Working paper

International Growth Centre

# Job flows and worker turnover

## Evidence from matched employer-employee data from Ethiopia

Admasu Shiferaw
Måns Söderbom
Getnet Alemu Zewdu

April 2020

When citing this paper, please use the title and the following reference number:
F-32420-ETH-1

DIRECTED BY LSE UNIVERSITY OF OXFORD

FUNDED BY UKaid from the British people

# Job Flows and Worker Turnover: Evidence from Matched Employer-Employee Data from Ethiopia*

Admasu Shiferaw
*William & Mary*

Måns Söderbom
*University of Gothenburg*

Getnet Alemu Zewdu
*Addis Ababa University*

**April, 2020**

*We are very grateful for the financial support provided to this project by the World Bank and the International Growth Center (IGC). We would like to thank Tom Bundervoet, Peter Brummund, Peter McHenry, Christian Meyer, Victoria Strokova, and conference participants at the World Bank and at the International Conference on the Ethiopian Economy for helpful comments.

Abstract

This paper examines job and worker flows in the formal private sector of Ethiopia using matched employer-employee data. We find a very high worker turnover rate (38%) associated with a relatively lackluster job growth. Nearly half of worker turnover is driven by firm-level job creation and destruction while the other half is due to excess turnover or churning. A substantial part of hiring (separation) occurs among downsizing (growing) firms underscoring how worker mobility exceed job reallocation across firms. Churning is costly for firms and reduces subsequent employment growth. This effect is stronger among firms that rely more on long-term relationships with workers. Firm-level churning rises subsequent to rapid employment expansion but declines among firms that pay above average wages and benefits. At the worker-level, the probability of separation declines with potential labor market experience, tenure and wage after controlling for relevant firm characteristics.

Key Words: Job Creation, Job Destruction, Worker Turnover, Churning, Hiring and Separation Rates, Ethiopia.

# 1. Introduction

Recent studies show that urban workers in developing countries have shorter tenure (Schaffner, 2001) and higher separation rates (Gong, van Soest, and Villagomez, 2004; Blattman and Dercon, 2018; Donovan, Lu, and Schoellman, 2019) suggesting potentially higher worker turnover rates relative to that of developed countries. However, data limitations have prevented existing studies from providing direct and comprehensive measures of labor mobility across firms in developing countries and the interactions with job reallocation. Since productivity growth and economic development involve the reallocation of jobs and workers across firms and sectors (World Bank, 2012), a deeper understanding of labor market dynamics certainly requires insights on both job and worker flows, and the interactions thereof. Analysis of labor market flows is also important to address why job growth in the formal sector remains a major challenge for less developed countries (La Porta and Shleifer, 2014). This challenge appears to be even more pressing in Sub-Saharan Africa where the economic upturn since the late 1990s has not generated robust growth in stable and well-paying jobs while informality and urban unemployment rates remain high (ACET, 2014).

The scarcity of matched employer-employee data has been a major constraint to jointly examining the reallocation of jobs and workers across firms hence limiting researchers to study either job or worker reallocations. While studies that use firm-level data have shed some light on gross job creation and destruction — processes often referred to as job flows (Davis and Haltiwanger, 1992; Baldwin, Dunn and Haltiwanger, 1998; Shiferaw and Bedi, 2013), such studies do not reveal the full extent of labor mobility through hires, quits and layoffs — processes often referred to as worker flows. Similarly, studies that use worker-level data from labor force and household surveys examine aspects of worker flows without capturing job flows on the demand side (Blanchard and Diamond 1990; Schaffner, 2001; Gong et a., 2004). Only a few studies, predominantly from developed countries, have so far used matched employer-employee data to jointly examine job and worker flows, and provide a fuller picture of labor market dynamics (Anderson and Meyer, 1994; Abowd, Corbel, and Kramarz, 1999; Burgess, Lane, and Stevens, 2000, 2001; Bjelland, Fallic, Haltiwanger, and McEntarfer, 2011). Other studies attempt to overcome the lack of matched employer-employee data by combining different

datasets (Davis, Faberman, Haltiwanger, 2012; Davis and Haltiwanger, 2014). This paper contributes to the literature on labor market dynamics in developing countries by exploiting a unique administrative data from Ethiopia that links formal private-sector employers and employees.

It is well known that firms' decisions to create and destroy jobs, due to heterogeneous productivity and shifts in product demand, are important drivers of worker mobility across firms and states of employment. In fact, standard search and matching models draw a strong tie between job and worker flows (Mortensen and Pissarides, 1994) implying that worker turnover contributes to aggregate productivity growth as it accompanies the reallocation of jobs from less to more productive firms. However, worker turnover often exceeds job reallocation because of separations that require replacement hiring. Labor economists attribute this to an information problem where the true quality of a job match, or at least part of it, can only be observed after hiring leading subsequently to the dissolution of inferior job matches (Jovanovic, 1979; Pries and Rogerson, 2005). The resulting replacement hiring implies that growing firms may hire more workers than the number of jobs they create, while downsizing firms may also engage in hiring (Fujita and Nakajima, 2016; Lazear and Spletzer, 2012). Recent studies show that not only does replacement hiring contribute significantly to worker turnover, it may also have important implications for job flows at the firm-level presumably because of an increase in labor adjustment costs (Burgess et al. 2000). With matched employer-employee data, it is possible to disentangle the part of total worker turnover that is driven by job creation and destruction from the part that is driven by the dissolution of poor-quality job matches that entail replacement hiring. Part of our objective in this paper is to estimate the magnitude of worker flows in excess of job flows, hitherto referred to as churning following the terminology in Burgess et al. (2000), and its dynamic relationship with job flows in the context of a low-income African country.

We use administrative data from the Private Organizations' Employees Social Security Agency (POESSA) of Ethiopia that span from September 2011 to September 2018. POESSA uses unique employer and employee identification numbers that allow tracking of firms and workers over time. Since this is the first time that such data are acquired from a Sub-Saharan African country, the paper provides new insights on labor market flows in the African context where both

employment growth and job stability in the formal sector remain important policy concerns. Using the panel nature of the data, we calculate the rates of worker turnover, job flows, and churning at the firm level on a bi-annual basis. The paper has three major objectives. First, we examine the distribution of job and worker flows across distinct groups of firms and over time in a manner that better characterizes the Ethiopian formal labor market and allows comparison with existing studies that use similar datasets. Second, we estimate the extent to which excess worker turnover may be costly for firms and affects job growth. To better understand the implications of churning, we assess firm heterogeneity in the churning-job flows relationship based on expected differences in the relative importance of job stability across firms. The matched employer-employee data also allows us to juxtapose firm-level evidence on the relationship between churning and job growth with worker-level evidence on the returns to experience and tenure. The underlying assumption is that firms would adopt payment structures that promote long-term relationships with workers if their production activities are more dependent on firm-specific human capital (Farber, 1999). Third, we analyze the drivers of turnover and churning at the firm level using an empirical model inspired by existing theoretical and empirical studies of worker turnover. The idea is to show whether total and excess worker turnover vary systematically across firms and how much control firms may have on turnover. We then verify the consistency of our findings from firm-level determinants of churning with worker-level evidence on the probability of separation where we control for firm and worker characteristics.

As a preview of our results, we find a relatively weak net employment growth (2.3%) in the formal private sector of Ethiopia despite strong GDP growth during the sample period[1]. This lackluster employment growth is, however, accompanied by a very high worker turnover rate where nearly two out of five private sector employees would either be hired or separated over a period of six months. A little over half (52%) of this turnover is driven by job flows, i.e., firms' decisions to create and destroy jobs. Churning, or worker turnover in excess of job flows, accounts for the remaining 48%. Regression results show that an increase in churning is negatively associated with subsequent net employment growth at the firm level suggesting that churning is costly for employers. The growth-reducing effect of churning appears to be stronger in manufacturing, a

[1] The labor market dynamics we capture in this paper pertains only to formal wage employment in the private sector.

sector presumably more reliant on trained and experienced workers, followed by the services sector. Firms in the rest of the economy seem to be much less sensitive to churning.

Regarding the drivers of churning, we find that rapidly growing firms tend to have higher churning subsequently suggesting that faster growth raises the uncertainty of job match quality. Churning also varies inversely with an increase in idiosyncratic component of firm-level average wage and non-wage benefits, while it has a non-linear relationship with firm size. This appears to be consistent with findings from our worker-level analysis where younger and low-wage workers are more likely to be separated. Firms that are larger and offer above average wages and benefits also experience lower separation rates after controlling for worker characteristics. These findings underscore the critical importance of considering both worker and firm heterogeneity to better understand the nature and implications of excess worker turnover.

The rest of the paper is organized as follows. The next section discusses the definition and measurement of job and worker flows while section three introduces the country context and the unique administrative data. A review of the extant literature on labor market flows and the contributions of the current paper are highlighted in section four. Section five describes patterns of job and worker flows. Sections six examines the responsiveness of firm-level job flows to excess turnover and how this relationship varies across groups of firms. Section seven examines the drivers of firm-level churning, and the underlying probability of separation at the worker level. Section eight concludes the paper.

## 2. Defining Job and Worker Flows

We construct indicators of job and worker flows following the standard practice in the literature on labor market flows (Davis and Haltiwanger,1992; Burgess et al., 2000).

The firm-level *Hiring Rate* ($HR_{it}$) is calculated by dividing the total number of workers hired by firm $i$ as of time $t$ ($H_{it}$) by average employment level ($E_i$) at $t$ and $t-1$: $HR_{it} = \frac{H_{it}}{0.5(E_{it}+E_{it-1})}$

where $H_{it}$ is the number of new workers at time $t$ who did not work for firm $i$ at $t-1$ subsequent to the firm's registration with POESSA. Since we have biannual data at the end of March and September, $H_{it}$ represents the number of workers hired over the past six months while the denominator is average firm-level employment during that period.

The firm-level *Separation Rate* ($SR_{it}$) is the number of workers separated from firm $i$ at time $t$ ($S_{it}$) relative to average firm-level employment: $SR_{it} = \frac{S_{it}}{0.5(E_{it}+E_{it-1})}$. We calculate the number of separations ($S_{it}$) by counting employees who are no longer working for firm $i$ at time $t$ after being observed at $t-1$. The POESS dataset does not allow us to distinguish between quits and layoffs.

We calculate *Net Employment Growth Rate* ($NEGR_{it}$) as the difference between a firm's hiring and separation rates: $NEGR_{it} = \frac{H_{it}-S_{it}}{0.5(E_{it}+E_{it-1})}$. The *Worker Flow Rate* ($WFR_{it}$) is the number of hired or separated workers relative to average firm-level employment: $WFR_{it} = \frac{H_{it}+S_{it}}{0.5(E_{it}+E_{it-1})}$. We also refer to $WFR_{it}$ as the worker turnover rate, or simply worker flows.

The *Job Creation Rate* ($JCR_{it}$) is positive NEGR while the *Job Destruction Rate* ($JDR_{it}$) is negative NEGR. Because we are measuring these variables at the firm level, a firm can either create, destroy or have no change in jobs at a given point in time. The *Job Flow Rate* ($JFR_{it}$) is thus the absolute value of *NEGR*, i.e., $JFR = \left|\frac{E_{it}-E_{it-1}}{0.5(E_{it}+E_{it-1})}\right| = \left|\frac{H_{it}-S_{it}}{0.5(E_{it}+E_{it-1})}\right|$. The firm-level *Excess Worker Flow Rate* ($EWFR_{it}$) or churning rate is the worker flow rate that is above and beyond the job flow rate: $EWFR_{it} = WFR_{it} - JFR_{it}$.

Calculating the above-mentioned indicators at the microlevel allows us to examine firm heterogeneity in job and worker flows as well as their dynamic interactions. We also calculate aggregate measures of job and worker flows to capture their overall magnitude and relative importance. The aggregate worker turnover rate, for instance, is the sum of all hires and separations divided by aggregate employment in our sample lagged by one period.

# 3. Literature on Job and Worker Flows

This paper is inspired by and contributes to the existing literature on worker and job flows. Worker turnover has been an essential element of theories of labor market dynamics given its critical and at times competing macroeconomic implications. Efficiency wage models have long underscored the costliness of high worker turnover for individual firms and the aggregate economy by increasing structural unemployment (Salop, 1979) or by raising urban unemployment in developing countries (Stiglitz 1974). However, recent macro-labor studies from developed countries point to positive effects of worker turnover. Davis and Haltiwanger (2014) and Mercan and Schoefer (2020) show that quit-driven replacement hiring increases net employment in the United States and Germany, respectively. Moscarini and Postel-Vinay (2016) reach a similar conclusion using a dynamic job ladder model. These recent studies are, however, silent about the implications of worker turnover on firm-level job flows where there appears to be limited theoretical and empirical insight. Nonetheless, firms that rely on specific human capital have been shown to adopt compensation structures that allow them to attract experienced workers and extend the longevity of existing job matches (Lazear, 1979). Encouraging long-term relationships by adjusting compensation structures could be expensive for firms (Farber, 1999) arguably forcing them to scale back job growth or choose production activities that depend less on long-term relationships with workers (Schaffner, 2001). If turnover exceeds the firm's optimal rate, the resulting increase in adjustment costs could be consequential at least for firms that rely on specific human capital. This view is supported by Burgess et al. (2000) who find that churning is negatively correlated with subsequent employment growth among US firms. Lane et al. (1996) also find, using the same dataset as Burgess et al. (2000), that churning increases the hazard of firm exit. These studies suggest that churning may lead to a downward spiral of employment contraction that ends with firm exit, especially if skilled workers with better outside options are among the first to leave a struggling firm (Faberman and Nagypál, 2008). Such undesirable effects of turnover are consistent with the implications of efficiency wage models and seem to be supported by Alvarez and Veracierto's (2001) model where reducing turnover through severance payments may reduce the unemployment rate.

