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The Dynamics of Job Creation and Job Destruction in an African Economy: Evidence from Ethiopia†

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Abstract

A growing share of manufacturing in GDP and in employment is a common feature observed in successful developing countries. Manufacturing, however, has not been a major source of employment in Ethiopia and in other Sub-Saharan African countries. This paper relies on a unique census-based panel data covering the period 1996–2007 to analyse the micro-dynamics of aggregate employment changes. The analysis shows that the weak employment performance of Ethiopian manufacturing is not due to limited job creation but a consequence of simultaneous offsetting processes of job creation and destruction. We find strong evidence of intra-industry job mobility and attribute a substantial proportion of job creation and destruction to firm entry and exit. However, jobs created by small firms tend to be transitory and there has been a re-allocation of jobs from small to larger firms during periods of faster aggregate net employment growth. Overall,

†We would like to thank seminar participants at the World Bank, EUDN, University of Goettingen, University of Utrecht, and participants at the Fifth IZA/World Bank Conference on 'Employment and Development' (South Africa, 2010) and especially, an associate editor and three reviewers for their comments. AS is grateful for financial support from the German Research Foundation (DFG).

the evidence suggests that employment growth and job re-allocation are not necessarily restrained by labour laws and regulations.

JEL classification: J21, J23, O14

1. Introduction

A growing share of manufacturing in GDP and in employment is a common feature observed in successful developing countries. Manufacturing, however, has not been a major source of gainful employment for the African labour force. The sector accounts for less than 10% of total employment in the region except for the island economy of Mauritius, where it accounts for about 25%.[1] From a macroeconomic perspective, among others, the lack of growth in manufacturing has been attributed to the low rates of investment (Collier and Gunning, 1999), low level of domestic demand for manufactures in Sub-Saharan Africa and the lack of export orientation of its manufacturing sector. Notwithstanding the relative merits of the various aggregate-level explanations, the micro-dynamics underlying the lackluster aggregate employment performance of African manufacturing and whether or not the underlying firm-level processes of job creation and job destruction, which shape aggregate employment outcomes, are different from the rest of the world is not yet known.

Recent micro-level studies indicate that the behaviour of African manufacturing firms is not very different from their counterparts in other developing and advanced economies despite the fact that African manufacturing is still at an incipient stage. For instance, small firms in African manufacturing grow faster than large firms (Gunning and Mengistae, 2001; Van Biesebroeck, 2005; Bigsten and Gebreeyesus, 2007), while relatively efficient firms stand better chances of survival just as in other parts of the world (Frazer, 2005;

[1] This is far less than the nearly 30% share of manufacturing in total employment in East Asia, and the approximately 20% share in developed countries (ILO, 2009). In Ethiopia, Denu *et al.* (2005) note that, in 1999, manufacturing employment accounted for 4.45% of total employment, and in 2005 (ILO, 2009) the figure was marginally higher (4.8%). This figure includes employment in small-scale and cottage/handicraft manufacturing establishments. According to the Central Statistical Agency (CSA) of Ethiopia, 'small scale' refers to firms with less than ten workers which use power-driven machinery, while cottage/handicraft refers to firms with less than ten workers but which do not use power-driven machinery. Employment in firms hiring ten or more workers, as shown in Figure 1, has risen from about 80,000 workers in 1996 to about 115,000 workers in 2007. While the absolute figures suggest strong employment growth, in terms of the share of total manufacturing employment the increases are marginal, accounting for 7.3% of total manufacturing employment in 1999 and about 7.5% in 2007 (see Denu *et al.*, 2005; ILO, 2009).

Söderbom *et al.*, 2006; Shiferaw, 2007, 2009a). While some of these studies (Gunning and Mengistae, 2001; Van Biesebroeck, 2005; Bigsten and Gebreeyesus, 2007) have examined age and size effects on firm-level net employment growth, they have not examined the magnitude and nature of gross job flows, i.e., job creation, job destruction and job re-allocation—which underlie aggregate net employment growth.

