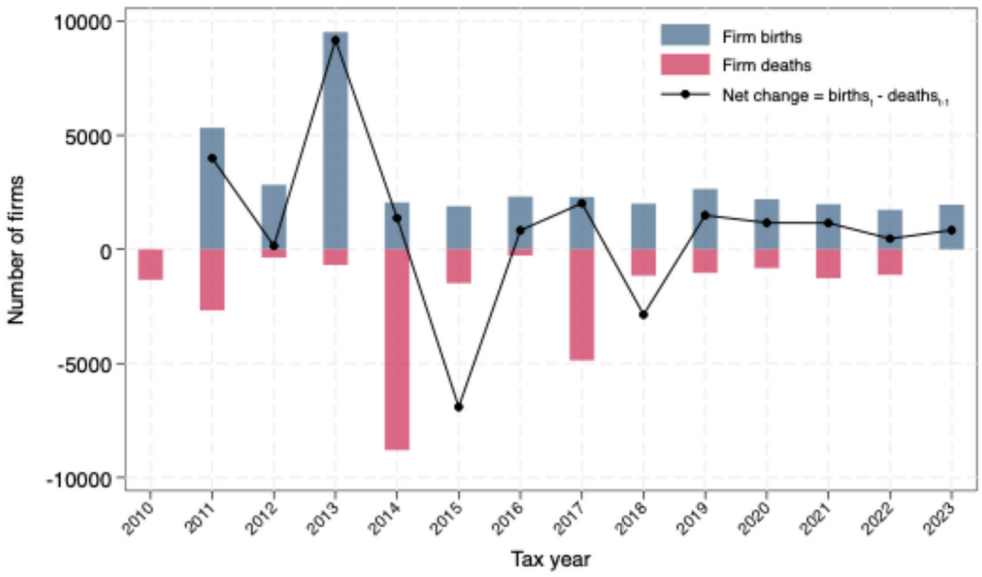
[15] Firms observed only once are classified as exiters if they appear at the start of the panel and as entrants if they appear at the end. For job-flow calculations, however, such one-year firms count toward both entry-related creation (all E_{it}) and exit-related destruction (all $E_{i,t-1}$), consistent with the approach commonly taken in the literature.

destruction of jobs at the firm-level, but not the reallocation of individual workers within or between firms.

5 RESULTS

We begin with examining dynamics on the extensive margin – that is, entry and exit (firm births and deaths) – before turning to also considering intensive margin dynamics among incumbent firms (as reflected in job creation and destruction.). Figure 7 presents trends in the annual number of firm births and deaths in levels over the period, with more detailed data reported in Table A3 in the Appendix. Overall, with the exception of a few contraction episodes, firm births exceed deaths in most years, resulting in a net increase in the stock of firms of nearly 13,000 (or nearly 160%), as reported earlier in Figure 2. The average year sees a net gain of approximately 1,000 firms (about 10%), comprising nearly 3,000 births and 2,000 deaths. Net changes, measured as the number of births in year *t* and deaths in year *t-1*, were especially large in 2011 and 2013 and only turned negative in two years: 2015 and 2018. Thereafter, growth in the stock of firms remained modestly positive from 2019 onwards, despite the COVID-19 pandemic. The former two periods coincide with relative high economic growth episodes, while the latter two coincide with relatively weak growth. This is consistent with the idea of job flows being strongly cyclical, which has been documented in other contexts (Davis et al., 1992; Lee & Mukoyama, 2015).

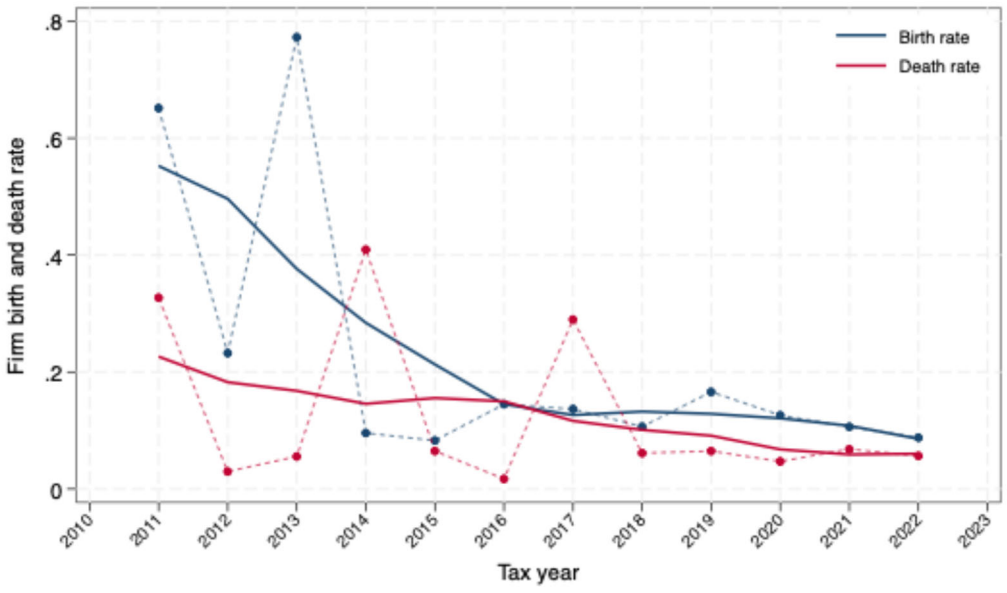
Figure 7: Absolute formal sector firm births and deaths in Rwanda, 2010 – 2023



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Firm births are defined as firms appearing in year t but not in t–1. Firm deaths are defined as firms present in t but absent in t+1. Net change in year t refers to the change in the stock of firms from year t-1 to year t, equivalent to the difference between firm births in year t and firm deaths in year t-1. Births in 2010 and deaths in 2023 are not presented due to panel censoring.

To account for the changing stock of firms, avoid conflating the varying magnitudes of births and deaths with scale effects, and make them comparable over time, we convert births and deaths from levels to rates by normalising levels in a given year to the stock of firms in the previous year, as described in Section 3. Firm birth and death rates are reported in Figure 8. Similar to the previous figure, firm birth rates consistently exceed firm death rates in most years. Over time, firm birth rates start high but trend down steadily, while death rates remain lower and also decline. In the early 2010s, births exceed deaths by more than double during several years. This may reflect a genuine high entry period, or a period of heightened tax registration and compliance. As mentioned in Section 3, since we only observe PAYE-registered firms, it's difficult to disentangle real entry from improved administrative coverage. Similar to the previous figure, the peaks in the death rate in 2014 and 2017 coincide with weaker economic growth episodes, again highlighting the strongly cyclical nature of job flows. From the late 2010s, birth rates stabilize around 9 – 17% and death rates around 5 – 7%, leaving a smaller, steadier positive gap – indicative of continued net entry and consistent with a maturing, more stable formal sector that may be approaching a steady-state equilibrium.

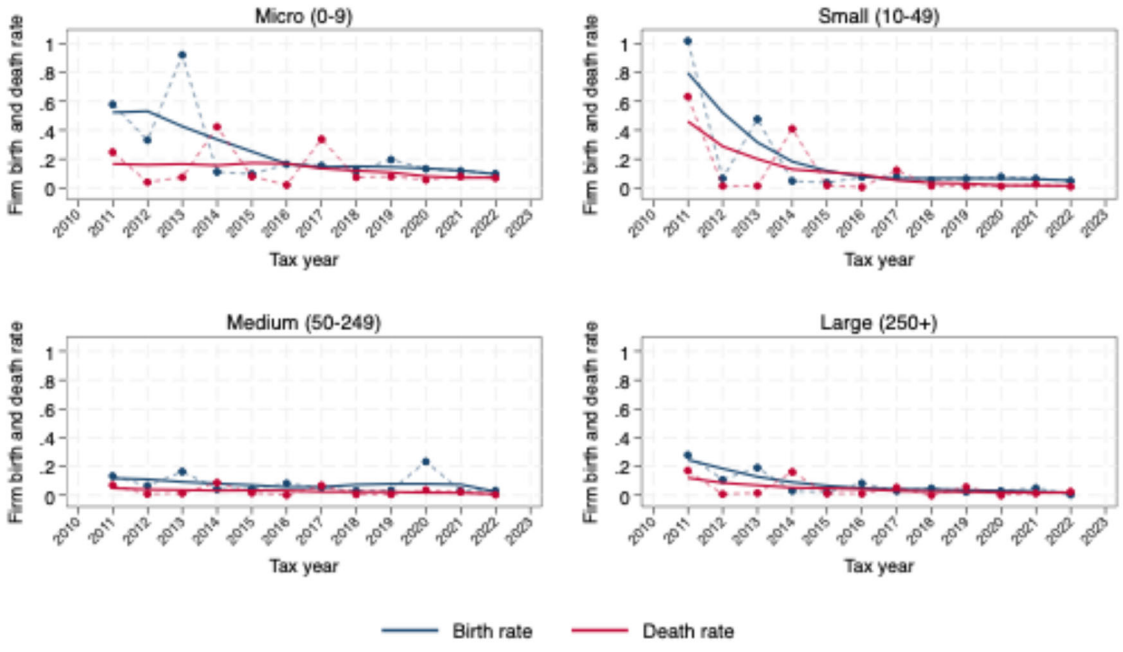
Figure 8: Formal sector firm birth and death rates in Rwanda, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Firm births are defined as firms appearing in year t but not in t–1. Firm deaths are defined as firms present in t but absent in t+1. Birth and death rates are expressed relative to the number of active firms in the prior year. Rates in 2010 and 2023 are not presented due to panel censoring. Connected points show calculated rates with a lowess-smoothed line overlaid.

In Figure 9, we consider how firm birth and death rates vary across the firm size distribution, a margin that prior work shows is tightly linked to job flows. Broadly, existing studies from other countries tend to find that smaller firms exhibit higher entry and exit rates, while larger incumbents adjust mainly on the intensive margin (Davis & Haltiwanger 1992; Bartelsman et al., 2004; Haltiwanger et al., 2013; Decker et al., 2014). From a cross-country perspective, Haltiwanger et al. (2008) find that small firms account disproportionately for job flows across several diverse economies, and that differences in firm-size structure explain nearly half of the variation in job flows across countries.[16] Our findings with respect to Rwanda below align closely with the existing literature, with most churn on the extensive margin being concentrated among smaller firms. Micro firms show the highest birth and death rates, around 10 – 20% and 6 – 8% in recent years, respectively. On the other hand, large firms exhibit much lower birth and death rates of around 1 – 5%. This indicates that the net increase in Rwanda's firm population documented previously is driven by small firms. While this is suggestive of a dominant role for small firms in driving job flows, it reflects only extensive-margin dynamics; adjustments within incumbent firms are not captured here.