Given the above-mentioned implications of turnover, it is important that we understand the drivers of worker turnover across firms. Existing studies from developed countries show that worker turnover varies inversely with the restrictiveness of labor market regulations across countries (Bertola and Rogerson, 1997; Pries and Rogerson, 2005; Kiyotaki and Lagos, 2007) and varies in a procyclical fashion within a country (Lazear and Spletzer, 2012) unlike job flows that tend to be countercyclical (Davis and Haltiwanger,1992). While little is known about the extent of worker turnover in developing countries, a few recent studies suggest potentially higher turnover rates relative to that of developed countries. Using urban household surveys, Schaffner (2001) finds shorter job tenure in Columbia as compared to the Unites States. Based on harmonized labor force surveys from a large sample of developed and developing countries, Donovan, Lu and Schoellman (2019) show a reduction in the employment-unemployment transition rate as per capita income increases. Donovan et al. (2019) attribute this pattern to the predominance and fluidity of self-employment in developing countries, which seems consistent with Basu et al. (2019) where worker heterogeneity in access to self-employment is a critical aspect of worker mobility in developing countries. Blattman and Dercon (2018), for instance, find strong preference for self-employment and a very high quit rate from wage employment among urban workers in Ethiopia. The prevalence of self-employment as an alternative to formal wage employment may thus raise worker turnover in the formal labor market of developing countries adding to the effect of the prevalence of small firms (Gong et al., 2004).[2]

To better understand labor market dynamics, however, it is important to go beyond cross-country comparisons and examine potential determinants of firm-level worker flows. According to search models of turnover (Jovanovic, 1979; and Moscarini, 2005), the likelihood of separation from an employer is expected to decline with tenure. This implies higher worker turnover rate among rapidly growing firms where the proportion of workers with shorter tenure may be higher. Farber (1999) provides supportive evidence from the US where new jobs tend to end early and the probability of job change declines with tenure. This observation further suggests higher turnover rate among small firms as employment growth typically declines with firm size (Evans, 1987;

[2] Unlike traditional models of developing country labor markets where workers are assumed to choose between rural employment, urban wage employment and urban unemployment, recent studies seem to show greater labor market dynamics where workers move frequently between self-employment, wage-employment, unemployment and inactivity (Donovan et al. 2018; Basu et al., 2019).

Jovanovic 1979). On the other hand, if firm growth is an indication of current and expected profitability as in Faberman and Nagypál (2008), successful firms that offer higher wages should experience relatively lower quit and replacement hiring rates. Other studies provide some evidence that firm age may play a bigger role than firm size in determining both the growth rate and the stability of jobs (Davidsson, Lindmark and Olofsson, 1998; Brummund and Connolly, 2019).

There is, however, very little empirical evidence on firm-level variation in total and excess worker turnover. Burgess et al. (2000) and Lane et al. (1996) show that churning decreases with firm size and age in the United States while Burgess et al. (2001) find that churning decreases with wage after controlling for firm size and age. Most importantly, Burgess et al. (2000) find that rapid employment growth increases subsequent churning suggesting that the average job-match quality may decline as firms expand rapidly as implied by matching models. Their finding also implies that firms that recently downsized are expected to have less churning subsequently as they might have expunged poor quality job matches. But churning appears to be widespread across firms as hires and separations are shown to take place both among growing and downsizing firms (Hamermesh et al., 1994; Burgess et al., 2001; Lazear and Spletzer, 2012).

As indicated earlier, the lack of evidence on labor market flows in developing countries is largely due to scarcity of linked employer-employee data. While Schaffner (2001), Gong et al. (2004) and Donovan et al. (2019) provide rough estimates of worker turnover, they do not examine firm-level job flows and hence unable to isolate excess turnover. These studies also provide only partial measures of worker turnover using either the length of job tenure (Schaffner, 2001), the transition rate from employment to unemployment (Gong et al. 2004; Donovan et al., 2019) or just the quit rate (Blattman and Dercon, 2018). While a few recent studies have used matched employer-employee data from Brazil, their primary focus has been on estimating the labor market effects of trade shocks ( Dix-Carneiro, 2014; Krishna, Poole and Senses, 2014; Dix-Carneiro and Kovak, 2017) and the relative importance of firm age in creating stable jobs

(Brummund and Connolly, 2019)[3]. This paper is the first to provide estimates of worker turnover, job flows and churning at the firm level using linked employer-employee data from a large African economy following the standard approach in Davis and Haltiwanger (1992) and Burgess et al. (2001). Most importantly, unlike extant studies from developing countries, the paper examines the dynamic interaction between job flows and worker flows at the firm level, and the heterogeneity in this nexus across groups of firms.

We also contribute to this literature by providing worker-level analyses of wage determination and labor mobility to reinforce the implications of our findings from firm-level analyses. The worker-level analyses allow us not only to check the robustness of the firm-level evidence but also to better understand potential underlying mechanisms. Firms that rely on specific human capital and likely to experience high labor adjustment costs (in terms of search and training costs, or the productivity gap between new hires and experienced workers) may use compensation structures that reduce turnover (Lazear, 1979; Farber, 1999). Parson (1972) also argues that quit and layoff rates will be lower in industries where investments in firm-specific human capital are larger. Accordingly, if excess turnover is costly as implied by efficiency wage and specific capital models, the experience and tenure profiles should be steeper for firms that rely heavily on job stability for competitiveness. Similarly, we complement our firm-level evidence on the determinants of churning with a worker-level analysis of the probability of separation. Since the data allow us to control for worker and firm characteristics simultaneously, this approach allows us to determine which workers are more mobile and which firms have greater job stability.

## 4. Country Context and Data

Ethiopia provides an interesting case to study labor market dynamics in the African context. To begin with, Ethiopia is the second most populous country in Africa with a 3% average population growth rate. The country has achieved strong real GDP growth of about 10% p.a. on average since the early 2000s making it one of the fastest growing economies in the region. However,

[3] This could partly be because of the annual nature of the Brazilian matched employer-employee data that does not allow estimation of job and worker flows on quarterly and bi-annual basis.

approximately 80% of the population is still employed in agriculture and urban unemployment rate remains relatively high. According to the Urban Employment and Unemployment Survey conducted by the Central Statistical Agency (CSA) of Ethiopia, the urban unemployment rate was 25% in the early 2000s and declined to about 17% in 2016 before rising slightly to 19% in 2017 and 2018. Youth unemployment in urban areas, however, remained above 25% throughout the last two decades. Approximately 75% of urban employment is in the private sector of which the share of self-employment is about 60%. There is no minimum wage in the private sector, and labor unions are typically very weak. Despite some improvements over the last decade, courts remain inefficient and provide limited legal recourse for disputes between employers and employees. The urban labor market is thus marked by high unemployment and self-employment rates, low wages and limited restraint on worker separations either from labor unions or the court system.

As already indicated, the data for this paper come from the administrative records of the Private Organizations' Employees Social Security Agency (POESSA) of Ethiopia. The agency manages the mandatory social security scheme for private sector employees introduced by government in June 2011. This is a defined benefits pension scheme that applies to all private sector firms with at least one employee. The POESSA data do not include civil servants and employees of state-owned enterprises who are covered under an older social security scheme established in the 1960s. Also not covered under POESSA are the self-employed, and employees of private firms who already had Provident Funds (PFs) as of June 2011. Provident funds are voluntary schemes that draw contributions from employers and employees, and provide lumpsum payments upon separation. The 2011 pension law allows PFs to co-exist with the new scheme if both employers and employees agreed to keep them while prohibiting the formation of new ones. It is not clear exactly how many privately-owned firms and their employees have PFs. However, Shiferaw et al. (2017) indicate that approximately 20% of manufacturing firms have PFs and that such firms tend to be larger than their counterparts without PFs. We expect even lower coverage of PFs in the services sector given that firm size is substantially lower in services relative to manufacturing. The new pension scheme under POESSA is thus expected to cover at least 80% of formal private-sector firms that were established before 2011 and all firms established thereafter. However, due to weak enforcement of the new pension law, it is not

entirely clear what percentage of private employers are actually registered with POESSA. According to Shiferaw et al. (2017), close to 50% of privately-owned manufacturing firms have complied with the new pension law in 2012 and 2013[4]. If small firms are less likely to comply with the 2011 pension law than large firms, our findings may thus underestimate the extent of worker and job flows in the labor market. It should also be noted that our analysis abstracts from job and worker flows associated with firm entry and exit because of data limitations. The current dataset does not allow us to distinguish firm entry from compliance with the new pension law, or firm exit from failure to comply with the pension law.

Despite these limitations, the POESSA data provide the largest sample of formal private firms in Ethiopia that are matched with employees. Unlike most firm-level studies on job flows that cover only manufacturing firms, we have a more complete picture of the formal labor market encompassing all economic sectors across all administrative regions in the country. Our sample of the POESSA data has 1,645,645 workers matched with 51,600 firms. The total number of worker observations is 4,969,487 and the total number of firm observations is 234,521. Female workers account for 37% of observations on average. While concerns about data quality remain, the consistency of some of the descriptive statistics with widely recognized patterns of firm behavior in the existing literature, as discussed shortly, gives us confidence regarding data quality and representativeness.

## 5. Patterns of Job and Worker Flows

The main summary statistics on job and worker flows are reported in Table 1. Starting with Column 2 on aggregate numbers[5], formal private sector employment grew at 2.4% during the sample period on average. This relatively lackluster job growth is, however, accompanied by a

[4] The 2015/16 Large and Medium Scale Manufacturing and Electricity Industries Survey conducted by the Central Statistical Agency of Ethiopia captures approximately 3200 manufacturing firms that employ at least 10 workers and use power driven machinery. Approximately 5% of these manufacturing firms are state-owned enterprises and about 20% of them have PFs and hence do not report to POESSA. With a 100% compliance, one would expect approximately 2400 manufacturing firms in the POESSA data. The actual number of manufacturing firms in the POESSA data is about 1100 firms at any point during our sample period, which amounts to a compliance rate of about 45%.

[5] The aggregate numbers represent averages of aggregate measures calculated for each six-month period from March 2012 to September 2018.

very high worker turnover rate of 38.3% suggesting that nearly two out of five private sector employees at any given point in time have either been hired or separated over the preceding six months. The job flow rate, capturing job creation and destruction, amounts to 20% of employment. This shows substantial reallocation of jobs across firms that account for 52% of total worker turnover. The table also reveals sizeable churning (EWFR) flows of 18.2% that generated the remaining 48% of worker turnover. The prevalence of churning is also evident in Table 1 where the aggregate hiring rate is 80% higher than the job creation rate, and the separation rate is twice the job destruction rate.

Moreover, we find remarkable heterogeneity in job and worker flows across firms as shown by the difference between the sample median and aggregate measures in Table 1. The median firm has zero employment growth,12.4% job creation rate and 12.1% job destruction rate that are all far below the respective aggregate numbers. To assess the significance of such heterogeneity, we conducted a decomposition analysis of job and worker flows based on the firm's job growth status as shown in columns 3 to 5 of Table 1. The last row shows how downsizing among our sample firms has been as frequent as employment expansion and inaction. We find that 79% of hiring occurs among firms with positive job growth while 69% of separations take place among downsizing firms. While this shows a strong tie between job flows and worker flows as implied by the Mortensen and Pissarides (1994) type search models, Table 1 also shows that 27% of separations take place among growing firms while close to 18% of hiring takes place among downsizing firms. Similarly, growing and downsizing firms account for 53% and 39% of aggregate churning, respectively, while the remaining 7% is accounted for by firms with no change in employment. While the fractions of expanding and contracting firms are equal, growing firms account for 55% of total worker turnover relative to the 42% contribution by downsizing firms.[6]

[6] Among firms with zero growth, hiring and separation rates are tied at nearly 5% although three quarters of such firms have zero hires and separations. The remaining 25% of firms in this group have equal but non-zero hiring and separation rates, with a churning rate of 41.8% (20.9% HR plus 20.9% SR), which is the highest for any group of firms.

We now put our number in a broader context notwithstanding the difficulty of a direct comparison with labor market flows from other countries due to differences in the type, scope and frequency of data, not to mention differences in economic development. Burgess et al. (2000) report quarterly worker turnover rates of 32.3% in non-manufacturing and 19.4% in manufacturing for Maryland. This would translate to bi-annual turnover rates of approximately 60% and 40%, respectively, suggesting higher turnover rates as compared to Ethiopia. Most importantly, Burgess et al. (2000) show that churning accounts for 70% and 62% of worker turnover in non-manufacturing and manufacturing, respectively, which are substantially higher than the 48% share in our sample. Both Anderson and Meyer (1994) and Burgess et al. (2000) reported 23% quarterly separation rate in the US, which is also higher than the 18% biannual separation rate in Ethiopia. European countries, on the other hand, are known for having less worker turnover rates relative to the US that are estimated to lie in the 40-60% range on annual basis largely due to more restrictive labor market regulations (Contini,2002). These are lower than the annual worker turnover and churning rates of 78.5% and 32.2% in our sample are, respectively. These comparisons suggest that labor mobility in the Ethiopian formal labor market is arguably higher than that of European countries but lower than that of the United States. There are no comparable studies on labor market flows from other developing countries.

*Variation by firm size and sector*

Table 2 compares job and worker flows across the firm-size spectrum. Small firms with fewer than 21 employees account for 81% of firm observations and 31% of total employment in the formal private sector while larger firms account for only 3.3% of observations and 38% of total employment. NEGR declines sharply with firm size: from 7.9% among initially small firms with fewer than 11 employees to -0.8% among initially larger firms with more than 100 workers. This is consistent with the vast literature where small firms grow faster than large firms. Firms that employ less that 50 workers have higher than average worker turnover rate as compared to large firms. The main driver for this pattern is the secular decline in hiring rate as firm size increases while the separation rate remains relatively stable particularly among small and medium firms. Similarly, excess turnover remains stable within the 19-24% range among small

and medium size firms before dropping sharply to about 13% among large firms. This suggests that large firms experience better job stability although they tend to grow at a slower rate.