As reviewed in some more detail in the next section, the growing body of firm-level analyses of gross job flows in manufacturing yields some clear stylised facts. For example, in the context of developed countries, Davis and Haltiwanger (1992) and Baldwin *et al.* (1998) show that there are high rates of job creation and destruction, in excess of 10% a year even within narrowly defined industries, reflecting the simultaneous creation and destruction of jobs and the substantial firm-level heterogeneity in employment. Firm-level employment adjustments are mostly persistent rather than transitory, and adjustment rates tend to be higher among smaller and younger firms compared with larger and older firms. Especially in the case of developed countries, job destruction is more volatile than job creation, which implies that the reshuffling of jobs across firms is counter-cyclical. Researchers have also associated gross job flows with firm demographics to show the relative contributions of the birth, expansion, contraction and death of firms. The growing number of firm-level studies for different countries and the cross-country variation in the rate of job flows observed in these studies serve as an indicator of the degree of labour market flexibility and the efficiency of resource allocation. While Haltiwanger *et al.* (2008) provide the most recent cross-country analysis of job flows using harmonised firm-level data for sixteen countries, no African country features in their sample. A recent exception to the lack of studies on Sub-Saharan Africa is Klapper and Richmond (2011), who use firm-level data from Cote d'Ivoire to analyse job creation and destruction rates. However, their analysis does not examine variation in job flows across industries, firm size and business cycles.

The current paper contributes to this literature by providing a detailed analysis of job flows in the context of Sub-Saharan Africa using establishment-level panel data from Ethiopia. Despite country specificities, Sub-Saharan African economies share some common features that make the Ethiopian case useful from a regional perspective. In particular, barring a few exceptions (Mauritius, South Africa), the share of manufacturing in total employment is typically in the single digits (ILO, 2009). Across the region, light manufacturing activities dominate with the largest employment shares contributed by agricultural processing and the garment and textile industry. The countries in the region share similar advantages—low-labour

costs and access to raw materials, and similar disadvantages—labour market restrictions, lack of credit and an inability to enter export markets. Indeed, in a recent book on light manufacturing which deals with three countries in Africa, the authors (Dinh *et al.*, 2012) argue that 'there are enough common factors to make Ethiopia a good exemplar for a large group of Sub-Saharan African countries' (p. 5).[2]

This paper offers a rare description of job flows for Ethiopia and arguably for the region. Such a description is clearly the first step needed to understand aggregate net employment growth, a crucial policy concern. The analysis is motivated by two inter-related questions. First, is the lackluster aggregate employment performance of Ethiopian manufacturing a result of limited job creation or is it the result of simultaneous processes of job destruction and job creation offsetting each other? Second, after years of economic liberalisation, do Ethiopian labour markets appear to be flexible enough to smoothly accommodate labour re-allocations?

These questions cannot be answered by examining net employment change at higher levels of aggregation, as a given net employment growth rate (NEGR) could be consistent with any underlying rates of job creation and destruction. To address these questions, this paper relies on a unique census-based establishment-level panel data covering the period 1996–2007 and is structured around an exploration of three issues: (i) What are the patterns of job creation and job destruction over time? (ii) By exploiting the relatively long span of the data and the distinct business cycles that it captures, we examine whether observed patterns of job creation and job destruction are primarily driven by business cycles or by technological factors and employer-specific characteristics. (iii) What are the patterns of job creation across industries and what is the role of various firm characteristics—demographics, size and production technology—in determining job flows.

To preview some of our results, we find that the small contribution of manufacturing to overall employment masks high rates of job creation and job destruction at the firm level. The high job churning rate (24%) accompanying the 4% annual average net employment growth reflects the dynamism and flexibility of producers in the sector. Job creation rates are about 10% during slack periods and are higher (18%) during the upswing in the

[2] Moreover, based on the World Bank's Doing Business Report (2009), the country is ranked ninety-fourth out of 183 countries in terms of the ease of hiring and firing workers. Among the approximately forty countries in Sub-Saharan Africa for which the report contains data, Ethiopia may be ranked fifteenth out of forty.

business cycle. Thus, job re-allocation across firms is pro-cyclical, unlike patterns observed in developed countries, and suggests that firms are not as hesitant about creating jobs during an upswing as they might be in an environment with high costs of worker-layoff. Firm entry accounts for between 50 and 55% of new manufacturing jobs, while post-entry employment expansion is rather weak. However, job creation tends to be transitory, with small firms more likely to exit the market after 5 years than they are to graduate to larger firm size categories. As a consequence, we find that over time, there is a re-allocation of labour in favour of larger and more capital-intensive firms. Overall, it does not seem that Ethiopian labour markets are affected by excessive labour regulations.

The remainder of this paper is organised as follows. The next section reviews the literature on job flows and highlights key stylised facts. Section 3 provides a description of the data and briefly discusses the business environment and Ethiopia's manufacturing sector. Section 4 introduces the measurement framework. Section 5 provides a temporal and cross-industry analysis of variations in job flows and decomposes job flows along various dimensions. An econometric analysis of job flows using industry-level characteristics is provided in Section 6, while Section 7 contains concluding remarks.