Figure 9: Formal sector firm birth and death rates in Rwanda, by firm size, 2011 – 2022

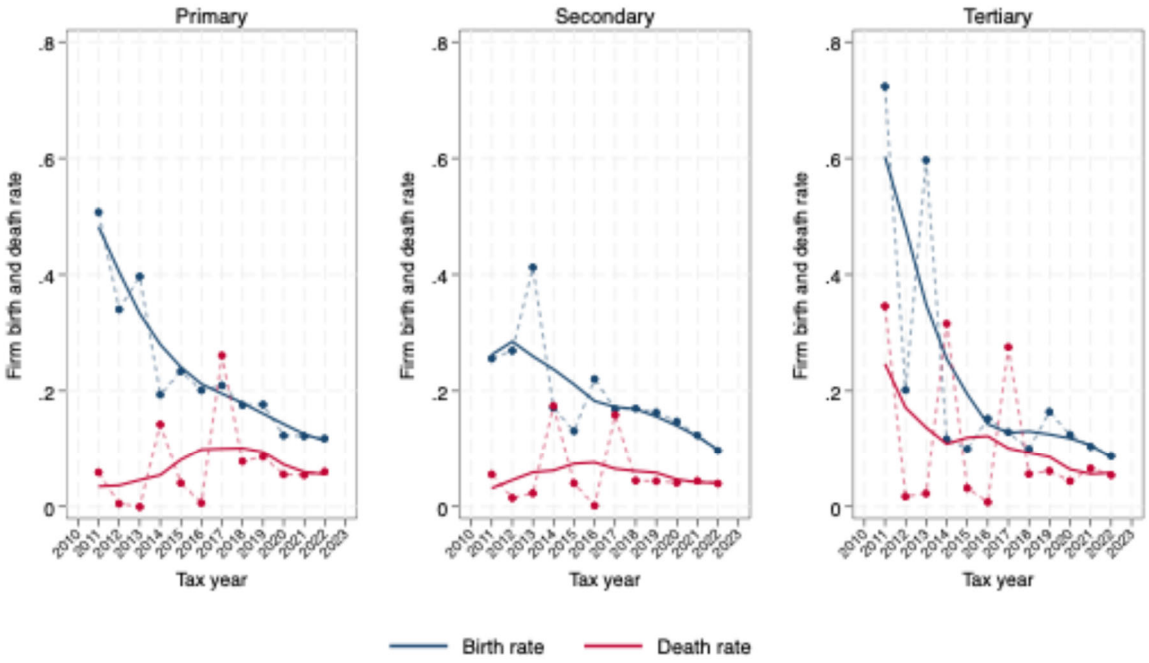


Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Firm births are defined as firms appearing in year t but not in t–1. Firm deaths are defined as firms present in t but absent in t+1. Birth and death rates are expressed relative to the number of active firms in the prior year. Rates in 2010 and 2023 are not presented due to panel censoring. Connected points show calculated rates with a lowess-smoothed line overlaid.

[16] These include eight OECD, four transition, and four Latin American and Caribbean countries.

Before turning to the full job flows analysis, we first examine how births and deaths vary across sectors. Figure 10 presents the estimated firm birth and death rates for the primary, secondary, and tertiary sectors over time. Figure A4 reports the more detailed, equivalent estimates for all 21 industries within these sectors. While existing studies from other contexts tend to find that both firm births and deaths are pervasive in all sectors, their intensity differs across sectors, with the services (tertiary) sector typically exhibiting higher entry and also often higher exit rates (Criscuolo et al., 2014; Klapper et al., 2006). Haltiwanger et al. (2008) argue that a combination of technological, market, and regulatory-driven factors likely explains such variation. Our findings for Rwanda are consistent with the literature. As shown in Figure 10, firm births exceed deaths in all sectors throughout the period, resulting in the stock of firms rising across the board. In the early 2010s, both rates are elevated in every sector but were highest in the tertiary sector - with birth rates around 60–72% and death rates 32–35% - while the secondary sector exhibits the lowest. Over time, birth rates trend down in all sectors, and death rates, while noisier, remain below births and decline from about 2016 onward, yielding a smaller, steadier positive gap. Taken together, these patterns point to a maturing formal economy with stabilizing entry and exit dynamics over time.

Figure 10: Formal sector firm birth and death rates in Rwanda, by sector, 2011 – 2022

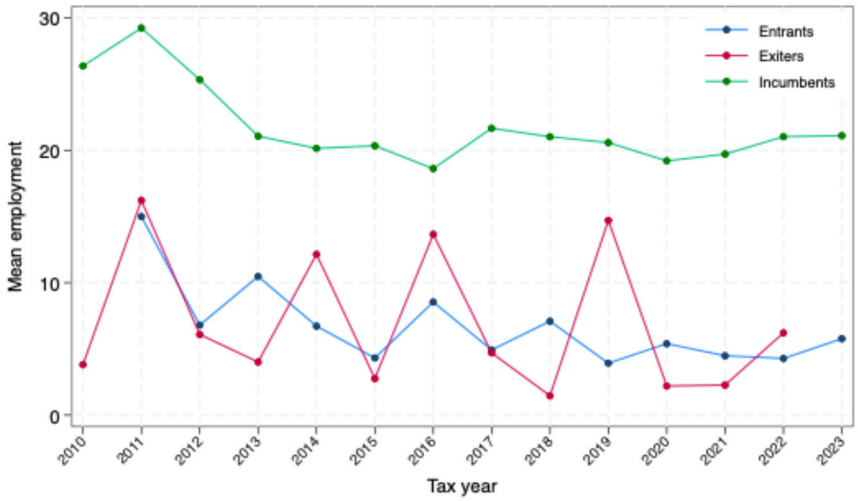


Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Firm births are defined as firms appearing in year t but not in t–1. Firm deaths are defined as firms present in t but absent in t+1. Birth and death rates are expressed relative to the number of active firms in the prior year. Rates in 2010 and 2023 are not presented due to panel censoring. Connected points show calculated rates with a lowess-smoothed line overlaid.

Because firm births and deaths are only partially informative about job creation and destruction – as mentioned previously, they cannot say anything about jobs created or lost within incumbent firms – we first examine how firm size differs for entrants, exiters, and incumbents before turning to job-flow rates. Doing so sheds light on the relative contribution of each margin to changes in aggregate employment over time. Figure 11 reports mean firm sizes for each group over time.[17] Entrants are relatively small in their entry year, employing 7 workers on average, reflecting that new firms typically start at a small scale. Exiters are similarly small in their exit year, reflecting pre-exit shrinkage as distressed firms tend to shed jobs before closure. By contrast, incumbents are much larger on average, employing more than three times (nearly 22) as many workers. This pattern is strongly consistent with the existing literature (Davis et al., 1996; Haltiwanger et al., 2013; Criscuolo et al., 2014). Given this, together with the majority (73%) of firms being incumbents in a given year, it is unsurprising that incumbents dominate aggregate employment, accounting for 87% of workers on average (see Figure A5 in the Appendix).

The implication is that extensive-margin adjustments – firm birth and death counts – do not translate proportionately into job counts. Because entrants and exiters are small, many births or deaths correspond to relatively few jobs created or lost. Incumbent adjustments dominate aggregate job creation and destruction, which motivates our next step: analysing job creation and job destruction rates which account for all sources of job flows.

Figure 11: Firm size of entrants, exiters, and incumbent formal sector firms in Rwanda, 2010 – 2023

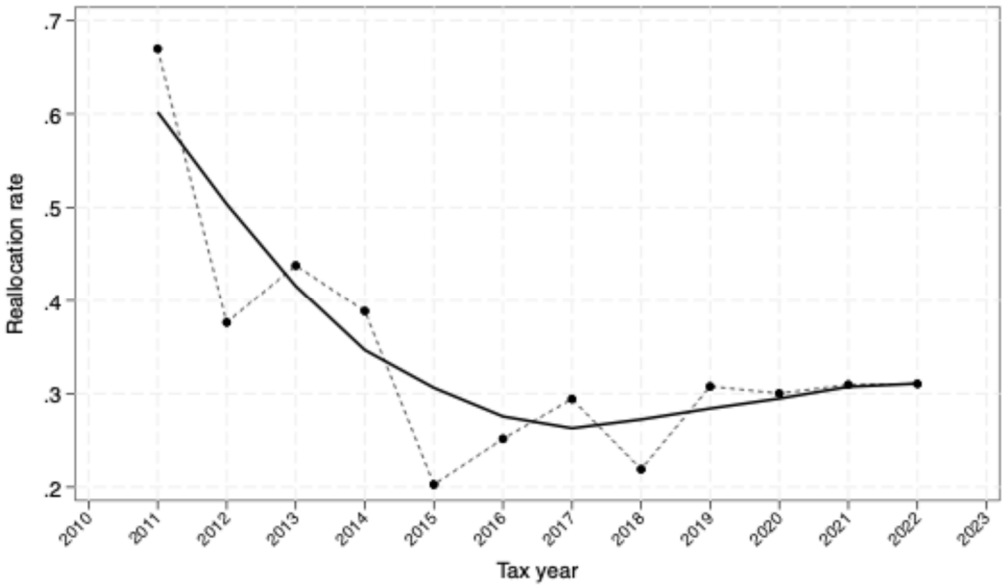


Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Firm size is measured by the number of PAYE-registered employees in each year.

[17] These values are simple cross-sectional means by category–year (entrants, exiters, incumbents). Firms can switch categories over time, so the figures reflect each group's average size when in that state, not the evolution of the same firms across states.

As discussed in Section 3, aggregate job reallocation – calculated as the gross sum of job creation and destruction – provides a summary measure of the intensity of labour market churn, regardless of the direction. Our estimates of job reallocation rates are presented in Figure 12. Reallocation was very high in 2011 - just under 70% - then fell sharply to about 38-44% from 2012 to 2014. It dipped again to 20% in 2015 and 22% in 2018, and from 2019 onward appears to have stabilised around 30%, yielding a 34% average for the entire period. By international standards, Rwanda's reallocation is relatively high. By comparison, U.S. manufacturing in the 1970s-80s is around 19% (Davis et al., 1996); OECD economies is 25% (Haltiwanger et al., 2008); and South Africa is 20-25% (Kerr et al., 2014; Kerr, 2018; Visagie et al., 2026). Rwanda's most recent level is closer to Ethiopian manufacturing (28%) (Shiferaw & Bedi, 2009), Côte d'Ivoire (30%) (Klapper & Richmond, 2011), and four East European transition and four Latin American and Caribbean economies (29-30%) (Haltiwanger et al., 2008).

Figure 12: Formal sector job reallocation rate in Rwanda, 2011 – 2022

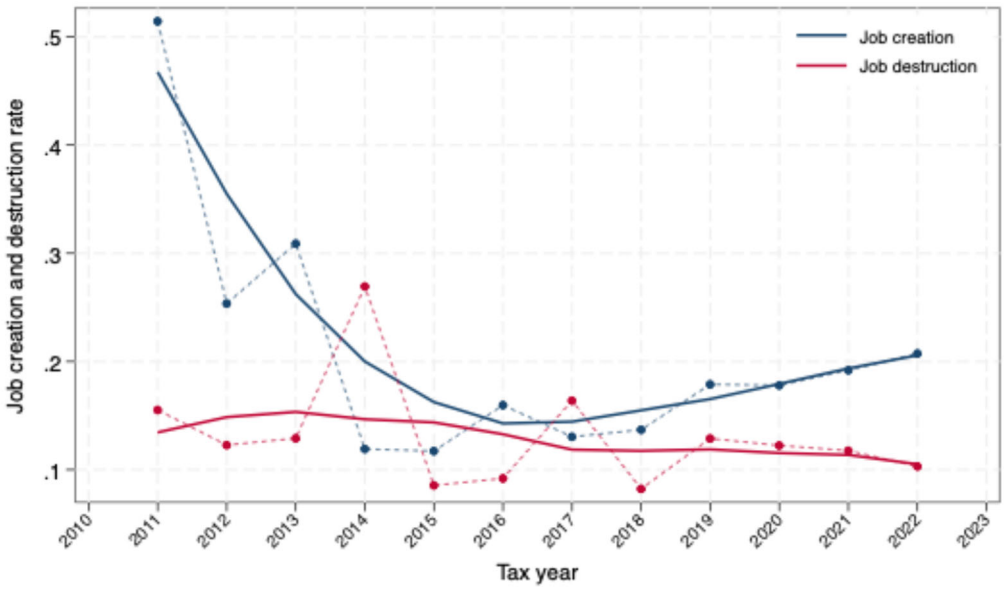


Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Reallocation rate calculated as the gross sum of job creation and job destruction rates. Job creation (destruction) rates measure the share of employment added (lost) by firms each year; for entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment; job creation in 2010 and job destruction in 2023 are not observed due to panel censoring; connected points show calculated rates with a lowess-smoothed line overlaid.