While small firms grow faster than large firms on average, Panel B of Table A1 in the appendix shows that about 87% of them actually remain very small during the sample period. Small firms also tend to have shorter spells, typically less than half of the maximum firm-spell of 15 observations, with an average NEGR of -6% as shown in Panel A of Table A1. Initially small firms would have to sustain atypically rapid employment growth (15% or more) for at least five years to become medium size firms. See Figure 1 for the distribution of firm growth. About three quarters of initially large firms also remained in the same category and experienced longer spells with an average NEGR of 1.6%. The -0.8% NEGR reported in Table 2 for all initially large firms thus reflects the performance of the remaining 25% of firms that downsized significantly over time. Firm size is thus persistent among the ubiquitous very small firms as well as among large firms. It is often medium size firms that seems to be more flued.

Figure 2 shows that the services sector accounts for 55% of formal private sector employment while manufacturing accounts for 20%[7]. It is worth noticing that the sectoral composition of formal jobs remains stable over the sample period. While firms in manufacturing and services have statistically insignificant difference in employment growth, Table 3 shows that worker turnover and churning rates are significantly lower in manufacturing suggesting better job stability relative to services. The construction sector has above average NEGR reflecting the construction boom in urban areas and the massive public investment program in infrastructure over the last two decades (Moller et al., 2017). However, construction jobs are the least stable as they feature the highest worker turnover and churning rates[8]. This is quite consistent with Anderson and Meyer (1994) who reported 66% quarterly worker turnover rate in construction

[7] Although manufacturing accounts for less than 5% of total employment in the Ethiopian economy, Figure 3 shows that it is an important source of employment in the modern private sector. The construction and not-for-profit firms each account for 11% of employment. Not-for-profit organizations include business and professional associations as well as other non-governmental organizations

[8] This likely reflects the nature of employment contracts in this sector as they tend to be project specific and workers are loosely attached with a particular employer.

relative and 30% in manufacturing for the US – which is comparable to the difference between Europe and the United States in worker flows that has been the subject of extensive research. Burgess et al. (2000) also show substantially lower turnover in manufacturing relative to the rest of the economy as indicated earlier. We believe this sectoral difference in turnover reflects underlying heterogeneity in the relative importance of long-term relationships with workers and exploit it in subsequent sections to better understand firm-level differences in sensitivity to churning. We also recognize that the sectoral variation in worker flows could partly be associated with differences in firm size. As shown in Table A2 in the appendix, 74% of service providers are very small firms with fewer than 11 workers while only 43% of manufacturers operate at this scale. The average manufacturing firm has 58 workers, which is nearly four times the average size of a service provider.

*Time-series of job and worker flows*

Turning to temporal variation in labor market flows, Figure 3 shows a declining trend in aggregate net employment growth during the sample period. The downturn intensified since March 2016 where NEGR dropped to -9.8% and -24% in September 2017 and March 2018, respectively, before bouncing back to -1.6% in September 2018.

Labor market tightness would normally reflect a country's macroeconomic performance. This, however, does not seem to be the case in Ethiopia as the economy has been growing at 9% p.a. during 2012-2018. The slack labor market rather seems to reflect the elevated political uncertainty in the latter part of the sample period marked by declarations of state of emergency[9]. This upheaval precipitated a demand for deeper economic and political reforms, paving the way for the appointment of a new Prime Minister in April 2018. The sharp recovery in net employment growth in September 2018, the first data point after the appointment of PM Abiy Ahmed, underscores the critical importance of political stability for labor market performance. It is also interesting to see how the POESSA data seem to capture this turn of events rather adequately.

[9] The government declared a state of emergency in October 2016 amidst rising political unrest that started in the last quarter of 2015. Mass protests triggered by disputes over land rights in parts of the Oromiya region bordering Addis Ababa spread quickly to the Amhara region. Although the first state of emergency was lifted in August 2017, a second one was issued in February 2018 due to a restart of mass protests.

The recovery in NEGR in September 2018 is largely due to a sharp decline in the separation rate rather than an improvement in hiring rate as shown in Figure 3. While improved political conditions in the second and third quarters of 2018 appear to have encouraged employers to reduce firing, business confidence does not seem to be strong enough to spur hiring.

To better understand the dynamics of the formal labor market, we examine whether the decline in aggregate NEGR was largely due to changes in the fraction of growing, downsizing and stagnating firms or due to changes in the average rates of employment expansion and contraction. We explore this by splitting the sample into three periods: a period of relatively strong NEGR during 2012 and 2013 (11%), a period of weak but positive NEGR during 2014 and 2015 (2.1%), and a period of negative NEGR during 2016-2018 (-4.5%). Table A3 in the appendix shows that NEGR declined over time not only because of adjustments in the extensive margin where the fraction of contracting firms increased and that of growing firms declined, but also due to adjustments in the intensive margin where NEGR among expanding firms attenuated and the rate of contraction among downsizing firms accentuated. However, adjustments in the extensive margin seem to be more pronounced than adjustments in the intensive margin as shown in Table A3. This suggests that while firm heterogeneity accounts for the simultaneous expansion and contraction of firms at any point in time, the labor market also exhibits common trends where both the fraction of growing firms and their average rate of growth declined during the sample period just as the fraction of downsizing firms and the rate at which they did so increased.

Another important consideration is whether aggregate values of job and worker flows are correlated with trends in NEGR. Figure 4 shows that job flows are relatively stable over time as compared to worker flows. It is also evident that total worker turnover is nearly equally split between job flows and churning flows. While a closer look at Figure 4 shows some co-movement between aggregate churning and job growth[10], it is not strong enough to imply procyclical churning as reported in Lazear and Spletzer (2012) for the United States. Figure 5 shows that trends in NEGR are very similar across sectors except for sharp downturns in agriculture due to

[10] The correlation between aggregate NEGR and Churning is 0.05 and statistically insignificant.

whether shocks. There is relatively more variation across sectors in churning relative to NEGR although they exhibit similar trends.

*Regional variation*

Table A5 shows substantial variation across regions in job flows but only modest difference in excess worker turnover. The federal city administrations of Addis Ababa and Dire Dawa, which have been historical centers of business and manufacturing, feature some of the lowest net employment growth rates while faster NEGR is observed in previously marginal regions. Despite such differences in NEGR, the deterioration in labor market conditions during the sample period is evident across regions. Panel A of Table A5 also shows considerable geographic concentration of formal private sector firms and employment. About 44% of such firms and 61% the jobs they created are located in Addis Ababa although the capital city accounts for less than 5% of the Ethiopian population. Table A6 shows the sectoral distribution of firms and employment within each administrative region. Manufacturing accounts for nearly 30% employment in Addis Ababa, which is substantially larger than the 20% share nationally.

## 6. Econometric Approach

The first part of this section examines the relationship between employment growth and excess worker turnover at the firm level. It also examines the degree of firm heterogeneity in this relationship and whether this variation has to do with the relative importance of long-term relationship with workers. The second part of this sections addresses the determinants of firm-level churning and whether the underlying dynamic is consistent with the behavior of workers as captured by the likelihood of separation.

*6.1. Churning and job growth*

We exploit the panel nature of our matched employer-employee data to investigate the relationship between turnover and job flows. To that effect we specify a model for firm-level net

employment growth (NEGR) featuring lagged churning and other widely used determinants of growth as follows:

$$NEGR_{jsryt} = \propto_j + \beta_1 Churning_{jt-1} + \beta_2 Firm - Size_{jt-1} + \beta_3 [Firm - Size]^2_{jt-1} + \beta_4 Wage_{jt-1} + \beta_5 Benefit_{jt-1} + \tau_y + \delta_t + \rho_{s*y} + \mu_{r*y} + \varepsilon_{jyt} \quad (1)$$

where subscripts $j$, $s$ and $r$ index firms, sectors and regions, respectively. Year and month of observation are indexed by $y$ and $t$, repsectively. *Firm-size* is firm-level average employment consistent with the way job and worker flows are calculated. *Wage* measures the deviation of firm-level mean wage from the sector average at time $t$, where the firm-level wage is calculated as nominal monthly wage bill divided by the number of workers. *Benefit* represents total employer contribution to the pension scheme relative to the wage bill. Eq.1 also includes firm, year and month fixed effects that are represented by $\propto_j$, $\tau_y$, and $\delta_t$, respectively. Firm size, wage and benefits are all measured in logarithms. The time fixed effects allow us to control for countrywide effects such as macroeconomic shocks and political unrest that change over time and affect all firms equally. All variables are lagged by one period (six months) to capture dynamics and also to mitigate the simultaneity problem. By using the panel fixed effects estimator on Eq.1, we account for time-invariant and firm specific unobserved factors such as the firms' personnel policy that could be correlated with churning, wages and benefits. Recognizing that the equation error term $\varepsilon_{jyt}$ is likely serially correlated within a firm, we use standard errors that are clustered at the firm level. The model also includes interaction terms of sector and year dummy variables represented by $\rho_{s*y}$ as well as interactions of regional states and year dummy variables represented by $\rho_{r*y}$. In doing so, we are allowing sector- and region-specific trends in NEGR and hence accounting for different growth prospects in labor markets that may be segmented by sector and region. Following standard practice in empirical labor market studies, we exclude very small firms that employ less than four workers from the analysis. Burgess et al. (2000) use a similar model featuring lagged churning as a covariate but the authors condust a time-series analysis for each employer rather while we choose a panel-data approach with more control variables.

Table 4 reports regression results from Eq.1. The coefficient on lagged churning is negative and statistically significant where the point estimate suggests that reducing churning by 10 percentage points would increase NEGR by a third of a percentage point. This is consistent with the findings of Burgess et al. (2001) for US firms and supports the view that excess turnover is costly for firms. This interpretation assumes that after making a decision on the number of jobs firms apply time invariant personnel policies on pay structure and which workers to hire and fire. It is thus hard to interpret $\beta_1$ in the unlikely scenario where firms frequently switch their personnel policies and employment targets simultaneously. The negative coefficient on churning in Table 4 is hence consistent with quit-driven replacement hiring rather than firms laying off less productive workers and replacing them with more productive ones.

The coefficients on firm size and its squared term are also significant and suggest that employment growth declines with firm size, albeit at a decreasing rate. The elasticities of NEGR with respect to firm size are -0.492, -0.417 and -0.313 at the 10$^{th}$ percentile, the mean and the 90$^{th}$ percentile of the firm size distribution, respectively. The deviation of firm-level wage from the sector average is positively correlated with NEGR. This seems to capture, as will be shown shortly, the reduction in worker separation rate among firms that pay above-average wages. Since we are capturing the idiosyncratic component of firm-level wage, its positive coefficient is consistent with Faberman and Nagypál (2008) where the quit rate declines with idiosyncratic profitability as well as with the job-ladder model of Moscarini and Postel-Vinay (2016). Non-wage benefits in the form of employer pension contributions, however, tend to reduce NEGR significantly. This suggests that the cost of pension benefits is not fully shifted to workers in terms of lower wages hence reducing firms' demand for labor. This is consistent with Shiferaw et al. (2017) who find reduction in firm-level employment following the 2011 pension reform in Ethiopia.

*Churning and Job Growth Across Groups of Firms*

Lacking theoretical guidance on the implications of churning on firm-level performance except for the traditional efficiency wage models, we resort to examining firm heterogeneity in the NEGR-Churning nexus across groups of firms and their consistency with the implications of

efficiency wage models. We begin with Columns 4-6 in Table 4 which show results from Eq. 1 for small, medium and large firms. Our expectation is that large firms would be more reliant on long-term relationships with employees as compared to small firms and hence more susceptible to churning. It is interesting to note that the coefficient on churning is statistically insignificant among small firms with fewer than 21 workers while it is negative and significant for medium and large firms. The coefficient on churning among large firms is more than twice that of medium firms although a chi-square test shows this difference to be imprecise with a p-value of 0.20. Since differences in wage and non-wage benefits are already controlled for, the observed heterogeneity in the implications of churning for firm growth across the size spectrum is consistent with the expectation that excess turnover is more costly for firms that rely on firm-specific skills. Also worth noticing is the negative association between pension benefits and employment growth that turns out to be stronger and highly significant for small firms but insignificant for large firms. This is presumably because larger firms are able to switch at least part of the cost of pension benefits to workers in the form of lower wages, which we will explore later, or because they are able to absorb the cost of such benefits better than small firms.

As shown in Table 2, churning varies significantly across sectors with construction firms having the highest rate. The question now is whether $\beta_1$ in Eq.1 also varies across sectors in a manner that reflects the relative importance of firm-specific human capital. The results are reported in Panel A of Table 5. The coefficient on lagged churning is negative and statistically significant only in manufacturing and services. Manufacturing also seems more sensitive to churning that services as shown in Table 2 but a chi-square test a noisy difference with a p-value of 0.20. While churning is also negatively associated with job growth in the remaining three sectors, it turns out to be insignificant. It is worth noticing that despite construction firms exhibiting the highest churning rate, they do not seem to be adversely affected by it. The converse is true for manufacturing firms which often compete with imported products unlike the other sectors. The heterogeneous sensitivity to churning across sectors is thus consistent with the relative importance of experience and firm-specific skills for firm-level productivity in sector like manufacturing and services relative to construction and agriculture. The fact that the coefficient on churning is substantially larger in manufacturing relative to others, also supports our

expectation that churning is largely driven by replacement hiring for quits rather than firms revamping the skill mix of their workforce.

While pension benefits reduce labor demand in manufacturing, services and non-profit sectors, this negative association is twice as high in manufacturing. This finding also presumably reflects the import penetration rate facing most manufacturing industries in Ethiopia (Manyazewal and Shiferaw, 2019) while the other sectors essentially remain insulated from international trade giving the latter more flexibility to respond to non-wage labor cost.