2. Job flows: a review

Firm heterogeneity in employment is a prominent feature of gross job flows in developed and emerging economies. Firms producing similar products experience a simultaneous process of job creation and destruction and exhibit large variations in the rates of job creation and destruction. For instance, during the 1970s and 1980s, new jobs were created at the rate of 10% per annum in the manufacturing sectors of the USA and Canada, while job destruction occurred simultaneously at a comparable rate. In a recent paper, Haltiwanger *et al.* (2008) study job flows in sixteen developed and emerging economies using harmonised firm-level data sets from the 1990s. Their work goes beyond the results obtained from a number of country-specific studies and provides interesting insights into the distribution of job flows across countries. They find job creation rates of about 12.7, 14.8 and 17.4% for OECD, Latin American and transition economies, respectively, with corresponding job destruction rates of 12.7, 14 and 12.8%. When economic reforms began in transition economies in the early 1990s, job destruction rates were much higher than job creation rates before coming closer to that

of OECD countries in the late 1990s (Faggio and Konings, 2003). Klapper and Richmond (2011) provide the only evidence from a Sub-Saharan African country and report a job creation rate of 14.7% in Cote d'Ivoire during the period 1976–97, of which 8% is due to firm entry. They also find a job destruction rate of 15.3%, of which 8.3% is due to contraction of incumbents.

In terms of patterns across industries, Haltiwanger *et al.* (2008) find a positive rank correlation of job re-allocation rates (the sum of job destruction and job creation rates) across industries in their sample of sixteen countries, suggesting that some industries have above-average job re-allocation rate across all countries. More specifically, Baldwin *et al.* (1998) show that industry job-flow patterns are very similar across the USA and Canada and that sectors which have a high job re-allocation rate in Canada also have a high job re-allocation rate in the USA (a correlation of 0.83). These patterns suggest that there may be common industry-level characteristics such as technology, cost and demand factors that drive job re-allocation patterns across different countries. Other noteworthy observations include the fact that the overwhelming fraction of job re-allocation occurs within industries rather than across industries and that firm decisions to create and destroy jobs tend to be persistent, reflecting adjustments towards desired firm size rather than temporary layoffs and rehires (Davis and Haltiwanger, 1990, 1992).[3]

In addition to these basic patterns, an interesting aspect of the literature is the cyclical nature of job re-allocation across producers. In developed countries, job re-allocation is counter-cyclical, that is, it intensifies during recessions or periods of net employment loss. Baldwin *et al.* (1998) show that net employment growth in the manufacturing sectors of the USA and Canada is accompanied by a reduction in job destruction rate without significant improvement in job creation. Similarly, net employment loss at the aggregate level is mainly associated with a rapid increase in job destruction, with only a slight decrease in job creation. In other words, the variance of job destruction is higher than that of job creation, leading to the counter-cyclical movement of job re-allocation. Campbell and Fisher (2000) argue that this is partly because of asymmetric adjustment costs. Job creation involves not only the actual adjustment cost of hiring new workers but also the expected

[3] For instance, Baldwin *et al.* (1998) find that across time only 2–4% of excess job re-allocation in Canada and the USA may be attributed to shifts across industries. Davis and Haltiwanger (1992) report that the average 1-year persistence rates for annual job creation and destruction lie between 68 and 81%.

cost of future separations, making job creation less responsive to business cycles than job destruction.[4]

Turning to correlates of firm heterogeneity in job flows, various authors have examined the role of firm size and age, and technological characteristics such as industrial affiliation and capital intensity. In general, job creation and destruction rates decline with firm size and age, although at the aggregate level the bulk of (or size-weighted) gross job flows is accounted for by larger and older firms (Davis and Haltiwanger, 1990, 1992; Haltiwanger *et al.*, 2008). Similarly, explicit decomposition analyses of firm demographics and job flows have shown that during the 1970s and 1980s, new establishments accounted for 20% of job creation in US manufacturing, while firm closures accounted for 25% of job destruction (Davis and Haltiwanger, 1990). The bulk of labour adjustment, therefore, takes place among continuing firms. Comparable measurements are not available for transition economies as the existing firm-level data for these countries do not capture firm entry and exit.