Reallocation in Rwanda is job creation-led. Figure 13 decomposes the reallocation rate shown above into its two components: the job creation rate and the job destruction rate. Job creation exceeds destruction in most years, especially in the early 2010s when creation was elevated, tapering thereafter

before a gradual uptick from 2019. These dynamics earlier in the period mirror the surge in firm births documented earlier, whose contribution we examine later. As noted earlier, variation in both rates coincide with relatively strong and weak growth periods. Formally, as shown in Table A4 in the Appendix, we find that variation in job flows is empirically associated with variation in economic growth, with reallocation tending to increase with real GDP per capita, driven by more job creation and less job destruction.[18] On average over the whole period, job creation is 21% and job destruction 13%, implying a mean reallocation rate of 34% (as in Figure 12). As such, job creation accounts for more than 60% of gross job flows (see in Figure A6 in the Appendix). In the latest year (2022), Rwanda's job creation rate is 21% and its job destruction rate is 10%. While this latter rate sits within the typical international range, albeit at the lower end (10-16%), the job creation rate is high by international standards (9-18%) (Davis et al., 1996; Haltiwanger et al., 2008; Criscuolo et al., 2014; Kerr et al., 2014; Kerr, 2018; Shiferaw & Bedi, 2009).

Figure 13: Formal sector job creation and destruction rates in Rwanda, 2011 – 2022

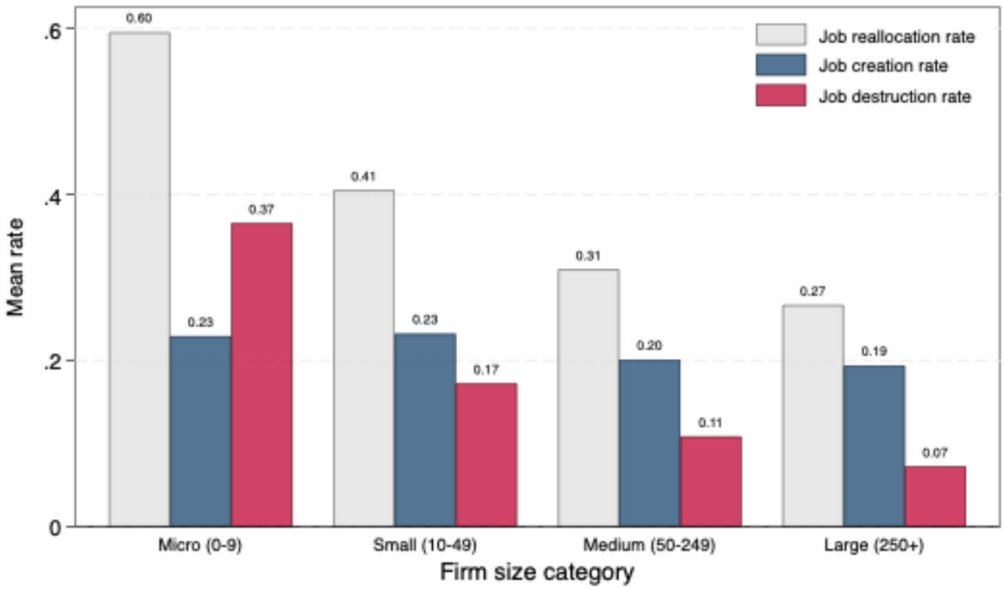


Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation (destruction) rates measure the share of employment added (lost) by firms each year; for entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment; job creation in 2010 and job destruction in 2023 are not observed due to panel censoring; connected points show calculated rates with a lowess-smoothed line overlaid.

[18] These estimates are obtained from Ordinary Least Squares (OLS) regressions of the reallocation rate, job creation rate, or job destruction rate on log real GDP per capita$_t$, log GDP per capita$_{t-1}$, and a pandemic dummy (2020=1). With only 12 yearly observations, coefficients are not statistically significant which is expected given limited power, but the signs align with typical cyclical patterns, with higher contemporaneous growth translating into more creation and less destruction. Because reallocation equals the gross sum of job creation and destruction, a given coefficient in the reallocation equation reflects the sum of the equivalent coefficients in the job creation and destruction equations.

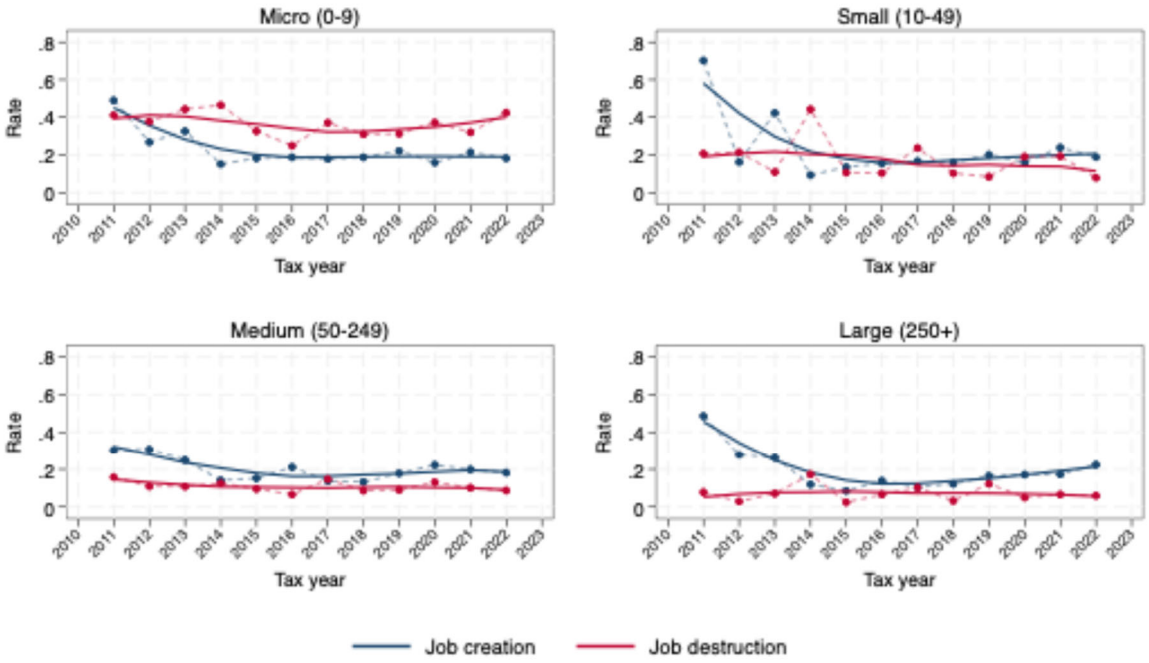
We find that while reallocation is creation-led on average, this is not uniform across the size distribution. Figure 14 presents job reallocation, creation, and destruction rates across firm size categories, using the pooled data for the entire study period. Reallocation rates decline with firm size, from 0.60 for micro firms to less than half (0.27) for large firms. Both job creation and job destruction are higher among smaller firms. Creation varies only modestly by size (19–23%), but destruction varies substantially – 37% for micro firms compared to 7% for large firms. This pattern is consistent with our earlier evidence of higher births and deaths among smaller firms and with findings from other countries that both creation and destruction fall with employer size (Davis et al., 1996; Haltiwanger et al., 2013; Criscuolo et al., 2014). Interestingly, reallocation is creation-driven for small, medium, and large firms – creation exceeds destruction by about 6-12 percentage points, making these groups net job makers on average – whereas micro firms are the exception, with destruction (37%) outpacing creation (23%). The time series presented in Figure 15 shows that this pattern holds during most years. Given that earlier we found firm births exceed deaths across all size classes, this finding points to dominant intensive-margin adjustments (i.e., within-firm contractions) among micro incumbent firms. Later, we decompose job flows by source to investigate this formally.

Figure 14: Formal sector job reallocation, creation, and destruction rates in Rwanda, by firm size, pooled



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation (destruction) rates measure the share of employment added (lost) by firms each year; for entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment. Data pooled for the 2011 – 2022 period.

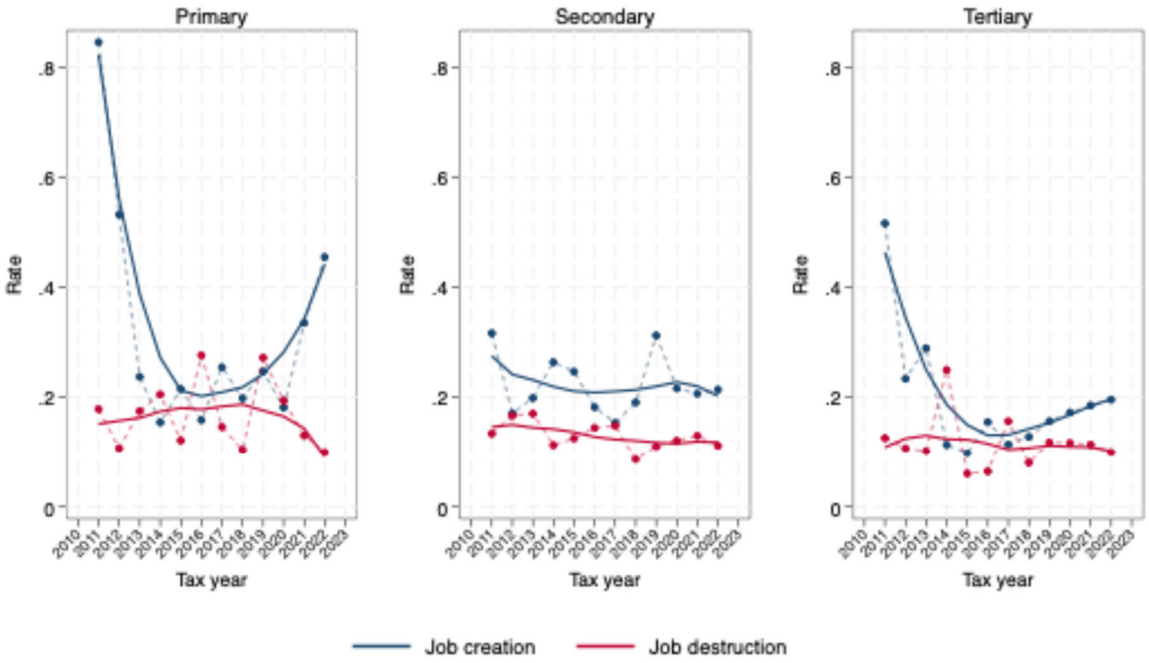
Figure 15: Formal sector job creation and destruction rates in Rwanda, by firm size, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation (destruction) rates measure the share of employment added (lost) by firms each year; for entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment; job creation in 2010 and job destruction in 2023 are not observed due to panel censoring; connected points show calculated rates with a lowess-smoothed line overlaid.

By sector, Rwanda's job-flow patterns are broadly similar to the existing literature, with job creation exceeding destruction during most years across all sectors and sizable within-sector churn over time (Davis et al., 1996; Criscuolo et al., 2014). As shown in Figure 16, the primary sector exhibits the largest early spikes in job creation which later ease, while destruction is lower but more volatile. By 2022, job creation exceeds 40% while destruction is around 10%. In contrast, the secondary sector does not display large early spikes but does experience meaningful variation over time, with both creation and destruction trending downward overall. The tertiary sector also starts with relatively high job creation in the early 2010s, before dipping in the mid-2010s and then rising to about 20% by 2022, with destruction being persistently modest. Industry-level heterogeneity is pronounced, as shown in Figure A7 in the Appendix, though creation typically exceeds destruction within most industries. By 2022, job creation is highest in primary and similar in size in secondary and tertiary, while destruction converges to roughly 10% in all three sectors.