Lastly, panel B of Table 5 examines Eq. 1 across firm-age categories. For younger firms under 10 years-of-age, churning is insignificantly correlated with employment growth. For firms that have been operational for more than 10 years, we find the coefficient on churning to be negative and significant. Once again, this observation is consistent with our expectation that churning would be costly for firms that rely on firm-specific human capital.

*Returns to Experience and Tenure*

To further underscore that $\beta_1$ in Eq1 captures the undesirable effects of excess turnover on job growth, we estimate a worker-level earnings equation for the entire sample and identifiable groups of firms. The idea is to see if the returns to experience and tenure are larger for firms that are shown to be more sensitive to excess turnover. The earnings equation we estimate is:

$$W_{ijsryt} = \theta_{ij} + \gamma_1 EXP_{it} + \gamma_2 EXP_{it}^2 + \gamma_3 Worker - Spell_{ijt} + \beta_1 Firm - Size_{jt} + \beta_2 [Firm - Size]_{jt-1}^2 + \beta_3 Benefit_{jt} + \tau_y + \delta_t + \rho_{s*y} + \mu_{r*y} + \varphi_{ijt} \quad (2)$$

where the dependent variable is nominal monthly wage for worker $i$ in firm $j$, sector $s$ and region $r$. The time subscript $y$ and $t$ capture year and month of observations, respectively, while the worker-firm fixed effect is represented by $\theta_{ij}$. In the absence of a direct measure of experience and tenure in the POESSA dataset, we proxy general labor market experience using worker age[11]. Because of problems with workers' date of birth in the POESSA data, we have

[11] Specifically, we use age minus 14 as our indicator of potential labor market experience.

reliable information on age only for 45% of worker observations. We also use $Worker - Spell$ , which measures the number of times a worker has been observed as an employee of a given firm since its registration with POESSA, as a proxy for tenure. Eq.2 also allows for sector- and region-specific trends in wage by include the interaction terms $\rho_{s*y}$ and $\rho_{r*y}$, respectively. The fact that we proxy experience with age implies that within the same age cohort the proxy likely overestimates the labor market experiences of more educated workers with higher wages. We thus expect the coefficient on experience to provide a lower bound of the returns to experience. Since the POESSA dataset does not capture workers' education, we rely on the panel fixed effects estimator to account for the returns to schooling, assuming educational attainment hardly changes over time for employed workers. If the returns to experience and tenure are statistically insignificant, it would suggest that replacement hiring is not costly for firms either because the production activity requires minimal experience and training such that new hires can match the productivity of workers with longer experience. Such a finding will be inconsistent with the results in Table 4 and 5. As discussed in Farber (1999), the coefficients on experience and tenure may not necessarily capture the true returns to human capital but they reveal the compensation structure that firms are using to incentivize long-term relationship with workers. This would be consistent with models that emphasize the importance of effort and firm-specific capital. As such, our primary objective in estimating the earnings equation is to examine the extent to which firms' preference for long-term relationship as revealed in Eq.2 corresponds with their sensitivity to excess turnover.

Table 6 reports results from Eq.2 for the entire sample and by sector. Looking at the entire sample, Column 1 shows that the coefficients on our proxies for experience and tenure are positive and statistically significant. This suggests that both general and firm-specific experience are valuable for employers in a manner that is consistent with Table 4 where the coefficient on churning is negative and significant. Across sectors, we observe that the returns to tenure as proxied by $Worker - Spell$ are positive and highly significant in manufacturing and services but insignificant in agriculture and non-profit sectors. While the coefficient on $Worker - Spell$ is significant in construction, the coefficient is slightly lower than that for manufacturing and services. Also notable is the insignificance of general labor market experience for construction

firms as compared to other sectors. The pattern emerging from the results of the earnings equation for the entire sample and across sectors are broadly consistent with the relationship between NEGR and churning across sectors in the sense that firms that rely on firm-specific skills are more likely to have wage structures that incentivize long-term relationships with employees (Lazear, 1979). Such firms seem to follow personnel policies that encourage retention of experienced workers. We also find that wages initially decline with firm size and then rise substantially among large firms with the inflection point occurring at the median firm size for the entire sample. Finally, Table 6 provides some evidence of reduction in wage (about 15%) as pension contribution rates rise for the entire sample.

Table 7 reports regression results from Eq.2 by firm size as our last robustness check. We find that the coefficient on worker-spell is three times larger for medium and large firms as compared to that of small firms with fewer than 21 employees. A chi-square test confirms that small firms differ significantly from medium and large firms in rewarding tenure, while the difference between medium and large firms is insignificant. This is once again consistent with the coefficient on churning in Eq.1 being statistically insignificant among small firms while it is negative and significant for medium and large firms that are likely to rely on specific human capital.

*6.2. Determinants of Churning*

We now turn to examining the drivers of churning. Since job flows are important drivers of worker mobility, our churning model includes lagged net employment growth an explanatory variable similar to Burgess et al. (2000). Our churning model also takes into account wage and non-wage benefits which are critical considerations for workers in making mobility decisions as suggested by efficiency wage as well as search models. As shown in section five, churning also varies across the size and sectoral distribution of firms. Our churning model is thus:

$$Churning_{jsryt} = \beta_0 + \beta_1 NEGR_{jt-1} + \beta_2 Firm - Size_{jt-1} + \beta_3 [Firm - Size]^2_{jt-1} + \beta_5 Wage_{jt-1} + \beta_6 Benefit_{jt-1} + v_j + \tau_y + \delta_t + \rho_{s*y} + \mu_{r*y} + \varepsilon_{jyt} \quad (3)$$

where the variable names and subscripts are as described in Eq.1. The lag structure allows us to mitigate the simultaneity problem. Using the panel fixed effects estimator on Eq.3 allows us

to control for time-invariant unobserved characteristics such as the firm's personnel policy that are correlate with churning as well as job growth, wage setting and benefits. Including time dummy variables and their interactions with sector and location dummy variables allowing us to control for sector- and region-specific trends in churning. We implement a similar model where the dependent variable is worker turnover to show the difference between total and excess turnover.

The results are presented in Table 8 where Panel A refers to churning and Pabel B refers to total worker turnover. We find that churning is positively and significantly associated with lagged net employment growth for the entire sample and across all sectors. On average, raising employment growth rate by 10 percentage points would increase subsequent churning by less than a third of a percentage point. This is consistent with search models of turnover (Jovanovic, 1979; and Moscarini, 2005) where rapid employment expansion brings about employees of uncertain match quality. The relationship between job growth and churning in our sample is also consistent with Burgess et al. (2000) from the United States. We also find that the idiosyncratic component of a firm's average wage is inversely related with churning as would be expected in efficiency wage models as well as Faberman and Nagypál (2008) who link the firm's profitability with higher wages particularly in manufacturing. We also find rather systematic and strong reduction in churning with an increase in pension benefits where a percentage point increase in pension contributions reduces churning by more than three quarters of a percentage point. We find that churning rises with firm size in a non-linear fashion. The inflection point occurs at approximately 100 workers for the entire sample, which is above the 95$^{th}$ percentile of the firm size distribution.

While churning rates and the costliness of churning vary significantly across sectors as shown in Tables 1 and 5, respectively, Table 8 shows very little difference across sectors on how churning responds to lagged growth. There is also very little difference across sectors in the firms' ability to reduce churning through benefits. Only the relationship between wages and churning vary across sectors with the coefficient on idiosyncratic wage being insignificant in construction and agriculture. Moreover, the R-squared from the churning model is typically below 10% across sectors as compared to the R-squared for the growth model in Table 4 that varies

between 25-42% across sectors. These observations suggest that the variation in churning across firms remains largely unexplained while the sensitively of job growth to churning varies significantly across firms.

Panel B of Table 8 shows important differences between total and excess turnover. Unlike churning, total turnover decreases significantly with firm size before starting to rise among large firms. This suggests that while small firms may experience very high total worker turnover rate, they do not necessarily have the highest churning rate. The reason why churning is not substantially lower among large firms is because job flows that contribute to worker flows also decrease with firm size. See also Table A3 in the appendix which, among other things, shows that the share of churning in total worker turnover increases with firm size. This is consistent with Burgess et al. (2000) where the share of churning in worker flows 64% among firms that employ less than 50 workers but 76.7% among firms that employ more than 1000 workers. Firms experiencing rapid employment growth tend to have less worker turnover rate subsequently. Since churning is already shown to increase following rapid employment growth, the negative association between lagged NEGR and total turnover indicates a reduction in job flows following a period of rapid employment growth. This is shown in Table A3 where the coefficient on NEGR is negative and significant in a model where the dependent variable is the job flow rate (JFR).

*The probability of separation*

The evidence so far seems to support that churning is largely driven by workers quitting their jobs rather than firms churning workers to improve productivity. We now turn to the probability of separation which is central to the microeconomic foundation of search and matching models (Jovanovic, 1979). Since churning captures replacements for separated workers, a worker-level analysis of the probability of separation would allow us to determine if churning is concentrated among certain types of workers – say those with short tenure. We specify a separation model that controls for worker and firm characteristics jointly as follows:

$$S_{ijyt} = \gamma + \alpha_1 Sex_i + \alpha_2 EXP_{iyt} + \alpha_3 EXP_{iyt}^2 + \propto_4 Worker - Spell_{ijyt} + \alpha_5 Wage_{ijyt} + \beta_1 Firm - Size_{jyt} + \beta_2 [Firm - Size]_{jyt}^2 + \beta_3 Firm - Wage_{jyt} + \beta_4 Benefit_{jyt} + \tau_y + \delta_t + \rho_s + \mu_r + \omega_{ijt} \quad (4)$$

where $S_{ijyt}$ is a binary variable that takes the value of one if worker $i$ gets separated from firm $j$ in the coming six months $(t+1)$ and zero otherwise. We use the logit model to estimate Eq.4 conditional on worker- and firm-level covariates observed at time $t$. The worker-level covariates include sex, proxies for potential experience and tenure, and individual wage. In labor markets with high search costs, it may take young workers quite some time to find suitable jobs. Moreover, the cost of switching employers may increase as workers acquire more firm-specific capital that is less valuable elsewhere. We thus expect the probability of separation to decline with experience and tenure as implied by search and matching modes (Jovanovic, 1979; Moscarini, 2005). The firm-level variables include firm size, pension benefits and average wage. The latter is measured in terms of deviation of the firm's average wage from the sector mean and presumably captures the prospect of wage growth as in Faberman and Nagypál (2008). As indicated earlier, firm size could reduce the probability of separation if employees of large firms have better chances of rising through the job ladder than their counterparts in small firms. The model controls for year, month, sector and region fixed effects.

Table 9 reports the marginal effects from Eq.4 for the entire sample and by sector. At the individual level, our proxies for experience and tenure are both inversely related with the probability of separation, suggesting that younger workers and those who recently joined a firm are more likely to be separated. This is consistent with evidence provided in Farber (1999) from the US. The coefficient on experience is negative and significant in all sectors except for the sector with the highest turnover rate, i.e., construction. Low-wage workers are more likely to be separated in the coming six months as compared to high-wage workers. After controlling for a worker's wage, the probability of separation is significantly lower among employees of firms that pay above average wages in their respective sector. In fact, the marginal effect of the firm's idiosyncratic wage is larger than the marginal effect of a worker's current wage. Taken together, our findings are consistent with workers considering both current wage and the prospect of wage growth in making mobility decisions. We also find that the probability of separation initially rises

with firm size but starts to decline sharply among medium and large firms that employ more than 20 workers. Since an employee's current wage, firm-level wage and benefits are controlled for, the firm-size effect presumably reflects the prospect of climbing the job ladder within large firms as compared to small firms, or the ability of large firms to screen job applicants more strictly as implied in Pries and Rogerson (2005).

## 8. Conclusion

This paper provides detailed analysis of labor market dynamics using a unique administrative dataset that links employers and employees in the formal private sector of Ethiopian. It shows an urban labor market characterized by relatively slow growth of formal jobs coupled with a very high (38.3%) worker turnover rate. Worker turnover is driven both by the reallocation of jobs across firms and churning in practically the same proportions. Turnover varies substantially across firms based on their production activities, scale of operation and age.

One of our main findings is that lagged churning is negatively associated with net employment growth suggesting the costliness of churning. There is also substantial firm heterogeneity in the job growth-churning relationship that is consistent with underlying differences in the relative importance of experienced and trained workers based on comparisons across sectors and distributions of firm size and age. Differences in the returns to experience and tenure across groups of firms also suggest that firms that stand to suffer more from excess turnover have payment structures that incentivize long-term relationships with workers. Interestingly, we find that firms that pay above average wages experience lower rates separation, turnover and churning but higher rates of employment growth. In a country where wages remain very low and there are no minimum wage laws in the private sector, the positive association of wages with both job growth and job stability implies better prospect for the expansion of formal employment.

We also find that rapidly growing firms risk higher churning subsequently suggesting a reduction in the average job match quality. However, a large part cross-firm variation in churning remains

unexplained with very litter difference in the nature of relationship between churning and model variables across sectors. After controlling for wages and benefits, works with fewer years of experience and tenure are more likely to be separated as compared to more experienced workers. This seems consistent with the high and persistent youth unemployment rate in urban areas suggesting that young workers joining the labor market have difficulty finding jobs and keeping them. Part of the problem could be search frictions that undermine the quality of job matches as shown in Abebe et al. (2016). The authors provide evidence that interventions aimed at reducing search frictions for young job seekers increase not only the probability of employment in the formal private sector but also the quality of job matches.

Another important feature of the formal labor market in Ethiopia is the relatively low (37%) share of female workers who are less likely to be separated and earn 30% less than their male counterparts. Further research is needed to identify potential barriers to formal employment among women. There is also a high degree of geographic concentration of formal sector jobs in the capital city Addis Ababa. On the other hand, 65% of the urban working age population and 60% of the urban unemployed live in small cities and towns according the Urban Employment and Unemployment Survey. Promoting private sector growth in secondary cities and small towns thus remains an important policy consideration.