With the availability of data on job flows from a growing number of countries, the cross-country variation in job re-allocation across firms has become an important indicator of labour market flexibility. In this regard, the experience of developed countries, particularly the USA, serves as a benchmark to gauge the efficiency of labour allocation in emerging economies. Haltiwanger *et al.* (2008) show that while a larger share (close to 60%) of the cross-country variation in job flows can be explained by industry and firm size effects (the firm size effect being dominant), a significant part is linked to differences in labour market regulations across countries. Thus, countries with restrictive labour laws exhibit relatively less re-allocation of jobs across firms, the effect being stronger in those industries with inherently high job re-allocation rates.

3. Data and background

3.1 Data

This paper uses establishment-level panel data from Ethiopian manufacturing covering the period 1996–2007.[5] The data come from the annual

[4] The counter-cyclical nature of job re-allocation is not universal. Even for the USA, the counter-cyclical pattern is observed mainly among larger and older firms, while firms in transition economies, where average firm size is smaller compared with the USA, exhibit pro-cyclical movements in job re-allocation (Haltiwanger *et al.*, 2008).

[5] The terms 'establishment' and 'firm' are used synonymously. Most firms have only a single plant.

manufacturing census carried out by the CSA of Ethiopia. The census covers all establishments that employ at least ten workers.[6] Each year, the statistics office updates the list of firms based on business registers of the Federal Ministry of Trade and Industry, and the corresponding bureaus of regional states which are authorised to issue business licences for trade and industry. Enumerators are then sent to the physical addresses of the establishments to fill out the questionnaire. The law requires all establishments to comply with the CSA's request for data. The same data collection procedure has been followed throughout the sample period and the scope is comprehensive in terms of covering all manufacturing activities, except the arms industry, throughout the country. If enumerators are not able to find an establishment for three survey rounds, then it is considered an exiting firm.[7]

The unbalanced panel data used in this paper is constructed using unique identification numbers assigned to each establishment by the CSA. The number of establishments increases from 623 in 1996 to 1,339 in 2007 and contains a total of 10,305 observations (establishment-years). About two-thirds of the manufacturing establishments are located in and around the capital city, Addis Ababa, and about 70% are producers with less than fifty employees. Distribution of firms across industries and average firm entry and exit rates are provided in Table 1.

Owing to the cut-off point used by the statistics office, this paper does not address the employment behaviour of establishments with less than ten workers. This clearly hampers international comparisons and tends to preclude a comprehensive assessment of employment dynamics.[8] The main

[6] The number of workers refers to employees who are on the payroll of the firm at the time the data were collected. This includes temporary and permanent workers. The CSA converts part-time workers to full-time equivalents. Family workers who are not on the firm payroll are not included in the worker count.

[7] Discussions with CSA employees indicate that location changes are extremely rare for firms with more than ten employees, suggesting that firm re-location does not play an important role in determining firm exit from the census.

[8] In addition to the annual data we are using in this paper, the CSA carries out the Small Scale Manufacturing Industries Survey in a less regular fashion (for 2002, 2005 and 2007) for firms that employ less than ten workers and use power-driven machinery. The data are pooled cross-sections and, therefore, not suitable for the analytical approaches used in this paper. Moreover, data from these surveys show that manufacturing establishments with less than ten workers are distributed evenly across Ethiopia compared with firms above the cut-off point which are highly concentrated in Addis Ababa. This distinct geographic distribution reflects the localised nature of the markets served by small and micro-enterprises unlike formal firms in our sample which have a relatively broader scope. Average size of firms below the cut-off point was 2.75 workers in 2007 with a total of 113.3 thousand workers,

Table 1: Number of Firms, Entry and Exit Rates by Industry

	Number of firms		Average firm entry rate (%)		Average firm exit rate (%)	
	1996	2007	1997–2001	2002–07	1997–2001	2002–07
Non-metal	83	275	22.3	36.2	22.5	23.4
Wood and furniture	101	236	27.5	33.6	24.5	28.0
Food and beverage	153	337	25.5	28.6	20.3	23.3
Metal and machinery	67	116	28.4	28.0	27.4	21.8
Chemical and plastic	51	128	15.3	19.6	11.6	9.8
Leather and footwear	63	72	16.1	17.1	19.1	12.6
Printing and paper	43	93	19.2	16.5	16.4	8.4
Textile and garments	62	82	14.6	14.4	15.2	9.6
Manufacturing total	623	1,339	21.1	24.2	19.6	17.1

Source: Authors' computation based on CSA data.
Note: Entry and exit rates are annual averages. Industries are ordered by average entry rate during 2002–07.