Figure 16: Formal sector job creation and destruction rates in Rwanda, by sector, 2011 – 2022



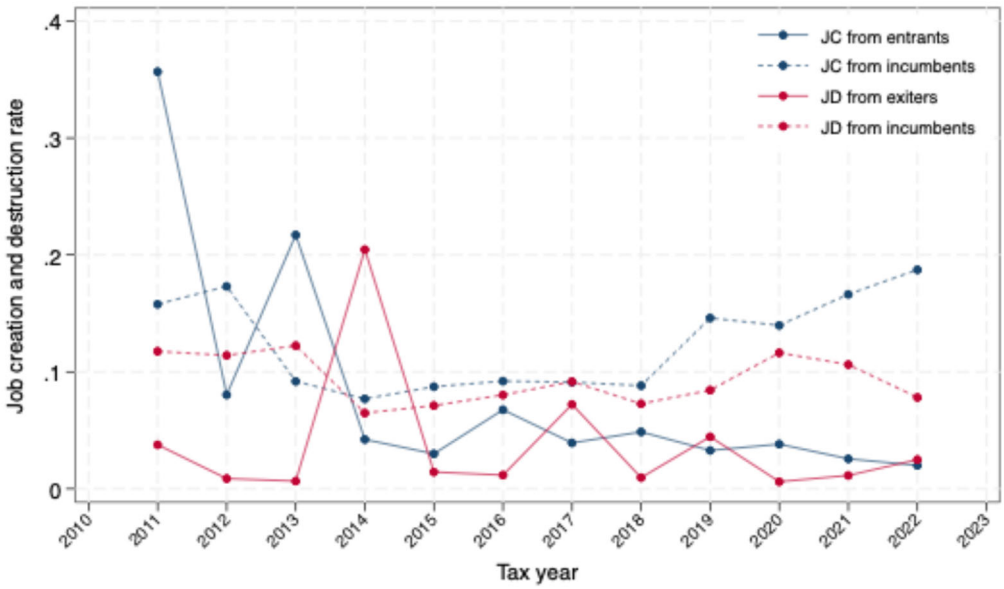
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation (destruction) rates measure the share of employment added (lost) by firms each year; for entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment; job creation in 2010 and job destruction in 2023 are not observed due to panel censoring; connected points show calculated rates with a lowess-smoothed line overlaid.

We now decompose job flows into its extensive – entrants and exiters – and intensive margin – incumbent firms – components. As shown in Figure 17, incumbents drive job flows in Rwanda for the majority of the period. Following the early-2010s surge in job creation driven by entrants – with entrants accounting for 70% of job creation (see Figure A8 in the Appendix), consistent with the relatively large amount of firm births noted earlier – job flows shift to the intensive margin. Expansions among incumbent firms become the main source of job creation from the mid-2010s onward, accounting for up to 90% of job creation in recent years. Similarly, incumbent contractions account for almost all job destruction. Job destruction from exits spike only episodically, most notably in 2014 when, as noted earlier, coincides with a relatively weak growth period. The dominance of incumbent firms driving job flows is strongly consistent with the broader literature, which documents that while firm births play a meaningful role, incumbents drive the bulk of job reallocation (Davis & Haltiwanger, 1992; Davis et al., 1996; Haltiwanger et al., 2013; Criscuolo et al., 2014).

Figure 18 shows that incumbent dynamics dominate job flows across firms of all sizes for most of the period. For micro firms, we can now see that the pattern of job destruction exceeding creation observed earlier is driven by contractions among incumbents rather than exits. Notably, job destruction from

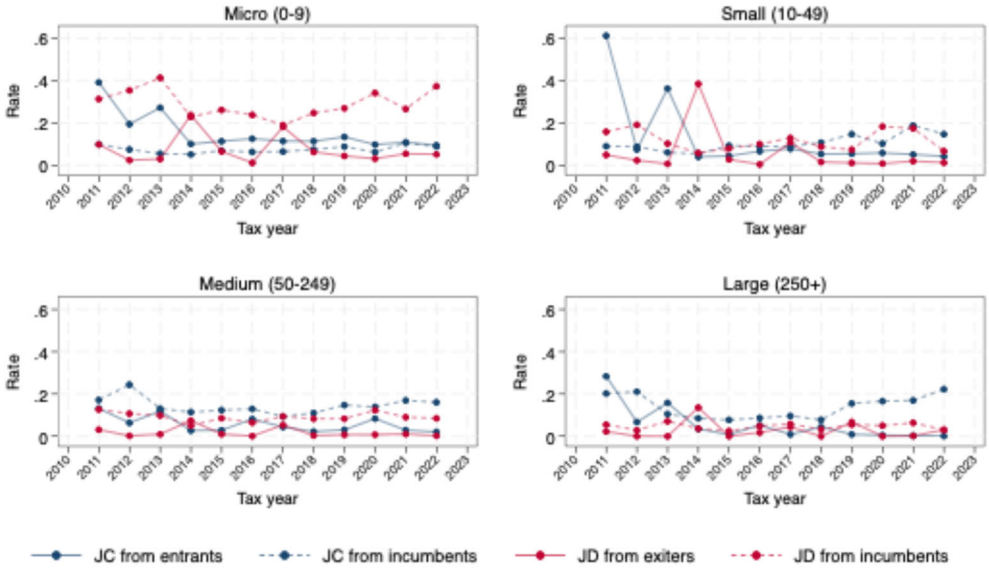
micro exiters is small, whereas destruction from micro incumbents is persistently high and rising over time. For larger firms, for whom job creation exceeds destruction in most years, adjustments among incumbents again drive both. Taken together, keeping in mind that firm births exceed deaths across all firm sizes, these findings point to a job reallocation dynamic led primarily by incumbents, with micro firms distinguished by incumbent contractions rather than expansions.

Figure 17: Decomposition of formal sector job creation and destruction rates in Rwanda, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation is decomposed into new jobs from entrant firms and growth of incumbent firms; job destruction is decomposed into job loss from exiting firms and contraction of incumbent firms. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Rates normalised by average employment in year t and t–1. Job creation rates in 2010 and destruction rates in 2023 are not presented due to panel censoring.

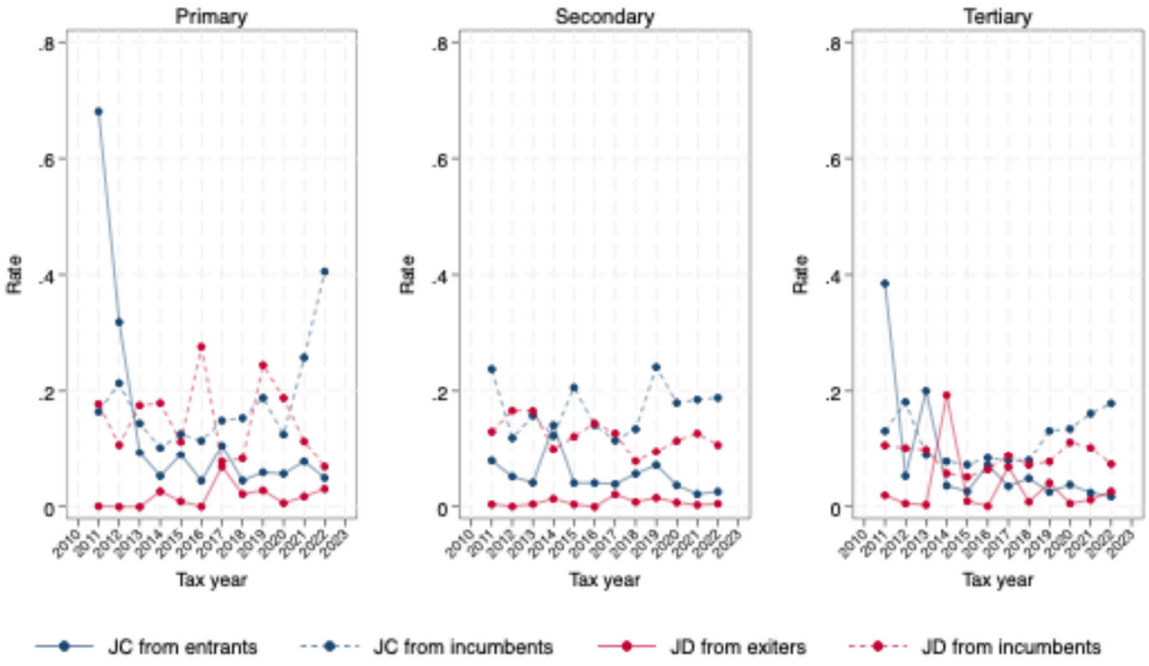
Figure 18: Decomposition of formal sector job creation and destruction rates in Rwanda, by firm size, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation is decomposed into new jobs from entrant firms and growth of incumbent firms; job destruction is decomposed into job loss from exiting firms and contraction of incumbent firms. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Rates are normalised by average employment in year t and t–1. Job creation rates in 2010 and job destruction rates in 2023 are not presented due to panel censoring.

Incumbents tend to drive job flows not only across firms of varied sizes, but also across firms in different sectors. As shown in Figure 19, job creation is driven by incumbent expansions while job destruction is driven by incumbent contractions during most years. Figure A9 in the Appendix highlights that, within sectors and across industries, incumbent expansions and contractions dominate job flows. Within the primary sector, the early-2010s entry-led job creation spike quickly fades and gives way to persistent incumbent-led growth. Job destruction, while lower in most years, is also driven by incumbents. Job losses from exits play a relatively muted role. Incumbents also drive job creation and, more broadly, job reallocation within the secondary sector in most years at a similar rate, with similar job destruction dynamics as the primary sector. Job destruction from exits remain relatively small in the tertiary sector, while job creation among incumbents is dominant and increases in importance over time, while that from entrants declines.

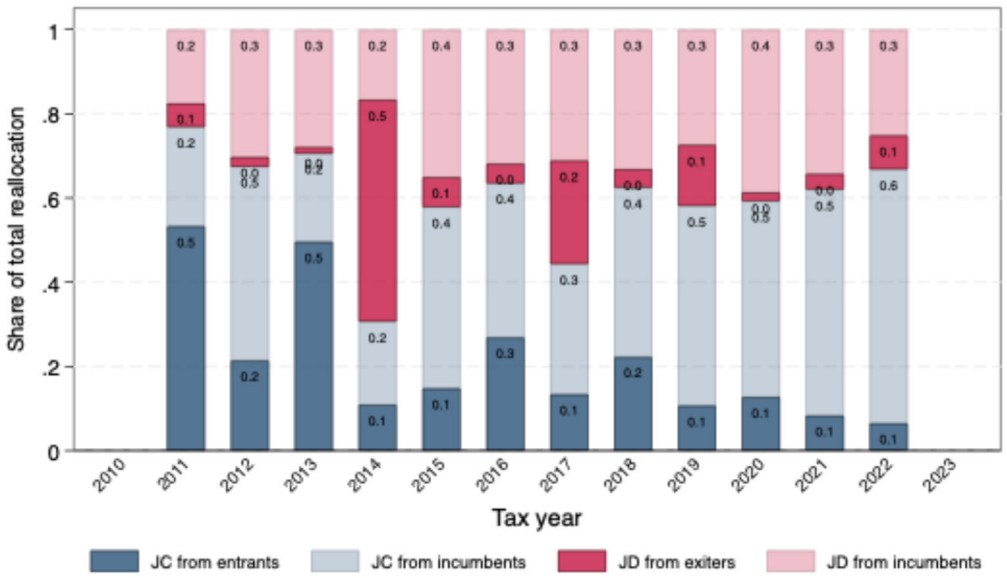
Figure 19: Decomposition of formal sector job creation and destruction rates in Rwanda, by sector, 2011 - 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation is decomposed into new jobs from entrant firms and growth of incumbent firms; job destruction is decomposed into job loss from exiting firms and contraction of incumbent firms. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Rates are normalised by average employment in year t and t–1. Job creation rates in 2010 and job destruction rates in 2023 are not presented due to panel censoring.

Finally, we present these sources of job creation and job destruction as shares of total job reallocation –the relative contributions of entrants, exiters, and incumbents. On aggregate, as shown in Figure 20 and implied earlier, reallocation is predominantly an intensive-margin process. While job creation from entrants accounted for over 70% of job creation or half of all job flows in 2010, this shrunk to 30% of all flows by 2016 and just 10% by 2022. Concurrently, job creation among incumbent firms accounted for 20% of all flows in the early 2010s, which tripled over time to 60% by 2022. On the destruction side, incumbent contractions consistently make up at least two-thirds of job destruction, or about 20 – 40% of all job flows, which remains largely stable over time. The exceptions are 2014 and 2017, when exit-driven job losses temporarily spike during weaker growth episodes, as noted earlier. Taken together, incumbents account for around 70 – 90% of total reallocation in most years, reaching about 90% in recent years – a pattern consistent with the broader literature in which incumbent firms drive the bulk of job flows (Davis & Haltiwanger, 1992; Davis et al, 1996; Haltiwanger et al., 2013; Criscuolo et al., 2014).