**References:**


Abebe, G., S. Caria, M. Fafchamps, P. Falco, S. Franklin, S. Quinn. 2016. “Curse of Anonymity or Distance? The Impact of Job-search Support in Urban Ethiopia,” NBER Working Paper No. 22409, National Bureau of Economic Research.

Abowd, J., P. Corbel, and F. Kramarz . 1999. “The Entry and Exit of Workers and the Growth of Employment: An Analysis of French Establishments,” *Review of Economics and Statistics* 81, 170-187.

African Center for Economic Transformation (ACET). 2014. “Growth with Depth – 2014 African Transformation Report,” Accra.

Alvarez, F., and M. Veracierto. 2001. “Severance payments in an economy with frictions,” *Journal of Monetary Economics* 47, 477-498.

Anderson, P. M. and B.D. Meyer. 1994. “The Extent and Consequences of Job Turnover,” *Brookings Papers on Economic Activity*: Microeconomics, 177-236.

Basu, K. A., N. H. Chau, G. S. Fields, and R. Kanbur. 2019. “Job Creation in multi-sector labour market model for developing countries,” *Oxford Economic Papers* 71, 119-144.

Baldwin, J., T. Dunne and J. Haltiwanger.1998. “A Comparison of Job Creation and Job Destruction in Canada and the United States”, *Review of Economics and Statistics* 80, 347–56.

Bertola, G. and R. Rogerson. 1997. “Institutions and Labor Turnover,” *European Economic Review* 41, 1147-71.

Bjelland, M., B. Fallick, J. Haltiwanger, and E. McEntarfer. 2011. “Employer-to-Employer Flows in the United States: Estimates Using Linked Employer-Employee Data,” *Journal of Business and Economics Statistics* 29, 493-505.

Blanchard, O., and P. Diamond. 1990. "The Cyclical Behavior of the Gross Flows of U.S. Workers." *Brookings Papers on Economic Activity*, Microeconomics: 85- 143.

Blanchard, O., and P. Portugal. 2001. “What Hides behind an Unemployment Rate: Comparing Portuguese and U.S. Labor Markets,” *American Economic Review* 91, 187-207.

Blattman, C., and S. Dercon. 2018. “The Impacts of Industrial and Entrepreneurial Work on Income and Health: Experimental Evidence from Ethiopia,” *American Economic Journal: Applied Economics* 10, 1-38.

Brummund, P., and L. Connolly. 2019. “Who Creates Stable Jobs? Evidence from Brazil,” *Oxford*

*Bulletin of Economics and Statistics* 81, 540- 563.

Burgess, S., J. Lane, and D. Stevens. 2000. “Job Flows, Worker Flows, and Churning,” *Journal of Labor Economics* 18, 473-501.

Burgess, S., J. Lane, and D. Stevens. 2001. “Churning dynamics: an analysis of hires and separations at the employer level,” *Labor Economics* 8, 1-14.

Davis, S., R. Faberman, and J. Haltiwanger. 2012. “Labor market flows in the cross section and over time,” *Journal of Monetary Economics* 59, 1-18.

Davis, S., and J. Haltiwanger. 1992. “Gross Job Creation, Gross Job Destruction, and Employment Reallocation,” *Quarterly Journal of Economics* 107, 819-63.

_____. 2014. “Labor Market Fluidity and Economic Performance,” NBER Working Paper No. 20479, National Bureau of Economic Research.

Davidsson, P., L. Lindmark, and C. Olofsson. 1998. “The extent of overestimation of small firm job creation–an empirical examination of the regression bias,” *Small Business Economics* 11, 87–100.

Dix-Carneiro, R. 2014. “Trade Liberalization and Labor Market Dynamics,” *Econometrica* 82, 825-885.

Dix-Carneiro, R., and B. K. Kovak. 2017. “Trade Liberalization and Regional Dynamics,” *American Economic Review* 107, 2908-46.

Donovan, K., J. Lu, and T. Schoellman. 2019. “Labor Market Flows and Development,” unpublished document.

Evans, S.D. 1987. “The Relationship between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries,” *Journal of Industrial Economics* 35, 567–81.

Farber, H. 1999. “Mobility And Stability: The Dynamics of Job Change in Labor Markets,” in: Orley Ashenfelter and Richard Layard, eds., *Handbook of labor economics*, Vol. 3 (North-Holland, Amsterdam) pp. 2439-2483.

Faberman, R. J. and E. Nagypál. 2008. “Quits, Worker Recruitment and Firm Growth: Theory and Evidence,” Working Paper 08-13, Federal Reserve Bank of Philadelphia.

Ferrie, J., H. Westerlund, M. Virtanen, and J. Vahtera, and M. Kivimaki. 2008. “Flexible Labor Markets and Employee Health,” *Scandinavian Journal of Work, Environment and Health* 6, 98-110.

Fujita, S., and M. Nakajima. 2016. “Worker flows and job flows: A quantitative investigation,” *Review of Economic Studies* 22, 1-20.

Gong, Xiaodong, A. van Soest, and E. Villagomez .2004. “Mobility in the Urban Labor Market: A Panel Data Analysis for Mexico,” *Economic Development and Cultural Change* 53, 1-36.

Hamermesh, D. S., W. H. J. Hassink, and J. C. van Ours. 1994. “New Facts about Factor-demand Dynamics: Employment, Jobs and Workers,” NBER Working Paper No. 4625, National Bureau of Economic Research.

Jovanovic, B. 1979. "Job Matching and the Theory of Turnover," *Journal of Political Economy* 87: 972-90.

Kiyotaki, N., and R. Lagos. 2007. “A Model of Job and Worker Flows,” *Journal of Political Economy* 115,5, 770-819.

Krishna, P., J. Poole, M. Senses. 2014. “Wage Effects of Trade Reform with Endogenous Worker Mobility,” *Journal of International Economics* 93, 239-252.

La Porta, R., and A. Shleifer. 2014. “Informality and Development,” *Journal of Economic Perspectives* 28, 109-126.

Lane, J., A. Isaac, and D. Stevens. 1996. “Firm Heterogeneity and Worker Turnover,” *Review of Industrial Organization* 11, 275-291.

Lazear, E. 1979. “Why Is There Mandatory Retirement?” Journal of Political Economy 87, 1261-1284.

Lazear, E., and J. Spletzer. 2012. “Hiring, Churn, and the Business Cycle,” *American Economic Review: Papers and Proceedings* 102, 575-579.

Manyazewal, M., and A. Shiferaw. 2019. Economic Policy and Structural Transformation in Ethiopia. In *The Oxford Handbook of the Ethiopian Economy*, eds F. Cheru, C. Cramer and A. Oqubay , Oxford University Press: Oxford.

Mercan, Y., and B. Schoefer. 2020. “Jobs and Matches: Quits, Replacement Hiring, and Vacancy Chains,” *American Economic Review: Insights* 2, 101-124.

Moller, L. C. and K. M. Wacker . 2017. “Explaining Ethiopia’s Growth Acceleration: The Role of Infrastructure and Macroeconomic Policy,” *World Development* 96, 198-215.

Mortensen, D. and C. Pissarides. 1994. “Job Creation and Job Destruction in the Theory of Unemployment.” *Review of Economic Studies* 61, 397–415.

Moscarini, G. 2005. “Job Matching and the Wage Distribution,” *Econometrica* 73, 481-516.

Moscarini, G., and F. Postel-Vinay. 2016. “Did the Job Ladder Fail after the Great Recession,” *Journal of Labor Economic* 34, 55-93.

Parson, D. 1972. “Specific Human Capital: An Application to Quit Rates and Layoff Rates,” *Journal of Political Economy* 80, 1120-1143.

Pries, M. and R. Rogerson. 2005. “Hiring Policies, Labor Market Institutions, and Labor Market Flows,” *Journal of Political Economy* 113, 811-839.

Salop, C. S. 1979. “A Model of the Natural Rate of Unemployment,” *American Economic Review* 69, 117-125.

Schaffner, J.A. 2001. “Job Stability in Developing and Developed Countries: Evidence from Colombia and United States,” *Economic Development and Cultural Change* 49, 511-35.

Shiferaw, A., and A. S. Bedi. 2013. “The Dynamics of Job Creation and Job Destruction in Sub-Saharan Africa: Evidence from Ethiopia,” *Journal of African Economies* 22, 651-692.

Shiferaw, A., A.S.Bedi, M. Söderbom, G. Zewdu. 2017. “Social Insurance Reform and Labor Market Outcomes in Sub-Saharan Africa: Evidence from Ethiopia,” IZA Discussion Paper No. 10903, Institute of Labor Economics, Germany.

Stiglitz, E.J. 1974. “Alternative Theories of Wage Determination and Unemployment in LDCs: The Labor Turnover Model,” *Quarterly Journal of Economics* 88,194-227.

Topel, H. R., and M.P. Ward. 1992. “Job Mobility and the Careers of Young Men,” *Quarterly Journal of Economics* 107, 439-79.

World Bank. 2012. *World Development Report 2013: Jobs*. Washington, DC: World Bank. DOI: 10.1596/978-0-8213-9575-2.