challenge is that, given the employment cut-off, exiting from or entering the data set cannot be construed as pure firm closure or firm start up, respectively. Owing to the cut-off, it is not possible to differentiate between firms that slip below the ten worker threshold and complete firm closure. Similarly, firm entry could be the result of new establishments or existing establishments growing into the firm size covered by the census. Thus, treating firm entry and exit as firm start-up and closure is likely to lead to an overestimate of job destruction and job creation rates.[9]

To provide an assessment of the effects of this data limitation on our estimates and to enhance international comparisons, we conduct our analysis based on two different assumptions. First, we treat all firms that are observed for the first time in the panel as firm births and all firms disappearing from our sample as firm deaths. This provides an upper bound of job creation and

of which only 32% percent are in paid employment (CSA, 2007). This contrasts vastly with our sample, where the average firm size in 2007 was ninety-three workers, all with paid jobs. In total, firms with more than ten employees account for 72% of all paid jobs in modern manufacturing in Ethiopia. The differences in size and location distributions of these two groups of producers suggest that it is better to analyse them separately rather than pooling them together.

[9] This problem is common to other firm-level studies (e.g., Bigsten and Gebreeyesus, 2007; Haltiwanger *et al.*'s 2008 data sets from Chile and Colombia), which use data with similar cut-off points.

job destruction rates. Second, we treat all firms that are observed for the first time in our sample as existing firms which employed nine workers prior to appearing in the survey and all firms that exit from our sample as slipping just below the cut-off point. This provides a lower bound estimate of job creation and job destruction rates. In addition, we also provide estimates based on the mean of the upper and lower bounds, which is likely to be a more plausible, albeit, one of the many possible outcomes.[10]

3.2 Background

In 1992, after 17 years of socialism and military dictatorship, Ethiopia launched a comprehensive set of economic reforms marking the country's transition to a market-based economy. Shortly after the launch of policy reforms, the transitional government also introduced a growth strategy dubbed Agriculture Development Led Industrialization (ADLI). This strategy gave priority to revamping the productivity of the agricultural sector, which in turn would contribute to a rapid expansion of the industrial sector.

The first few years after the launch of reforms saw the opening up of the economy to international trade and witnessed greater participation of the private sector (Shiferaw, 2009a). Except for a rise in inflationary pressure since 2005, macroeconomic conditions have been stable and the government continues to spend aggressively on physical infrastructure.[11] The economy grew at a respectable average annual rate of 5.6% during the 1990s and has continued to grow at even higher rates (average annual rate of about 8%) since the turn of the century.

The business environment has also witnessed substantial improvements. According to the World Bank's 'Doing Business' Report (2009), it takes seven procedures to start a new business in Ethiopia compared with the African average of ten procedures. The time taken to go through these procedures has declined from about 44 days in 2003 to 16 days in 2009, which is again far less than the 2009 regional average of about 45 days. However, other aspects of the business climate are not so favourable. The legal system remains unreliable and it takes an average of 690 days to enforce contracts and the country is ranked very low (below 100) in terms of protecting

[10] We would like to thank an anonymous referee for suggesting this approach to us.

[11] Between 2002 and 2007, the Ethiopian government's capital expenditure increased from 31.8 to 51.8% of total government expenditure within which the share of economic development projects (such as roads, bridges and dams) increased from 20% in 2002 to 32% in 2007. The remainder is spent on social development projects and multi-sector development projects (IMF, 2008).

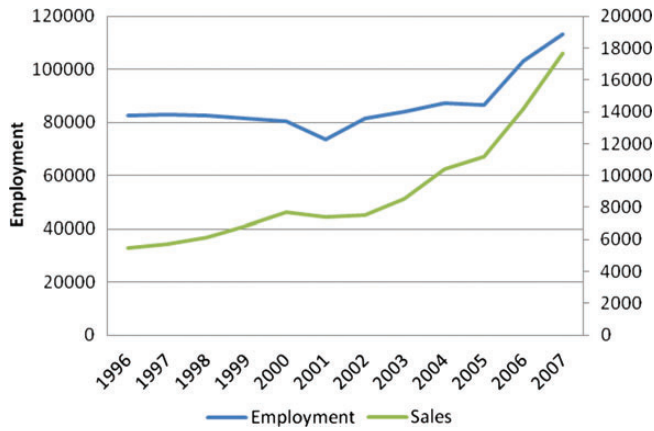

Figure 1: Manufacturing Employment and Sales in Ethiopia. Notes: Right-hand-side *y*-axis: real sales in 1996 prices and in millions of Ethiopian Birr; left-hand-side *y*-axis: the number of full-time-equivalent employees in the manufacturing sector. Figures are based on firms that employ more than ten workers. Source: Based on CSA's manufacturing census.

investors and registering property. Although labour laws have been adjusted twice (in 1993 and 2003) to give employers more flexibility in managing their workforce, the country is ranked ninety-four in the world in terms of the ease of hiring and firing workers.