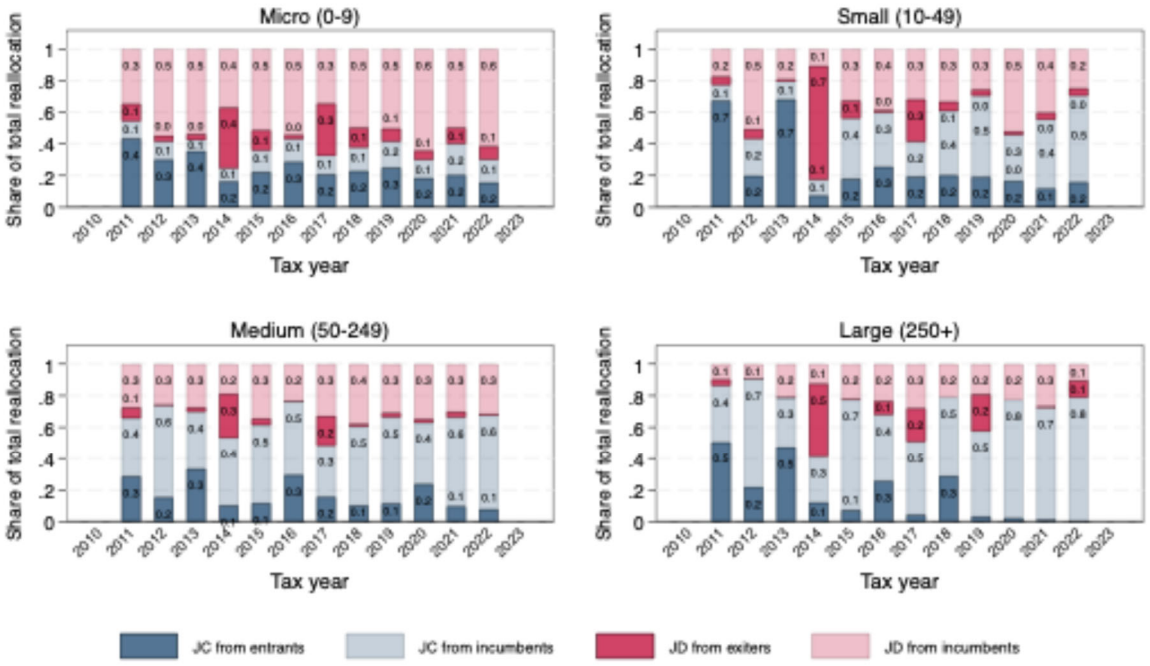
Figure 20: Decomposition of total job reallocation into all sources of job creation and destruction in Rwanda's formal sector, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job reallocation is defined as the gross sum of job creation and job destruction rates. The figure shows the relative contribution of each source – job creation form entrants and incumbent firms together with job destruction from exiters and incumbent firms – to total job reallocation in each year. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Job creation in 2010 and job destruction in 2023 are not observed due to panel censoring.

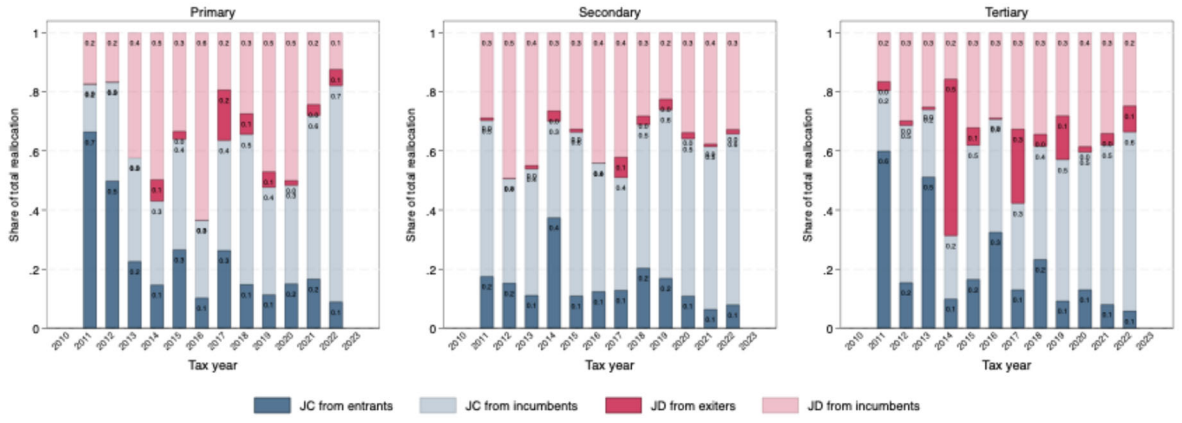
We find that the sources of job flows, however, differ markedly by firm size. As shown in Figure 21, for micro and small firms, job-flows are extensive margin driven, with a larger share of total reallocation stemming from entry-led creation and exit-driven destruction. On the other hand, for medium and large firms, reallocation is intensive margin driven, with incumbent expansions and contractions accounting for the bulk of creation and destruction. This pattern is consistent with our earlier findings, specifically the higher entry and exit rates among smaller firms. By sector, the composition of job-flow shares also tracks our earlier results and shows clear shifts over time. As reported in Figure 22, in the primary sector, entry-led creation dominates early but gives way to incumbent-led creation from 2023 onwards, while destruction is mostly from incumbent contractions with occasional exit spikes. Similarly, the tertiary sector begins with larger entrant shares that decline as incumbent creation rises. Apart from a brief surge mid-decade, exit-driven job destruction stays relatively modest within the sector. The secondary sector is incumbent-driven throughout. Entrants explain just up to 20% of job flows or one-quarter of job creation in most years, while exits account for a maximum of just 20% of all jobs lost or 10% of all flows. As shown in Figure A10 in the Appendix, heterogeneity is pronounced at the industry-level.

Figure 21: Decomposition of total job reallocation into all sources of job creation and destruction in Rwanda's formal sector, by firm size, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job reallocation is defined as the gross sum of job creation and job destruction rates. The figure shows the relative contribution of each source – job creation form entrants and incumbent firms together with job destruction from exiters and incumbent firms – to total job reallocation in each year. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Job creation in 2010 and job destruction in 2023 are not observed due to panel censoring.

Figure 22: Decomposition of total job reallocation into all sources of job creation and destruction in Rwanda's formal sector, by sector, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job reallocation is defined as the gross sum of job creation and job destruction rates. The figure shows the relative contribution of each source – job creation form entrants and incumbent firms together with job destruction from exiters and incumbent firms – to total job reallocation in each year. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Job creation in 2010 and job destruction in 2023 are not observed due to panel censoring.

6 CONCLUSION

This paper uses annual firm-level administrative tax panel data to analyse firm dynamics and job flows among formal sector firms and workers in Rwanda from 2010 to 2023. Using the standard framework developed and applied in the empirical literature (see David & Haltiwanger, 1992; Davis et al., 1996; and Haltiwanger et al. 2013 among others), we provide estimates of the total amount of job reallocation, both on average and decomposed into its extensive margin (firm births and deaths) and intensive margin (incumbent expansions and contractions) components, and hence identify the source of both job creation and destruction in the country over time. In doing so, the analysis extends the scarce evidence base on job flows on the continent, adding to earlier work for Ethiopia (Shiferaw & Bedi, 2009), Côte d'Ivoire (Klapper & Richmond, 2011), Ghana (Sandefur, 2010), Kenya (Esaku, 2020), and South Africa (Kerr et al., 2014; Kerr, 2018; Visagie et al., 2026).

Our analysis yields three sets of findings. First, we show that Rwanda's formal economy has grown rapidly over time. Between 2010 and 2023, employment more than doubled while the number of registered firms nearly tripled. The size of the mean or median firm has, however, declined, which we show is explained by a growing prevalence of micro firms. Despite this, employment remains highly concentrated in a small share of very large firms, with 1% of firms accounting for 60% of all jobs as of 2023.

Second, this net change in employment masks substantial churn beneath the surface. We estimate that gross job flows has settled around 30% in recent years. In other words, nearly one-third of all jobs during the typical year were either created or lost, which is high by international standards – similar to Ivory Coast, Ethiopia, and several Latin American and Caribbean economies but larger than South Africa and OECD economies – and indicative of a very dynamic formal economy experiencing constant change. Consistent with the strong employment growth, job flows are creation-led. In recent years, job creation averages about 21% versus 10% for job destruction. Hence, job creation accounts for more than 60% of all job flows. Decompositions show that intensive margin adjustments dominate. Although firm entrants outnumber exiters in most years, both groups are small, so such activity translates into a relatively modest number of job counts. By contrast, incumbents drive the vast majority of both creation and destruction – accounting for up to 90% of all job flows in recent years, which is strongly consistent with the broader literature. We also find a pro-cyclical relationship between economic growth and job flows, with higher GDP per capita being associated with more creation and less destruction.

Third, in examining who drives these job flows across the formal economy, we show that both job creation and destruction decline with firm size, and that the source of these flows differ. Smaller firms

tend to be more extensive-margin heavy (entry and exit), whereas larger firms tend to experience more intensive-margin adjustments (incumbent expansions and contractions), which is again in line with the literature and suggestive of both greater churn and vulnerability among smaller firms. Notably, small, medium, and large formal firms in Rwanda are typically net job creators while micro firms often experience net job losses. While micro firms are less likely to survive over time, we show that this is driven by incumbent contractions rather than firm deaths. Across sectors, job flows are net positive and incumbent-driven in most years, with notable within-sector shifts over time. In the primary and tertiary sectors, large job creation spikes in the early-2010s later ease as the source of flows shifts from entry-led to incumbent-led growth. The secondary sector is incumbent-driven throughout, with relatively muted variation. Within sectors, industry-level heterogeneity is pronounced. For example, low-churn, steadily incumbent-led patterns prevail in manufacturing, finance, and wholesale and retail trade, while episodic entry bursts appear in mining and utilities.

Our findings hold several policy implications. Since job creation is predominantly driven by expansions among incumbents rather than by new entrants, policies that support firm growth and survival are likely to deliver the greatest employment gains. At the same time, the high exits rates observed among smaller firms suggest a need for targeted support to support their resilience and potential for scaling. This is particularly important given the heavy concentration of employment in a small number of large firms, which makes them vulnerable to firm-specific shocks. Finally, the procyclical nature of job flows, with creation rising and destruction falling during growth periods, underscores the need for countercyclical labour-market stabilisation tools to help sustain jobs during downturns and strengthen the formal sector's overall resilience.