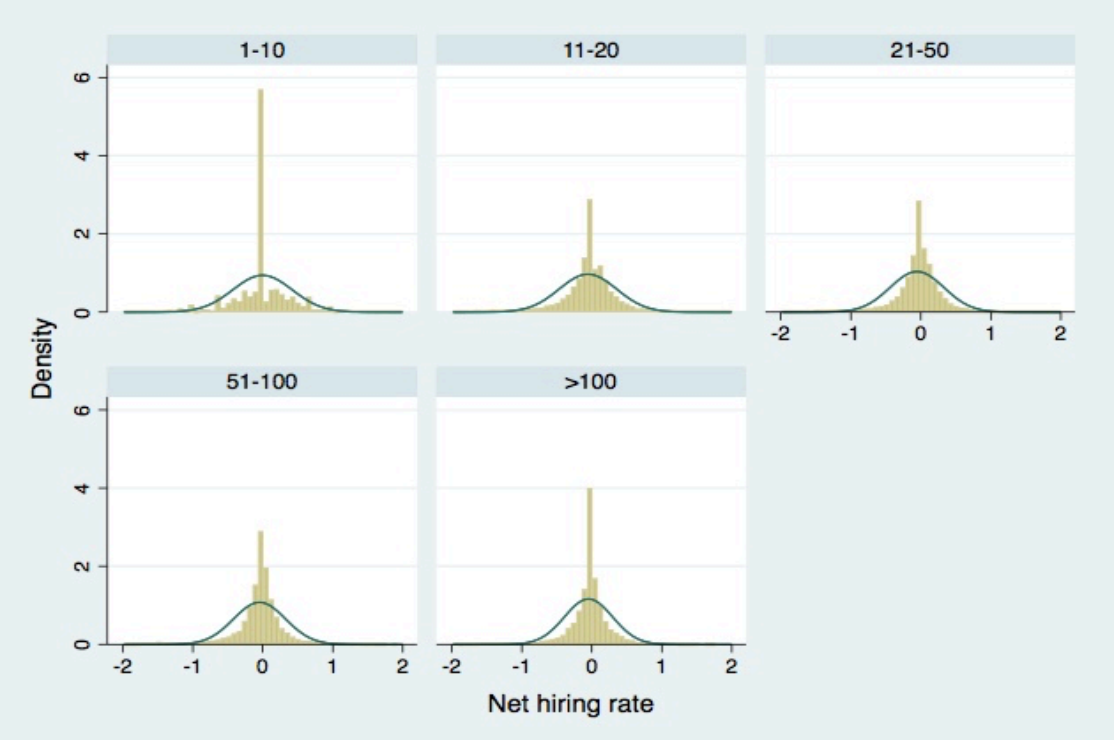

Figure 1: Distribution of Net Employment Growth Rate by Firm Size Category

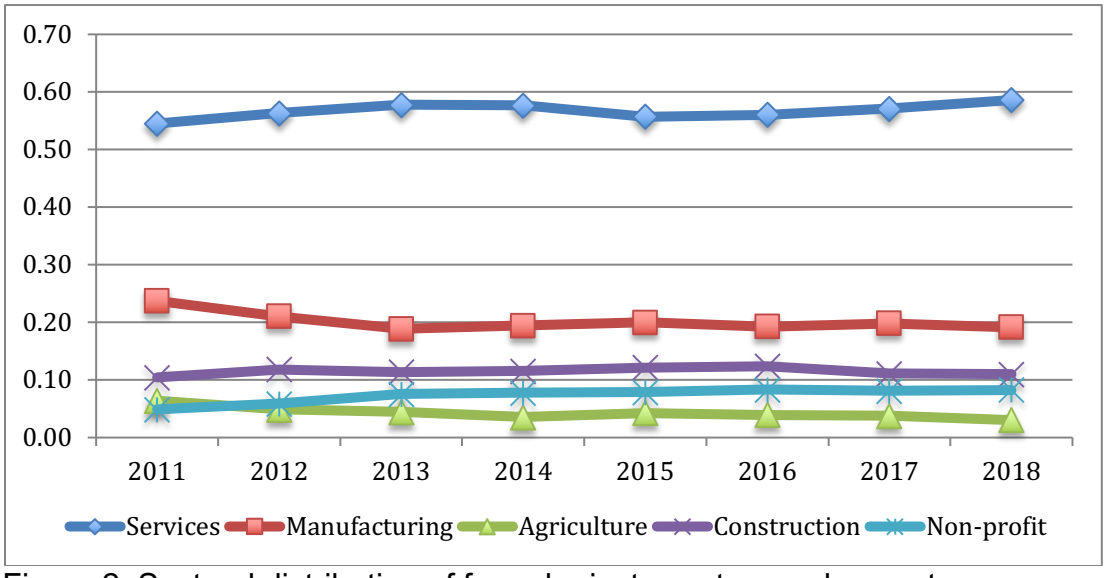

Figure 2: Sectoral distribution of formal private sector employment

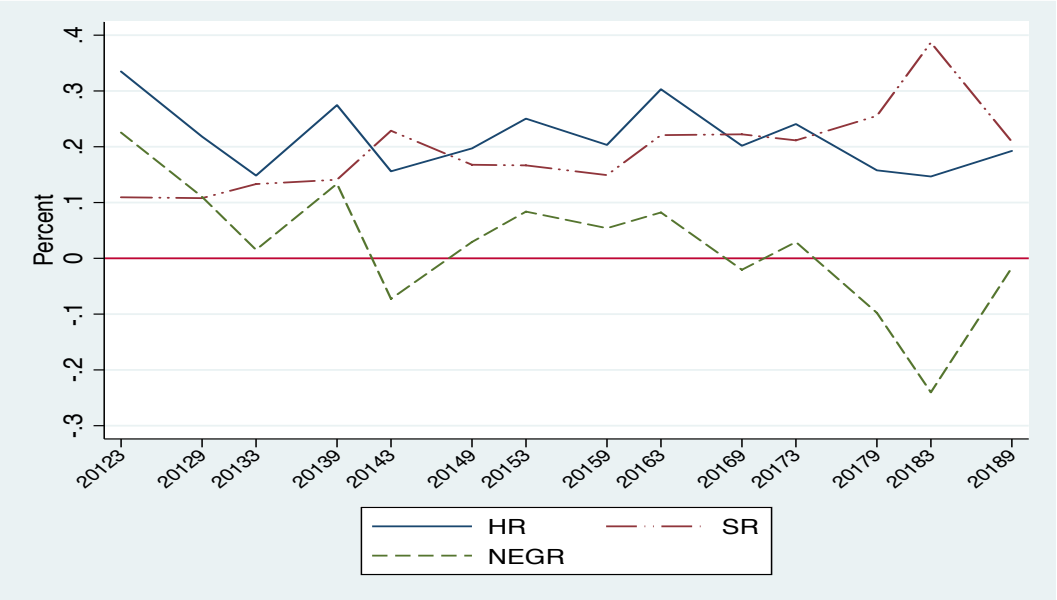


Figure 3: Aggregate Rates of Hiring (HR), Separation (SR) and Net Employment Growth (NEGR).
Note: The horizontal axis shows year and month of observation such that 20123 stands for March 2012 while 20129 stands for September 2012.

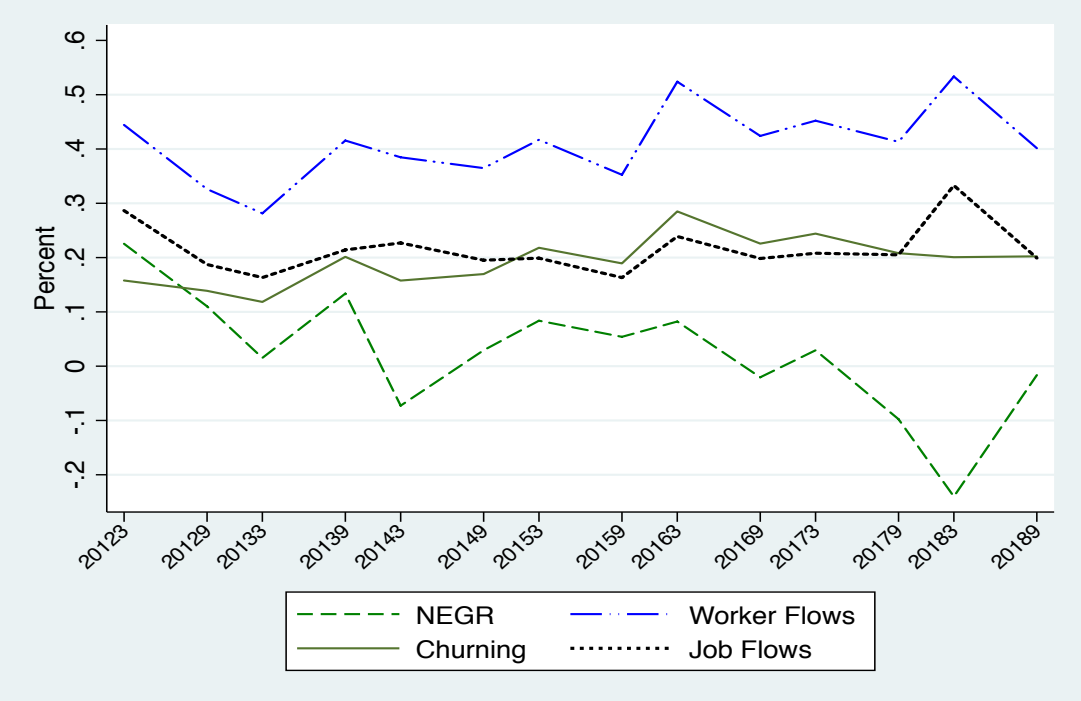


Figure 4: Trends in net employment growth, worker flows, job flows and churning

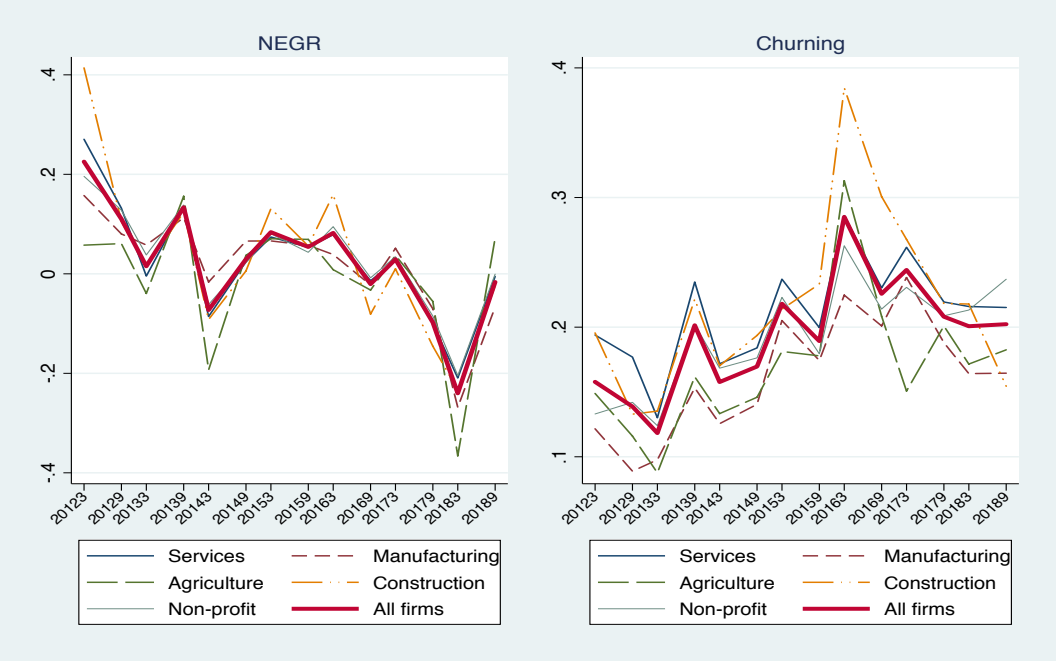


Figure 5: Sectoral trends in net employment growth and churning.

Table 1: Job and Worker Flows in the Formal Private Sector

| | **All Firms** | | **Decomposition by Growth Status** | | |
|---|---|---|---|---|---|
| | Median | Overall | Growing | Contracting | No Change |
| | 1 | 2 | 3 | 4 | 5 |
| HR | 0.1240 | 0.2031 | 0.1606 | 0.0358 | 0.0067 |
| SR | 0.1212 | 0.1795 | 0.0484 | 0.1244 | 0.0067 |
| NEGR | 0.0000 | 0.0236 | 0.1122 | -0.0886 | 0.0000 |
| JCR | 0.0000 | 0.1122 | 0.1122 | 0.0000 | 0.0000 |
| JDR | 0.0000 | 0.0886 | 0.0000 | 0.0886 | 0.0000 |
| JFR | 0.1106 | 0.2008 | 0.1122 | 0.0886 | 0.0000 |
| WFR | 0.3125 | 0.3826 | 0.2090 | 0.1601 | 0.0135 |
| EWFR | 0.1060 | 0.1818 | 0.0968 | 0.0715 | 0.0135 |
| Observations | 182676 | 182676 | 60536 (33.1%) | 62487 (34.2%) | 59653 (32.7%) |

Note: Author's computation based on POESSA data. HR is hiring rate, SR is separation rate, NEGR is net employment growth rate, JCR is job creation rate, JDR is job destruction rate, WFR is worker flow rate and EWTR is excess worker flow rate. For each variable, number in columns 3 to 5 add up to numbers in column 2. The last row shows the number of observations.

Table 2: Job and Worker Flow by Firm Size

| | Base Firm Size | | | | | |
|---|---|---|---|---|---|---|
| | Very Small (1-10) | Small (11-20) | Medium I (21-50) | Medium II (51-100) | Large (>100) | All Firms |
| HR | 0.2672 | 0.2593 | 0.2403 | 0.2261 | 0.1386 | 0.2031 |
| SR | 0.1887 | 0.2138 | 0.2102 | 0.1963 | 0.1462 | 0.1795 |
| NEGR | 0.0785 | 0.0454 | 0.0301 | 0.0298 | -0.0075 | 0.0236 |
| JCR | 0.1702 | 0.1465 | 0.1220 | 0.1220 | 0.0743 | 0.1122 |
| JDR | 0.0918 | 0.1011 | 0.0919 | 0.0922 | 0.0819 | 0.0886 |
| JFR | 0.2620 | 0.2476 | 0.2139 | 0.2142 | 0.1562 | 0.2008 |
| WFR | 0.4560 | 0.4731 | 0.4505 | 0.4224 | 0.2847 | 0.3826 |
| EWFR | 0.1940 | 0.2255 | 0.2366 | 0.2082 | 0.1285 | 0.1818 |
| Observations | 121962 (66.7%) | 25920 (14.2%) | 20437 (11.2%) | 7561 (4.1%) | 6796 (3.7%) | 182676 (100%) |
| Mean Base Employment | 3.3 | 14.5 | 30.9 | 69.5 | 250.6 | 11.7 |
| Employment Share | 19.6% | 11.6% | 17.3% | 13.8% | 37.7% | 100% |

Note: see notes under Table 1. The size classification is based on the number of workers in a firm when it is first observed in the POESSA database.

Table 3: Job and Worker Flows Across Sectors

| | MN | SR | CN | AG | NP | ALL |
|---|---|---|---|---|---|---|
| HR | 0.1800 | 0.2094 | 0.2590 | 0.1729 | 0.2039 | 0.2031 |
| SR | 0.1599 | 0.1830 | 0.2214 | 0.1771 | 0.1731 | 0.1795 |
| NEGR | 0.0201 | 0.0263 | 0.0376 | -0.0043 | 0.0308 | 0.0236 |
| JCR | 0.1031 | 0.1221 | 0.1387 | 0.0985 | 0.1185 | 0.1122 |
| JDR | 0.0830 | 0.0991 | 0.1091 | 0.1017 | 0.0905 | 0.0886 |
| JFR | 0.1861 | 0.2213 | 0.2478 | 0.2002 | 0.2090 | 0.2008 |
| WFR | 0.3399 | 0.3924 | 0.4804 | 0.3500 | 0.3770 | 0.3826 |
| EWFR | 0.1538 | 0.1711 | 0.2326 | 0.1498 | 0.1681 | 0.1818 |
| Observations | 13601 | 90893 | 12766 | 3522 | 51938 | 182676* |

Note: see notes under Table 1. The column heads represent firms in Manufacturing (MN), Services (SR), Construction (CN), Agriculture (AG) and Non-profit (NP) sectors. * About 5.4% of observations have no sector indicators.

Table 4: Net Employment Growth and Churning

| | All Firms | | | Small | Medium | Large | Mean |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Firm Size | -0.6012[a] | -0.6018[a] | -0.5988[a] | -0.6455[a] | -0.7257[a] | -0.3539[a] | 2.7198 |
| | (0.0121) | (0.0121) | (0.0121) | (0.0197) | (0.0611) | (0.0907) | (1.0963) |
| [Firm Size]$^2$ | 0.0338[a] | 0.0341[a] | 0.0340[a] | 0.0339[a] | 0.0418[a] | 0.0006 | 8.5991 |
| | (0.0021) | (0.0021) | (0.0021) | (0.0048) | (0.0085) | (0.0092) | (7.3874) |
| Wage | | 0.0419[a] | 0.0426[a] | 0.0193[b] | 0.0909[a] | 0.0810[a] | -0.2026 |
| | | (0.0064) | (0.0064) | (0.0077) | (0.0133) | (0.0209) | (0.8013) |
| Benefits | | -0.6295[a] | -0.5878[a] | -0.5938[a] | -0.2743[b] | -0.0344 | -2.3234 |
| | | (0.0677) | (0.0662) | (0.0756) | (0.1321) | (0.3677) | (0.1542) |
| Churning | | | -0.0328[a] | -0.0044 | -0.0537[a] | -0.1310[a] | 0.2370 |
| | | | (0.0062) | (0.0066) | (0.0126) | (0.0288) | (0.3013) |
| $R^2$ | 0.2660 | 0.2680 | 0.2685 | 0.3068 | 0.3817 | 0.4149 | |
| *N* | 82,059 | 82,059 | 82,059 | 53,041 | 22,271 | 6,747 | |

Note: The dependent variable is NEGR. Firm size, wage and benefits are measured in logarithms and lagged by six months. Wage measures the deviation of firm-level wage from the sector mean. All specifications include sector- and region-specific trends and an intercept. Standard errors are clustered at the firm level and hence robust to heteroscedasticity and autocorrelation of the equation error terms. Letters a, b and c represent, respectively, statistical significance at the 1%, 5% and 10% level of significance. The last column provides sample means and standard deviations of explanatory variables. Notice that the sample mean for churning is not weighted by firm size.

Table 5: Net Employment Growth and Churning by Sector and Age

| A. Sector | | | | | |
|---|---|---|---|---|---|
| | MN | SR | CN | AG | NP |
| Firm Size | -0.4299[a] | -0.6647[a] | -0.6080[a] | -0.5476[a] | -0.5764[a] |
| | (0.0438) | (0.0173) | (0.0442) | (0.0688) | (0.0212) |
| [Firm Size]$^2$ | 0.0117[b] | 0.0461[a] | 0.0318[a] | 0.0233[b] | 0.0302[a] |
| | (0.0055) | (0.0035) | (0.0065) | (0.0109) | (0.0037) |
| Wage | 0.0427[b] | 0.0446[a] | 0.0514[b] | 0.1534[a] | 0.0286[b] |
| | (0.0200) | (0.0090) | (0.0217) | (0.0378) | (0.0117) |
| Benefits | -.9985[a] | -0.5636[a] | -0.4398 | -0.1251 | -0.4965[a] |
| | (0.2562) | (0.0957) | (0.3120) | (0.5647) | (0.1041) |
| Churning | -0.0817[a] | -0.0375[a] | -0.0324 | -0.0511 | -0.0149 |
| | (0.0269) | (0.0080) | (0.0266) | (0.0520) | (0.0112) |
| $R^2$ | 0.2923 | 0.2710 | 0.2770 | 0.3422 | 0.2664 |
| $N$ | 8,349 | 38,778 | 6216 | 1935 | 26,781 |
| B. Firm Age | | | | | |
| | 1-5 | 6-10 | 11-20 | 21-30 | 31-40 |
| Firm Size | -0.6749[a] | -0.6259[a] | -0.5795[a] | -0.4464[a] | -0.6164[a] |
| | (0.0206) | (0.0342) | (0.0328) | (0.0718) | (0.0856) |
| [Firm Size]$^2$ | 0.0274[a] | 0.0147[b] | 0.0212[a] | 0.0001 | 0.0343[b] |
| | (0.0043) | (0.0067) | (0.0065) | (0.0123) | (0.0161) |
| Wage | 0.0137 | 0.0223 | 0.0327[b] | -0.0216 | 0.0558 |
| | (0.0103) | (0.0159) | (0.0174) | (0.0353) | (0.0560) |
| Benefits | -0.7284[a] | -0.5974[a] | -0.5523[a] | -0.0658 | -0.0653 |
| | (0.0954) | (0.1451) | (0.1705) | (0.3433) | (0.3815) |
| Churning | 0.0150 | -0.0145 | -0.0402[b] | -0.0791[b] | -0.2131[a] |
| | (0.0094) | (0.0139) | (0.0164) | (0.0470) | (0.0742) |
| $R^2$ | 0.3139 | 0.3019 | 0.2758 | 0.3004 | 0.4167 |
| $N$ | 28,701 | 17,142 | 11,818 | 2,611 | 881 |

Note: See notes to Table 4. Letters a, b and c represent, respectively, statistical significance at the 1%, 5% and 10% level of significance

Table 6: Wage Determination by Sector

| | All | MN | SR | CN | AG | NP | Means |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| EXP | 0.0664[a] | 0.0625[a] | 0.0548[a] | -0.0164 | 0.0660[a] | 0.1122[a] | 19.2390 |
| | (0.0089) | (0.0184) | (0.0140) | (0.0183) | (0.0217) | (0.0145) | (10.0189 |
| $EXP^2$ | 0.0003[a] | 0.0003 | 0.0005[a] | 0.0007[a] | -0.0001 | 0.0001 | 470.5170 |
| | (0.0001) | (0.0002) | (0.0001) | (0.0001) | (0.0002) | (0.0001) | (471.1976) |
| Worker-Spell | 0.0234[a] | 0.0318[a] | 0.0307[a] | 0.0253[b] | 0.0097 | 0.0059 | 3.8580 |
| | (0.0050) | (0.0084) | (0.0062) | (0.0100) | (0.0114) | (0.0103) | (2.8580) |
| Firm Size | -0.0674[b] | -0.0718[c] | -0.1759[a] | 0.0115 | 0.0749 | -0.0458[c] | 2.7198 |
| | (0.0266) | (0.0484) | (0.0460) | (0.0411) | (0.0695) | (0.0252) | (1.0963) |
| $[\text{Firm Size}]^2$ | 0.0212[a] | 0.0180[a] | 0.0415[a] | 0.0037 | 0.0049 | 0.0177[a] | 8.5991 |
| | (0.0036) | (0.0057) | (0.0065) | (0.0044) | (0.0072) | (0.0036) | (7.3874) |
| Benefits | -0.1513[a] | -0.1390[b] | -0.2662[a] | 0.0936 | 0.2541 | -0.0830 | -2.3234 |
| | (0.0496) | (0.0696) | (0.0929) | (0.1106) | (0.1748) | (0.0874) | (0.1542) |
| $R^2$ | 0.33 | 0.37 | 0.33 | 0.17 | 0.44 | 0.39 | |
| N | 2,077,923 | 446,768 | 736,235 | 220,724 | 105,151 | 569,045 | |

Note: The dependent variable is logarithm of nominal monthly wage. EXP measures potential experience after age 14. Worker-Spell measures the number of times a worker is observed as an employee of a firm. Benefits stands for average employer contribution rate to pension benefits. Firm Size and Benefits are in logarithms. The column heads represent firms in Manufacturing (MN), Services (SR), Agriculture (AG), Construction (CN) and Non-profit (NP) sectors. Letters a, b and c represent, respectively, statistical significance at the 1%, 5% and 10% level of significance. The last column provides sample means and standard deviations of explanatory variables.

Table 7: Wage Determination by Firm Size

| | All Firms | Small (3-20) | Medium (21-100) | Large (>100) |
|---|---|---|---|---|
| EXP | 0.0664[a] | 0.1599[a] | 0.0406[a] | 0.0352[a] |
| | (0.0089) | (0.0047) | (0.0097) | (0.0106) |
| $EXP^2$ | 0.0003[a] | -0.0006[a] | 0.0004[a] | 0.0004[a] |
| | (0.0001) | (0.0000) | (0.0001) | (0.0001) |
| Worker-Spell | 0.0234[a] | 0.0099[a] | 0.0340[a] | 0.0351[a] |
| | (0.0050) | (0.0019) | (0.0052) | (0.0054) |
| Firm Size | -0.0674[b] | 0.0758[a] | -0.1073 | -0.1961 |
| | (0.0266) | (0.0152) | (0.0873) | (0.1434) |
| $[\text{Firm Size}]^2$ | 0.0212[a] | -0.0016 | 0.0237[a] | 0.0298[b] |
| | (0.0036) | (0.0029) | (0.0081) | (0.0121) |
| Benefits | -0.1513[a] | 0.1022[a] | -0.2395[a] | -0.2736[a] |
| | (0.0496) | (0.0163) | (0.0662) | (0.0779) |
| $R^2$ | 0.33 | 0.51 | 0.28 | 0.26 |
| *N* | 2,077,923 | 668,191 | 1,409,732 | 1,133,630 |

Note: See Note to Table 6.

Table 8: Churning Flows and Worker Turnover Rates

| | All | MN | SR | CN | AG | NP |
|---|---|---|---|---|---|---|
| Panel A: Dependent Variable - Churning | | | | | | |
| Firm Size | 0.1013[a] | 0.0742[a] | 0.1170[a] | 0.1546[a] | 0.0731[c] | 0.0825[a] |
| | (0.0077) | (0.0195) | (0.0125) | (0.0260) | (0.0378) | (0.0138) |
| [Firm Size]$^2$ | -0.0109[a] | -0.0072[a] | -0.0141[a] | -0.0138[a] | -0.0033 | -0.0097[a] |
| | (0.0012) | (0.0025) | (0.0020) | (0.0038) | (0.0055) | (0.0024) |
| Wage | -0.0355[a] | -0.0602[a] | -0.0353[a] | -0.0004 | -0.0071 | -0.0416[a] |
| | (0.0045) | (0.0129) | (0.0069) | (0.0133) | (0.0254) | (0.0077) |
| Benefits | -0.7900[a] | -0.5590[a] | -0.8010[a] | -0.9265[a] | -1.0572[a] | -0.7726[a] |
| | (0.0576) | (0.1573) | (0.0878) | (0.2037) | (0.3735) | (0.0961) |
| NEGR | 0.0306[a] | 0.0399[a] | 0.0203[a] | 0.0730[a] | 0.0576[a] | 0.0234[a] |
| | (0.0037) | (0.0103) | (0.0057) | (0.0117) | (0.0205) | (0.0061) |
| $R^2$ | 0.0382 | 0.0678 | 0.0350 | 0.0764 | 0.0993 | 0.0390 |
| $N$ | 82,059 | 8,349 | 38,778 | 6,216 | 1,935 | 26,781 |
| Panel B: Dependent Variable – Worker Turnover | | | | | | |
| Firm Size | -0.2750[a] | -0.1944[a] | -0.2819[a] | -0.1633[a] | -0.2576[a] | -0.3280[a] |
| | (0.0128) | (0.0441) | (0.0207) | (0.0399) | (0.0627) | (0.0229) |
| [Firm Size]$^2$ | 0.0237[a] | 0.0104[c] | 0.0256[a] | 0.0143[a] | 0.0214[b] | 0.0299[a] |
| | (0.0021) | (0.0059) | (0.0038) | (0.0053) | (0.0088) | (0.0041) |
| Wage | -0.0466[a] | -0.0573[a] | -0.0455[a] | -0.0195 | -0.0240 | -0.0542[a] |
| | (0.0062) | (0.0186) | (0.0092) | (0.0205) | (0.0357) | (0.0099) |
| Benefits | -1.1316[a] | -0.9538[a] | -1.1119[a] | -1.4631[a] | -0.7255 | -1.1386[a] |
| | (0.0670) | (0.2177) | (0.1012) | (0.2395) | (0.5230) | (0.1080) |
| NEGR | -0.0761[a] | -0.0582[a] | -0.0857[a] | -0.0337[a] | -0.0627[b] | -0.0868[a] |
| | (0.0046) | (0.0153) | (0.0067) | (0.0142) | (0.0293) | (0.0080) |
| $R^2$ | 0.0867 | 0.1143 | 0.0815 | 0.0810 | 0.1368 | 0.1030 |
| $N$ | 82,059 | 8,349 | 38,778 | 6,216 | 1,935 | 26,781 |

Note: Firm Size and Benefits are in logarithms. Wage measures the deviation of firm-level wage from the sector mean. NEGR is net employment growth. The column heads represent firms in Manufacturing (MN), Services (SR), Agriculture (AG), Construction (CN) and Non-profit (NP) sectors. Letters a, b and c represent, respectively, statistical significance at the 1%, 5% and 10% level of significance

Table 9: The probability of separation: average marginal effects from a logit model

| | All | MN | SR | CN | AG | NP |
|---|---|---|---|---|---|---|
| Sex | -0.0023 | -0.0041 | -0.0010[i] | -0.0131 | 0.0278 | -0.0161 |
| | (0.0005) | (0.0010) | (0.0008) | (0.0019) | (0.0024) | (0.0009) |
| Wage | -0.0060 | -0.0100 | -0.0063 | -0.0086 | 0.0035[i] | -0.0054 |
| | (0.0004) | (0.0009) | (0.0007) | (0.0011) | (0.0021) | (0.0008) |
| EXP | -0.0036 | -0.0040 | -0.0036 | 0.0007 | -0.0090 | -0.0031 |
| | (0.0001) | (0.0002) | (0.0002) | (0.0003) | (0.0004) | (0.0002) |
| $EXP^2$ | 0.0001 | 0.0001 | 0.0001 | -0.0000[i] | 0.0002 | 0.0000 |
| | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Worker-Spell | -0.0152 | -0.0127 | -0.0159 | -0.0243 | -0.0081 | -0.0133 |
| | (0.0001) | (0.0002) | (0.0002) | (0.0004) | (0.0005) | (0.0002) |
| Firm Size | 0.0244 | 0.0198 | 0.0323 | 0.0744 | -0.0746 | 0.0236 |
| | (0.0008) | (0.0023) | (0.0013) | (0.0028) | (0.0044) | (0.0013) |
| $[\text{Firm Size}]^2$ | -0.0039 | -0.0035 | -0.0050 | -0.0085 | 0.0074 | -0.0036 |
| | (0.0001) | (0.0002) | (0.0001) | (0.0003) | (0.0005) | (0.0001) |
| Firm-Wage | -0.0211 | -0.0364 | -0.0338 | 0.0031 | -0.0478 | -0.0150 |
| | (0.0005) | (0.0011) | (0.0008) | (0.0012) | (0.0029) | (0.0009) |
| Benefits | -0.0937 | -0.0949 | -0.0417 | -0.2117 | -0.3193 | -0.0726 |
| | (0.0057) | (0.0114) | (0.0094) | (0.0186) | (0.0265) | (0.0110) |
| *N* | 2,110,877 | 451,264 | 746,320 | 227,786 | 105,452 | 580,055 |

Note: Sex takes the value of one for female workers and zero for males. Experience measures potential worker experience after age 14. Worker-Spell measures the number of times a worker is observed as an employee of a firm. Wage measures individual wage while Firm-Wage is the deviation of a firm's average wage from the sector average wage. Benefits stands for average employer contribution rate to pension benefits. All coefficients are statistically significant at 5% or better except for those marked with the letter *i*.