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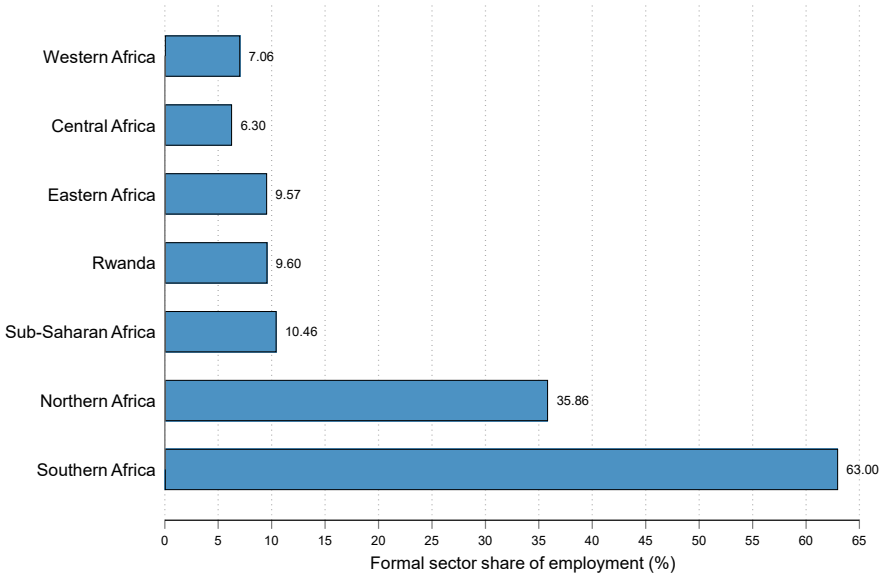
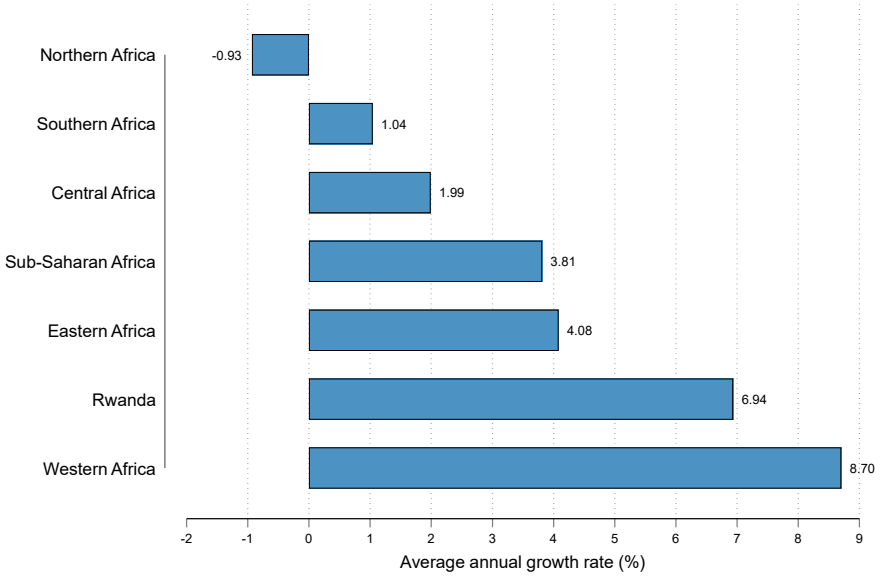
APPENDIX

Figure A1: Formal sector employment shares, by country and region, 2021



Source: Authors' own illustration using ILO(2025); NISR (2022).

Figure A2: Formal sector employment growth, by region and country, 2010 – 2021



Source: Authors' own illustration using ILO (2025).

Table A1: Descriptive statistics of formal sector firms in Rwanda, 2010 – 2023

Year	Number of firms	Number of workers	Mean employment	Median employment	Firm size							
					Micro (<10)		Small (10-49)		Medium (50-249)		Large (250+)	
					% of firms	% of employment	% of firms	% of employment	% of firms	% of employment	% of firms	% of employment
2010	8 178	185 375	22.7	3.0	71.0	8.0	23.2	21.4	4.3	20.1	1.5	50.5
2011	12 171	267 987	22.1	4.3	63.9	8.1	31.6	29.4	3.3	15.6	1.3	46.9
2012	12 325	254 379	20.7	3.0	72.3	8.9	23.2	23.8	3.5	18.9	1.1	48.4
2013	21 488	303 742	17.1	2.0	73.6	10.3	23.0	27.5	2.6	16.1	0.8	46.1
2014	22 859	317 573	16.6	2.0	75.0	10.4	21.8	26.7	2.4	15.0	0.8	47.8
2015	15 953	266 543	17.0	1.7	79.5	10.4	16.7	20.6	3.0	18.2	0.9	50.8
2016	16 782	284 275	17.2	1.5	80.4	10.1	15.5	18.8	3.2	19.0	0.9	52.1
2017	18 803	290 827	15.8	1.0	81.9	10.8	14.3	18.5	3.0	19.2	0.9	51.5
2018	15 943	286 409	18.0	2.0	80.5	9.7	15.1	17.4	3.4	19.0	1.0	53.9
2019	17 437	311 985	17.9	1.5	81.0	9.4	14.5	16.7	3.5	20.0	1.0	53.9
2020	18 602	315 005	16.9	1.0	82.9	9.7	12.9	15.6	3.3	19.6	0.9	55.1
2021	19 758	339 764	17.2	1.0	82.3	9.5	13.6	16.4	3.2	18.4	0.9	55.7
2022	20 226	381 061	18.8	1.0	81.7	8.5	14.2	15.5	3.3	17.4	0.9	58.6
2023	21 065	414 474	19.7	1.0	81.5	7.9	14.2	15.0	3.4	17.5	1.0	59.7
Mean	17 256	301 386	18.4	1.9	77.7	9.4	18.1	20.2	3.2	18.1	1.0	52.2

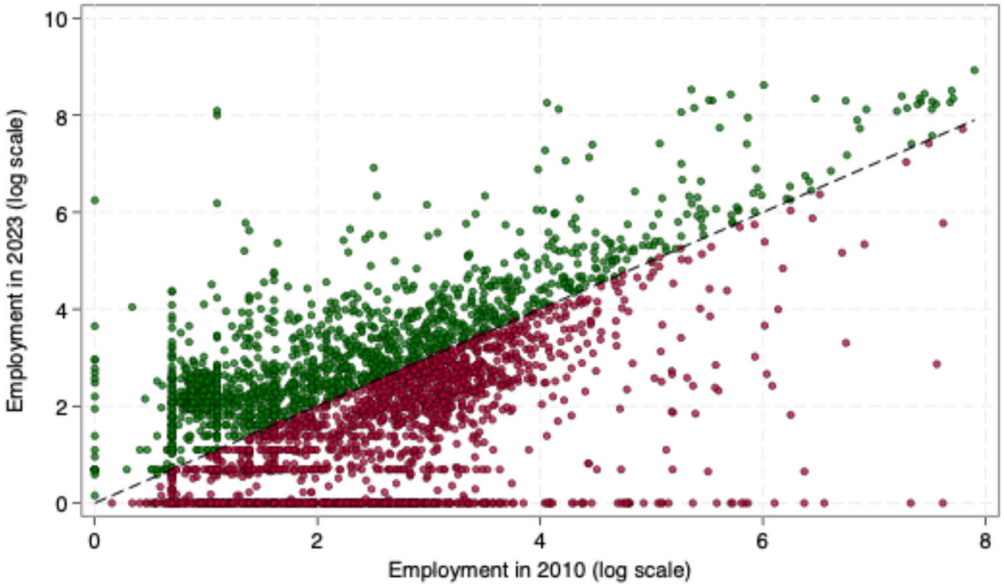
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Number of workers refers to permanent workers only.

Table A2: Additional descriptive statistics of formal sector firms in Rwanda, 2010 – 2023

Year	Number of firms	Mean firm age	Aggregate real annual earnings bill (bn)	Mean real annual earnings bill (per firm) (mil)	Mean real annual earnings (per worker) (mil)	Sector (%)			Entity type (%)		Province (%)				
						Primary	Secondary	Tertiary	Private	Public	Kigali City	Northern	Eastern	Southern	Western
2010	8 178	3.3	646.2	79.1	4.4	2.3	8.3	89.4	86.4	13.6	56.4	8.5	10.0	14.6	10.4
2011	12 171	2.6	1 201.1	99.1	4.6	2.1	5.8	92.2	72.6	27.4	42.0	12.4	12.5	18.2	14.9
2012	12 325	3.6	855.8	69.5	4.8	2.7	7.0	90.3	83.8	16.2	50.0	11.6	11.2	15.6	11.5
2013	21 488	4.0	1 007.1	56.7	4.7	2.4	6.2	91.4	83.1	16.9	47.2	11.3	11.8	16.2	13.5
2014	22 859	4.6	1 169.9	61.2	6.1	2.6	6.5	90.9	83.8	16.2	48.4	10.9	11.9	15.7	13.1
2015	15 953	5.1	1 205.8	76.8	7.6	3.5	7.6	88.9	90.8	9.2	56.0	9.1	11.2	12.6	11.0
2016	16 782	5.5	1 258.7	76.3	7.4	3.6	8.1	88.3	90.9	9.1	56.5	8.9	11.2	12.5	10.8
2017	18 803	6.0	1 271.2	69.0	6.9	3.9	8.3	87.8	91.0	9.0	56.6	9.0	11.2	12.4	10.8
2018	15 943	6.4	1 357.8	85.2	8.5	4.2	9.9	85.9	91.7	8.4	57.5	8.4	11.2	12.4	10.5
2019	17 437	6.8	1 462.0	83.9	7.9	4.2	10.0	85.8	92.0	8.0	56.7	8.8	11.5	12.4	10.6
2020	18 602	7.2	1 381.6	74.3	7.7	4.1	10.4	85.5	91.2	8.8	56.0	9.0	11.8	12.5	10.7
2021	19 758	7.7	1 580.2	80.0	7.8	4.1	10.6	85.3	91.6	8.4	56.3	8.9	11.8	12.5	10.6
2022	20 226	8.2	1 587.7	78.5	6.5	4.3	10.8	84.9	92.2	7.8	56.8	8.8	11.6	12.4	10.5
2023	21 065	9.2	1 632.4	77.5	5.9	4.4	12.0	83.6	92.6	7.4	57.0	8.6	11.5	12.6	10.3
Mean	17 256	5.7	1 258.4	76.2	6.5	3.5	8.7	87.9	88.1	11.9	53.8	9.6	11.5	13.8	11.4

Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: bn = billion; mil = million; Earnings expressed in 2023 R

Figure A3: Employment levels for surviving formal sector firms in Rwanda, 2010 vs. 2023



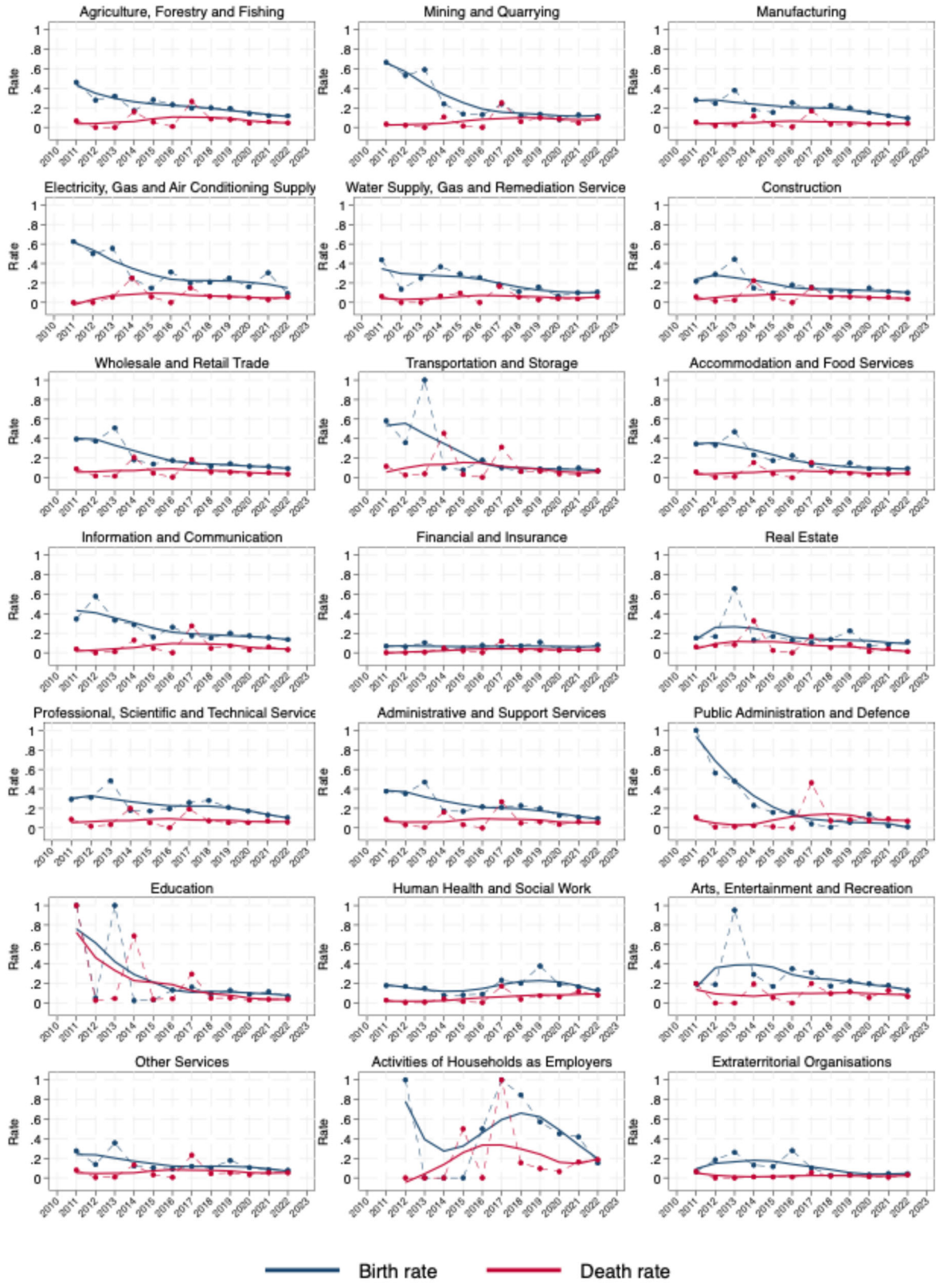
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Employment refers to permanent workers only, plotted on a log scale using log(employment + 1) to include firms with zero employees (i.e., self-employed). Points are color-coded: Green for firms that survived and grew in size; red for those that shrank.