## APPENDIX

Table A1: Transition rate between firm-size categories and mean NEGR

| Base Firm Size | Contemporaneous Firm Size | | | | | |
|---|---|---|---|---|---|---|
| | Very Small (1-10) | Small (11-20) | Medium I (21-50) | Medium II (51-100) | Large (>100) | Total |
| | A. Mean Net Employment Growth Rate | | | | | |
| 1-10 | -0.0598 | 0.1313 | 0.1527 | 0.1695 | 0.1673 | 0.0486 |
| 11-20 | -0.3414 | -0.0137 | 0.1144 | 0.1535 | 0.1766 | 0.0196 |
| 21-50 | -0.6661 | -0.2039 | 0.0071 | 0.1047 | 0.1707 | 0.0147 |
| 51-100 | -0.8595 | -0.5447 | -0.1658 | 0.0018 | 0.1165 | 0.0116 |
| >100 | -0.5264 | -0.8878 | -0.5010 | -0.1813 | 0.0156 | -0.0101 |
| Total | -0.1513 | -0.0291 | 0.0097 | 0.0216 | 0.0551 | 0.0116 |
| | B. Transition Probability and Duration | | | | | N |
| 1-10 | *86.5* (6.1) | *9.0* (8.9) | *3.3* (9.9) | *0.8* (10.6) | *0.5* (11.6) | 121962 |
| 11-20 | *34.5* (8.4) | *41.3* (7.9) | *19.4* (9.5) | *3.2* (10.4) | *1.6* (11.9) | 25920 |
| 21-50 | *11.4* (8.5) | *20.9* (9.4) | *52.2* (9.0) | *11.4* (9.8) | *4.2* (11.8) | 20437 |
| 51-100 | *4.2* (9.6) | *5.4* (9.3) | *27.8* (10.3) | *42.3* (10.3) | *20.2* (11.7) | 7561 |
| >100 | *2.1* (10.7) | *1.5* (9.7) | *5.6* (10.6) | *17.3* (11.8) | *73.6* (11.9) | 6796 |
| Total | *64.1* (6.3) | *14.5* (8.5) | *12.1* (9.4) | *4.6* 10.4) | *4.6* (11.9) | 182676 |

Note: Panel A shows weighted sample means of net-hiring rate. The upper number in italics in Panel B are transition probabilities that add up to 100% along a row. The last column in Panel B reports total number of observations in each row. The numbers in parenthesis are the number of times firms in a particular cell are observed on average.

Table A2: Distribution of firm size by sector (%) and average firm size

| Firm Size | MN | SR | CN | AG | NP | All |
|---|---|---|---|---|---|---|
| 1-10 | 43.26 | 73.87 | 62.76 | 63.85 | 63.68 | 67.52 |
| 11-20 | 15.27 | 12.19 | 12.75 | 11.18 | 15.91 | 13.54 |
| 21-50 | 17.37 | 8.74 | 11.94 | 8.85 | 13.06 | 10.91 |
| 51-100 | 9.97 | 2.84 | 5.63 | 4.43 | 4.42 | 4.09 |
| >101 | 14.13 | 2.36 | 6.92 | 11.68 | 2.93 | 3.94 |
| Mean Firm Size | 57.80 | 15.20 | 33.0 | 44.50 | 20.2 | 21.8 |
| Observations | 16413 | 116912 | 16772 | 4382 | 64643 | 219122 |

Note: The numbers add to 100% within each sector across firm size categories.
N is the number of observations.

Table A3: Distribution of Net Employment Growth by Firm Size and Status of Labor Market Conditions

| | Fraction of Firms (%) | | | | Mean NEGR (%) | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | Growing | Contracting | Zero | N | Positive | Negative | Total |
| | A. Very Small (<20) | | | | | | |
| 2012-13 | 62.45 | 10.53 | 27.02 | 46,672 | 53.26 | -34.09 | 18.66 |
| 2014-15 | 42.52 | 22.21 | 35.27 | 55,266 | 38.75 | -36.16 | 5.18 |
| 2016-18 | 40.47 | 27.26 | 32.27 | 61,158 | 30.22 | -34.32 | -0.24 |
| Total | 47.45 | 20.76 | 31.79 | 163,096 | 37.03 | -34.80 | 4.70 |
| | B. Small (21-50) | | | | | | |
| 2012-13 | 64.62 | 22.63 | 12.75 | 9,163 | 39.50 | -23.97 | 13.18 |
| 2014-15 | 41.64 | 42.22 | 16.13 | 9,836 | 29.46 | -29.12 | 1.45 |
| 2016-18 | 43.37 | 44.14 | 12.49 | 12,140 | 26.26 | -31.01 | -2.57 |
| Total | 49.08 | 37.21 | 13.72 | 31,139 | 30.22 | -29.42 | 1.87 |
| | C. Medium I (51-100) | | | | | | |
| 2012-13 | 66.31 | 25.95 | 7.74 | 6,948 | 30.80 | -18.76 | 11.33 |
| 2014-15 | 43.32 | 45.23 | 11.44 | 7,176 | 22.14 | -23.23 | 0.63 |
| 2016-18 | 42.36 | 49.10 | 8.53 | 9,877 | 23.74 | -27.32 | -2.57 |
| Total | 49.58 | 41.24 | 9.17 | 24,001 | 25.12 | -24.74 | 1.42 |
| | D. Medium II (>100) | | | | | | |
| 2012-13 | 66.18 | 26.81 | 7.01 | 2,510 | 32.56 | -16.82 | 12.73 |
| 2014-15 | 45.46 | 44.82 | 9.72 | 2,499 | 20.87 | -21.37 | 2.17 |
| 2016-18 | 38.63 | 55.34 | 6.04 | 3,645 | 22.88 | -26.27 | -5.38 |
| Total | 48.59 | 44.03 | 7.38 | 8,654 | 25.07 | -23.45 | 1.15 |
| | E. Large | | | | | | |
| 2012-13 | 63.00 | 20.58 | 16.42 | 2,284 | 21.85 | -15.40 | 7.49 |
| 2014-15 | 43.24 | 42.50 | 14.26 | 2,174 | 15.96 | -17.10 | 1.23 |
| 2016-18 | 31.14 | 61.08 | 7.78 | 3,173 | 18.49 | -22.57 | -8.36 |
| Total | 44.12 | 43.66 | 12.21 | 7,631 | 18.85 | -20.23 | -1.02 |

Table A4: Worker and Job Flows and the Share of Churning

| | HR | SR | WFR | JFR | EWFR/WFR |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Firm Size | -0.4263 | 0.1540 | -0.2723 | -0.3745 | 0.2727 |
| | (0.0100) | (0.0076) | (0.0128) | (0.0115) | (0.0103) |
| [Firm Size]$^2$ | 0.0266 | -0.0032 | 0.0234 | 0.0344 | -0.0245 |
| | (0.0016) | (0.0014) | (0.0021) | (0.0020) | (0.0017) |
| Wage | 0.0010 | -0.0550 | -0.0541 | -0.0170 | -0.0302 |
| | (0.0046) | (0.0045) | (0.0063) | (0.0050) | (0.0060) |
| Benefits | -0.6421 | -0.5024 | -1.1445 | -0.3695 | -0.4004 |
| | (0.0515) | (0.0398) | (0.0662) | (0.0539) | (0.0708) |
| NEGR | -0.1506 | 0.0720 | -0.0786 | -0.1079 | 0.0714 |
| | (0.0037) | (0.0032) | (0.0046) | (0.0038) | (0.0043) |
| Intercept | -0.4120 | -1.2243 | -1.6363 | 0.1207 | -0.9576 |
| | (0.1446) | (0.1154) | (0.1884) | (0.1521) | (0.1977) |
| $R^2$ | 0.26 | 0.15 | 0.09 | 0.13 | 0.04 |
| $N$ | 82,059 | 82,059 | 82,059 | 82,059 | 71,870 |

Note: Firm Size and Benefits are in logarithms. Wage measures the deviation of firm-level wage from the sector mean. NEGR is net employment growth. The column heads represent Hiring Rate (HR), Separation Rate (SR), Worker Flow Rate (FWR), Job Flow Rate (JFR) and the share of churning in turnover (EWFR/WFR).

Table A5: Net Employment Growth Rate and Churning Across Regional States

| | Net Employment Growth Rate | | | | Churning Rate | | | |
|---|---|---|---|---|---|---|---|---|
| | 2012-2013 | 2014-2015 | 2016-2018 | Total | 2012-2013 | 2014-2015 | 2016-2018 | Total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Addis Ababa | 0.1175 | 0.0278 | -0.0712 | 0.0040 | 0.1362 | 0.1651 | 0.2058 | 0.1768 |
| Dire Dawa | 0.0626 | -0.0027 | -0.0183 | 0.0082 | 0.1626 | 0.2155 | 0.2157 | 0.2007 |
| Oromiya | 0.0711 | 0.0013 | -0.0264 | 0.0090 | 0.1961 | 0.2098 | 0.2517 | 0.2239 |
| Harar | 0.0456 | 0.0425 | -0.0368 | 0.0112 | 0.0649 | 0.1730 | 0.1666 | 0.1310 |
| Benishangul-Gumuz | 0.0802 | 0.0475 | -0.0242 | 0.0132 | 0.1699 | 0.1835 | 0.2604 | 0.2240 |
| Afar | 0.1519 | -0.1099 | 0.0463 | 0.0202 | 0.2965 | 0.3076 | 0.3103 | 0.3072 |
| Amhara | 0.0939 | 0.0101 | 0.0080 | 0.0240 | 0.2052 | 0.2372 | 0.3287 | 0.2831 |
| SNNPR | 0.0954 | 0.0193 | -0.0122 | 0.0249 | 0.1658 | 0.1949 | 0.2454 | 0.2104 |
| Gambela | 0.0791 | 0.0818 | 0.0008 | 0.0413 | 0.2593 | 0.2596 | 0.3031 | 0.2810 |
| Tigray | 0.1869 | 0.0009 | 0.0327 | 0.0565 | 0.1808 | 0.2186 | 0.2152 | 0.2089 |
| Somali | 0.2110 | -0.0641 | 0.0688 | 0.0653 | 0.1660 | 0.1960 | 0.1821 | 0.1822 |
| Total | 0.1094 | 0.0206 | -0.0447 | 0.0236 | 0.1540 | 0.1827 | 0.2296 | 0.1818 |

Table A6: Cross-region distribution of firms and employment by sector

| Region | Manufacturing | Services | Agriculture | Construct | Non-profit | Total |
|---|---|---|---|---|---|---|
| A. Distribution of firms | | | | | | |
| Addis Ababa | 0.5421 | 0.4442 | 0.1148 | 0.5835 | 0.3786 | 0.4362 |
| Amhara | 0.0731 | 0.2277 | 0.1979 | 0.1824 | 0.1887 | 0.2005 |
| Oromiya | 0.1197 | 0.0960 | 0.2161 | 0.0814 | 0.1885 | 0.1263 |
| SNNPR | 0.0699 | 0.1367 | 0.1435 | 0.0712 | 0.1028 | 0.1168 |
| Tigray | 0.1306 | 0.0534 | 0.2403 | 0.0498 | 0.0623 | 0.0653 |
| Dire Dawa | 0.0423 | 0.0202 | 0.0062 | 0.0086 | 0.0227 | 0.0214 |
| Benishangul-Gumuz | 0.0031 | 0.0096 | 0.0707 | 0.0117 | 0.0291 | 0.0163 |
| Somali | 0.0052 | 0.0039 | 0.0009 | 0.0037 | 0.0102 | 0.0058 |
| Harar | 0.0101 | 0.0031 | 0.0000 | 0.0031 | 0.0097 | 0.0055 |
| Afar | 0.0038 | 0.0039 | 0.0078 | 0.0044 | 0.0044 | 0.0041 |
| Gambella | 0.0000 | 0.0015 | 0.0018 | 0.0003 | 0.0030 | 0.0018 |
| B. Distribution of employment | | | | | | |
| Addis Ababa | 0.6435 | 0.6521 | 0.1461 | 0.6184 | 0.5926 | 0.6096 |
| Amhara | 0.0562 | 0.1206 | 0.1412 | 0.1567 | 0.1013 | 0.1076 |
| Oromiya | 0.1180 | 0.0759 | 0.3695 | 0.0479 | 0.1258 | 0.1067 |
| SNNPR | 0.0704 | 0.0801 | 0.2492 | 0.1100 | 0.0767 | 0.0876 |
| Tigray | 0.0685 | 0.0344 | 0.0725 | 0.0409 | 0.0548 | 0.0491 |
| Dire Dawa | 0.0334 | 0.0242 | 0.0032 | 0.0035 | 0.0192 | 0.0214 |
| Benishangul-Gumuz | 0.0027 | 0.0046 | 0.0092 | 0.0113 | 0.0084 | 0.0062 |
| Somali | 0.0004 | 0.0019 | 0.0002 | 0.0044 | 0.0093 | 0.0039 |
| Harar | 0.0050 | 0.0020 | 0.0000 | 0.0020 | 0.0064 | 0.0037 |
| Afar | 0.0018 | 0.0030 | 0.0089 | 0.0047 | 0.0023 | 0.0030 |
| Gambella | 0.0000 | 0.0012 | 0.0002 | 0.0001 | 0.0034 | 0.0014 |

Note: Number add up to 100% within each column. The numbers refer to averages over the sample period, i.e. September 2011 to September 2018. Regional states are ranked by their share in the total number of firms in Panel A and by share in total employment in Panel B.

The International Growth Centre (IGC) aims to promote sustainable growth in developing countries by providing demand-led policy advice based on frontier research.

Find out more about
our work on our website
www.theigc.org

For media or communications
enquiries, please contact
mail@theigc.org

Subscribe to our newsletter and
topic updates
www.theigc.org/newsletter -signup

Follow us on Twitter
@the_igc

Contact us
International Growth Centre,
London School of Economic
and Political Science, Houghton
Street, London WC2A 2AE

IGC
International
Growth Centre

DIRECTED BY
LSE
UNIVERSITY OF OXFORD

FUNDED BY
UKaid
from the British people

Designed by soapbox.co.uk