Table A3: Formal sector firm births and deaths in Rwanda, 2010 – 2023

Year	Number of firms	Net change (%)		Births		Deaths	
		Level	%	Level	Share of change (%)	Level	Share of change (%)
2010	8 178	.	.	.	.	1 335	.
2011	12 171	3 993	48.8	5 328	133.4	2 675	-33.4
2012	12 325	154	1.3	2 829	1 837.0	362	-1737.0
2013	21 488	9 163	74.3	9 525	104.0	685	-4.0
2014	22 859	1 371	6.4	2 056	150.0	8 798	-50.0
2015	15 953	-6 906	-30.2	1 892	-27.4	1 483	127.4
2016	16 782	829	5.2	2 312	278.9	273	-178.9
2017	18 803	2 021	12.0	2 294	113.5	4 864	-13.5
2018	15 943	-2 860	-15.2	2 004	-70.1	1 153	170.1
2019	17 437	1 494	9.4	2 647	177.2	1 033	-77.2
2020	18 602	1 165	6.7	2 198	188.7	821	-88.7
2021	19 758	1 156	6.2	1 977	171.0	1 266	-71.0
2022	20 226	468	2.4	1 734	370.5	1 119	-270.5
2023	21 065	839	4.1	1 958	233.4	.	-133.4
Mean	17 256	991	10	2 981	282	1 990	-182

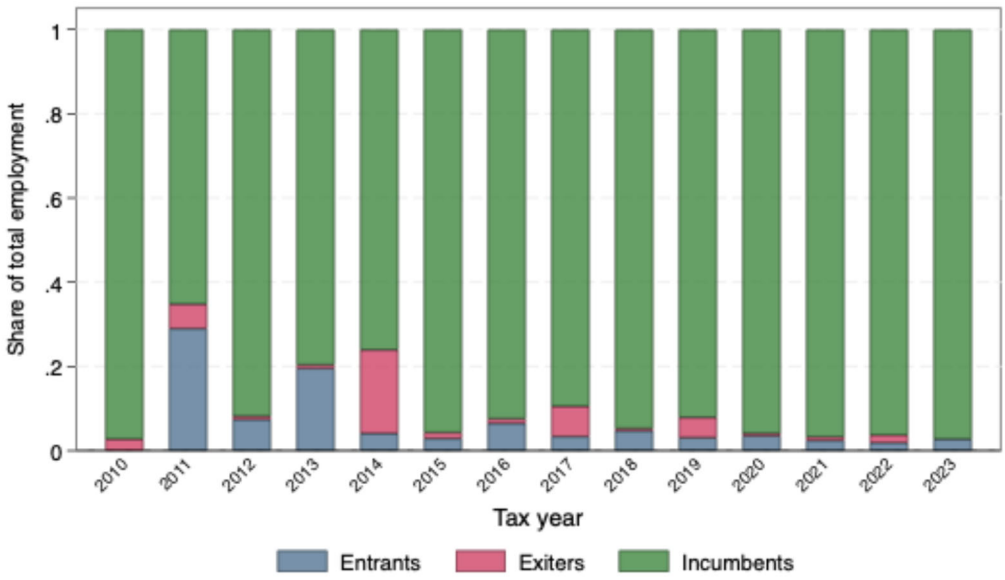
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Firm births (deaths) is measured as the number of firms that appear in the data for the first (last) time in year t and are not observed in any prior (subsequent) year; Net change in year t refers to the change in the number of firms from year t-1 to year t, equivalent to the difference between firm births in year t and firm deaths in year t-1.

Figure A4: Formal sector firm birth and death rates in Rwanda, by industry, 2011 – 2022



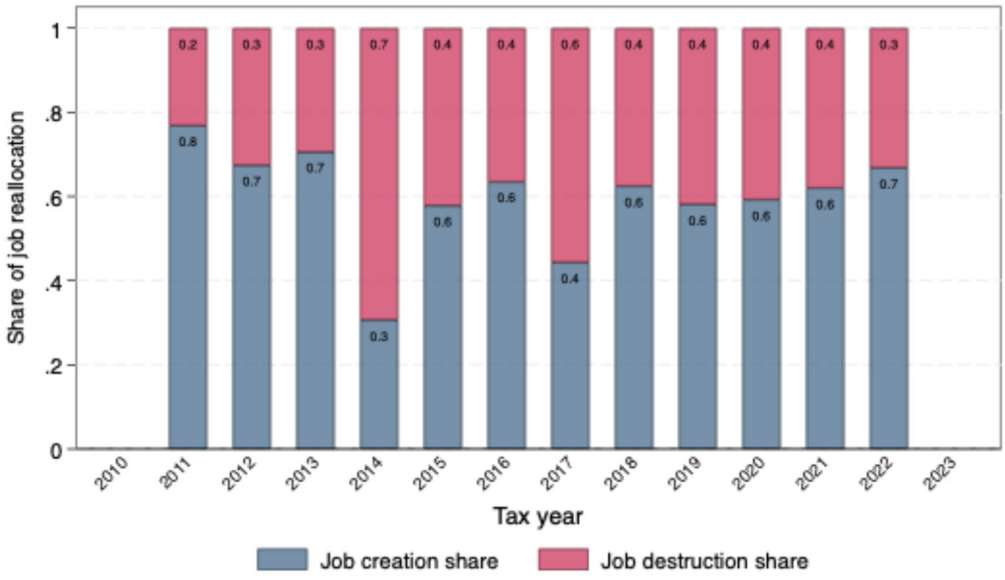
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Firm births are defined as firms appearing in year t but not in t–1. Firm deaths are defined as firms present in t but absent in t+1. Birth and death rates are expressed relative to the number of active firms in the prior year. Rates in 2010 and 2023 are not presented due to panel censoring. Connected points show calculated rates with a lowess-smoothed line overlaid.

Figure A5: Contribution of entrants, exiters, and incumbent firms to total formal sector employment in Rwanda, 2010 – 2023



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1.

Figure A6: Shares of total job reallocation due to job creation and destruction in Rwanda's formal sector, 2011 – 2022



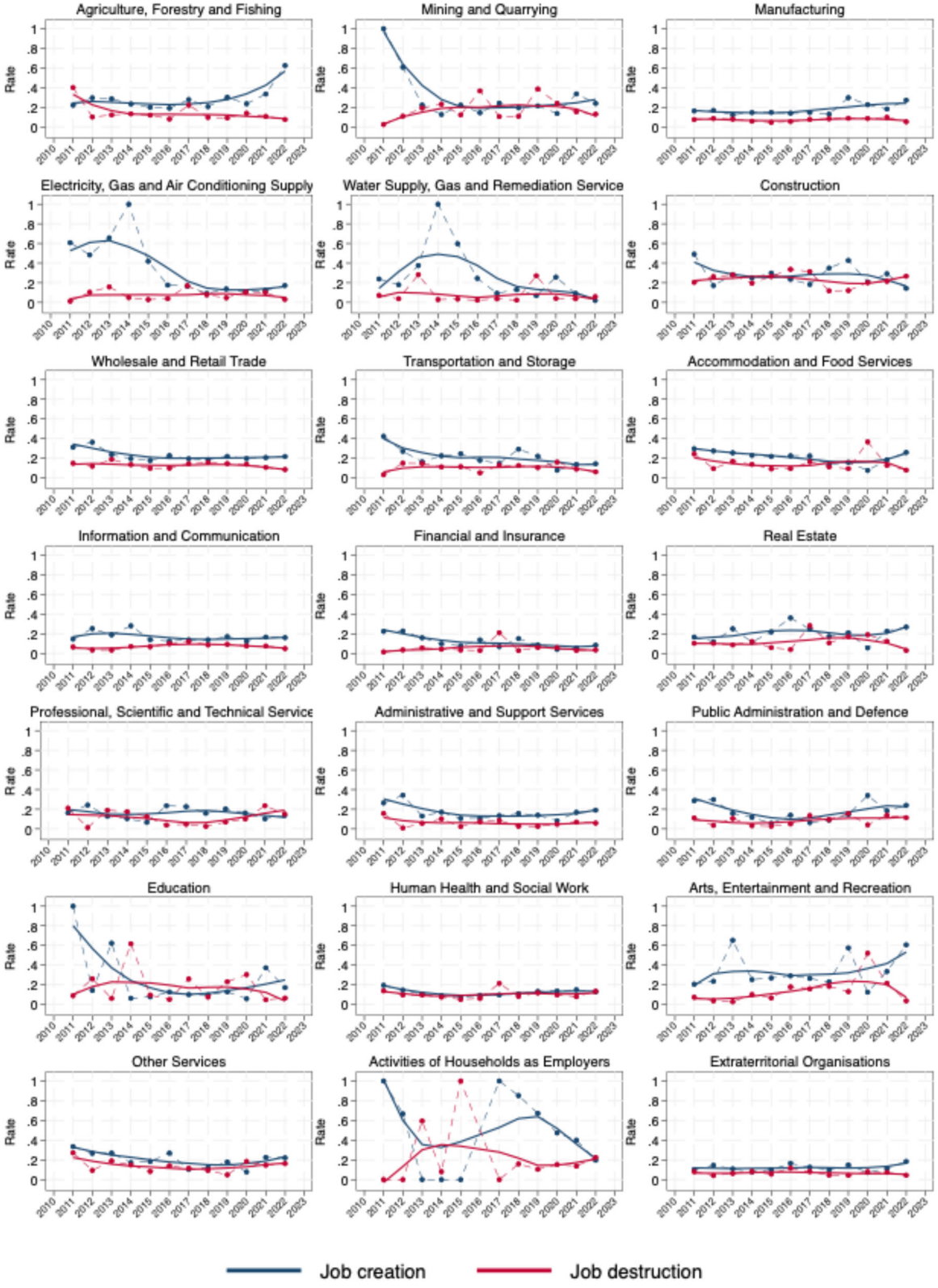
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Reallocation rate calculated as the gross sum of job creation and job destruction rates. Stacked bars show the share of reallocation accounted for by job creation and job destruction in each year. For entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment. Job creation in 2010 and job destruction in 2023 are not observed due to panel censoring and are therefore excluded.

Table A4: Formal-sector job reallocation, creation, and destruction vs. GDP per capita in Rwanda, 2011 – 2022

	(1)	(2)	(3)
Outcome:	Job reallocation rate	Job creation rate	Job destruction rate
GDP per capita (log scale) $_{t}$	0.344	1.158	-0.814
	(1.834)	(1.737)	(0.871)
GDP per capita (log scale) $_{t-1}$	-0.979	-1.700	0.721
	(1.935)	(1.832)	(0.918)
Pandemic	0.116	0.194	-0.078
	(0.246)	(0.233)	(0.117)
Constant	5.214**	4.327*	0.887
	(2.106)	(1.994)	(0.999)
Observations	12	12	12

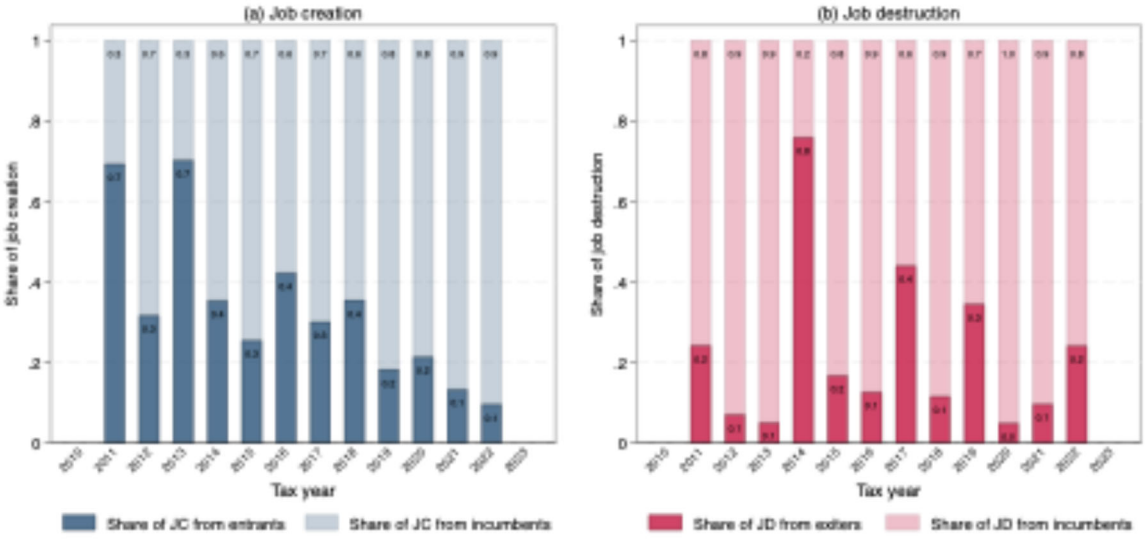
*Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority and macroeconomic data sourced from the World Bank's World Development Indicators. Notes: Estimates obtained from a linear regression using Ordinary Least Squares. Gross Domestic Product (GDP) per capita is in Purchasing Power Parity (PPP) constant 2021 international dollar, expressed on a log scale. GDP_{t-1} refers to the one-year lag. Pandemic is a dummy variable equal to 1 for 2020 and 0 otherwise. The job reallocation rate is the gross sum of the job creation (JC) and job destruction (JD) rates. JC (JD) rates measure the share of employment added (lost) by firms each year; for entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment. Standard errors in parentheses. * p<0.10; ** p<0.50; *** p<0.01.*

Figure A7: Formal sector job creation and destruction rates in Rwanda, by industry, 2011 – 2022



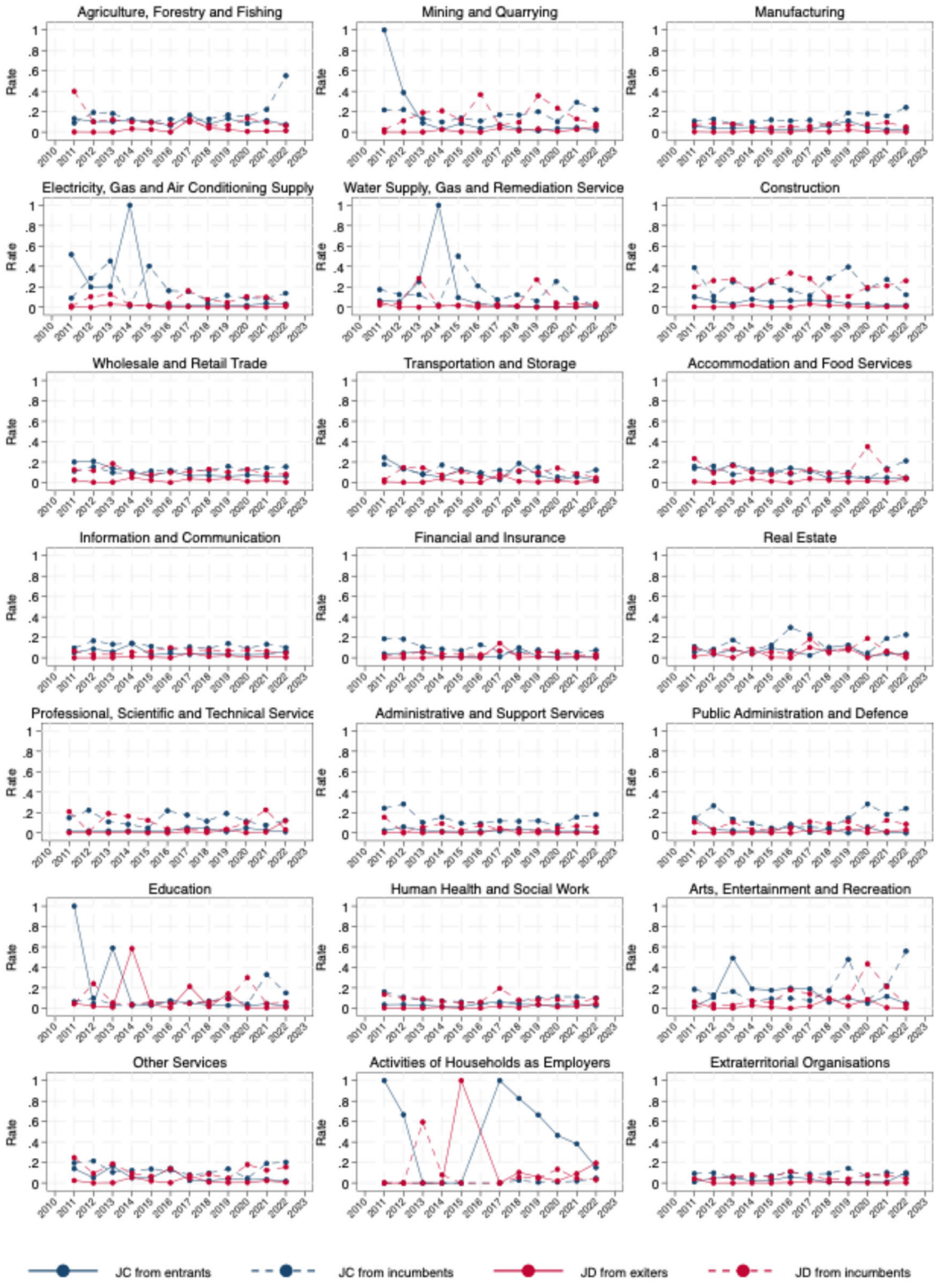
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation (destruction) rates measure the share of employment added (lost) by firms each year; for entrants, all employment counts as creation; for exiters, all employment counts as destruction; rates are normalised by average firm employment; job creation in 2010 and job destruction in 2023 are not observed due to panel censoring; connected points show calculated rates with a lowess-smoothed line overlaid.

Figure A8: Shares of job creation and destruction attributable to entrants, exiters, and incumbent formal sector firms in Rwanda, 2011 – 2022



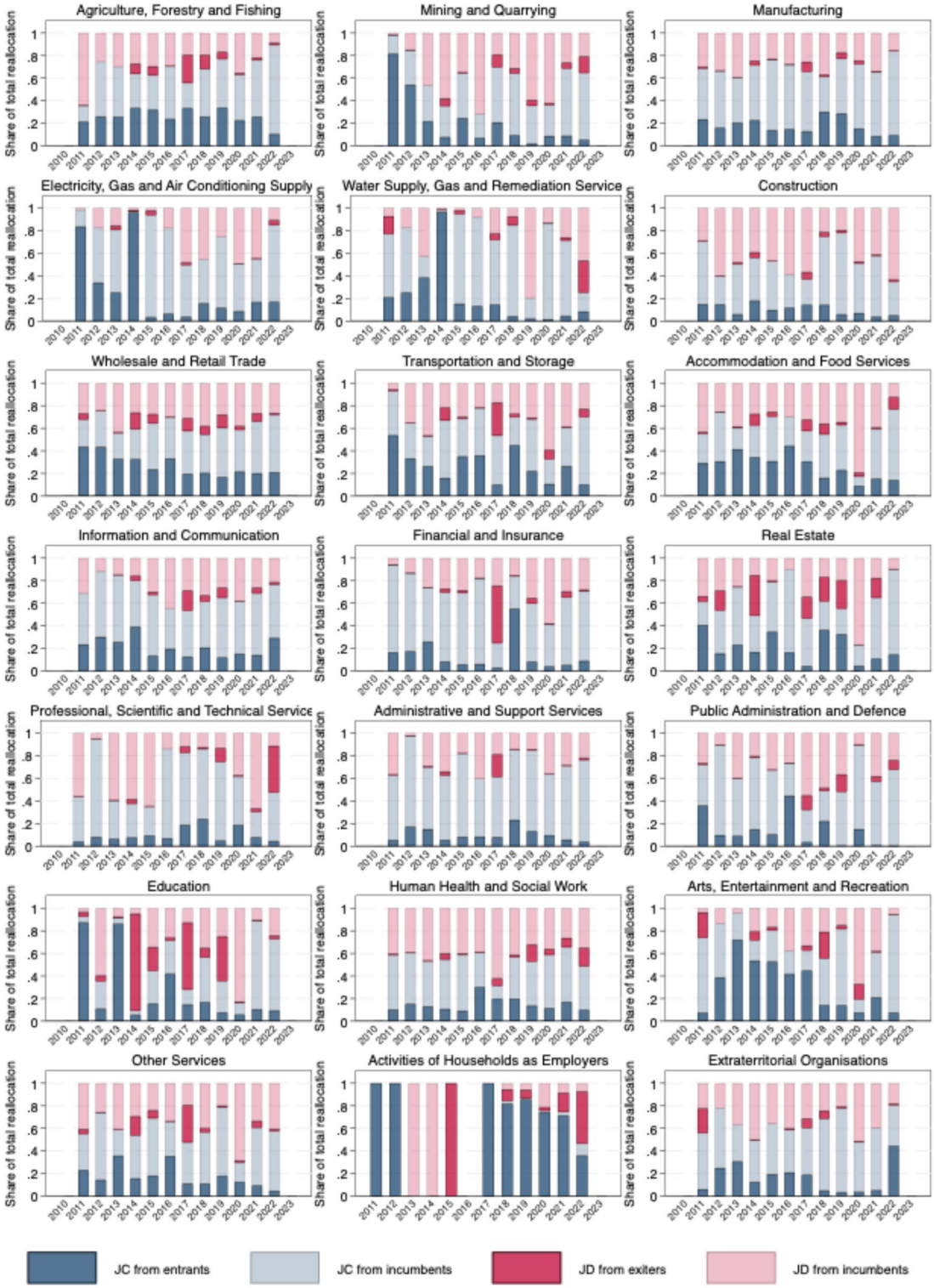
Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation is expressed as the share accounted for by entrant firms versus growth of incumbent firms. Job destruction is expressed as the share accounted for by existing firms versus contractions of incumbent firms. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Shares are calculated relative to total job creation and job destruction in each year. Job creation in 2010 and job destruction in 2023 are not observed due to panel censoring.

Figure A9: Decomposition of formal sector job creation and destruction rates in Rwanda, by industry, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job creation is decomposed into new jobs from entrant firms and growth of incumbent firms; job destruction is decomposed into job loss from exiting firms and contraction of incumbent firms. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Rates are normalised by average employment in year t and t–1. Job creation rates in 2010 and job destruction rates in 2023 are not presented due to panel censoring.

Figure A10: Decomposition of total job reallocation into all sources of job creation and destruction in Rwanda's formal sector, by industry, 2011 – 2022



Source: Authors' own calculations using PAYE administrative data provided by the Rwanda Revenue Authority. Notes: Job reallocation is defined as the gross sum of job creation and job destruction rates. The figure shows the relative contribution of each source – job creation form entrants and incumbent firms together with job destruction from exiters and incumbent firms – to total job reallocation in each year. Entrants are firms observed for the first time in year t; exiters are firms observed for the last time in year t; incumbents are firms present in both t and t–1. Job creation in 2010 and job destruction in 2023 are not observed due to panel censoring.

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