Unsurprisingly, the Ethiopian manufacturing sector is dominated by light consumer goods industries. About 60% of total manufacturing employment in our data set is in the textile and garments (36%) and food and beverage (24%) industries. These two industries also account for about 50% of total manufacturing sales. In terms of temporal patterns, Figure 1 plots manufacturing employment and real sales in Ethiopia between 1996 and 2007 using CSA data for firms that employ at least ten workers. The figure reveals very little change in employment during the first 6 years of the sample period culminating with an absolute decline in 2001. Since 2002, this trend has reversed and the sector has experienced strong employment growth in absolute terms, although in terms of the share of total manufacturing employment the increases are marginal, accounting for 7.3% of total manufacturing employment in 1999 and about 7.5% in 2007 (see Denu *et al.*, 2005; ILO, 2009).

A few events are worth mentioning in this context. Prior to 2002, Ethiopia was engaged in a costly war with Eritrea (May 1998–June 2000), and in 2001 the country also experienced political uncertainty due to internal differences within the main political party governing the country, with ripple effects in the business sector. The sense of stability after these negative shocks and the

better-than-average rainfalls (except for the drought in 2003) are believed to have contributed to faster economic growth since 2002. Notwithstanding the stable macroeconomic environment in recent years, political tension and uncertainty still remain high, particularly since the disputed elections in 2005, which damaged the domestic and international standing of the current government.

For the current purpose, the figure suggests a natural way of dividing the data in order to examine cyclical patterns in job flows, that is, a period of 1996–2001 and a period since 2002. One of our tasks in this paper is to breakdown this aggregate trend and investigate the underlying micro-dynamics in line with the literature on gross job flows.

4. Measuring job flows

This section introduces various concepts and outlines the framework used in this paper and the existing literature to measure employment changes. The discussion closely follows the framework developed and applied by Davis and Haltiwanger (1992) and Davis *et al.* (1996). We begin by defining a measure of establishment-level employment growth, which is in turn linked to industry-level measures of job creation and job destruction. Employment growth, g, at the establishment level, between time $t-1$ and t, is given by

$$g_{ijt} = \frac{\Delta X_{ijt}}{m_{ijt}} = \frac{X_{ijt} - X_{ijt-1}}{0.5(X_{ijt} + X_{ijt-1})}, \tag{1}$$

where X is the number of employees, and i and j are establishment and industry indices, respectively. Equation (1) shows a growth rate calculation in which change in employment is divided by average establishment size between two periods (m_{ijt}) rather than by initial size as conventionally calculated. This approach is widely used in the literature on job flows and offers a number of advantages.[12]

[12] It minimises measurement problems in the growth rate due to transitory low/high initial and end-of-period establishment sizes that may lead to overestimation of the expansion of small establishments or the contraction of large establishments—a bias that could generate a negative association between establishment size and growth. The formula yields a symmetric distribution of growth rates centred about zero and is bounded in the interval $[-2, 2]$, which corresponds, respectively, to establishment exit and entry. In contrast, growth rates calculated in the traditional manner range between zero and infinity, and do not capture entry and exit. Thus, a clear advantage of the measure is that it accommodates a combined treatment of establishment births (entry), deaths (exit) and continuing

Based on equation (1), several measures of gross job flows may be defined. Gross job creation is obtained by summing the jobs created by new establishments and expanding incumbents within an industry. In turn, the gross job creation rate (GJCR), a size-weighted average growth rate of all establishments in an industry with a positive growth rate, is written as

$$\text{GJCR}_{jt} = \sum_{i \in J} \left(\frac{m_{ijt}}{M_{jt}} \right) g_{ijt}^{+}, \tag{2}$$

where g_{ijt}^{+} is the positive employment growth rate, m_{ijt} is the average establishment size and M_{jt} is the average industry size. Similarly, gross job destruction is obtained by summing the job losses in an industry due to the closure and contraction of establishments, and the gross job destruction rate (GJDR) is written as

$$\text{GJDR}_{jt} = \sum_{i \in J} \left(\frac{m_{ijt}}{M_{jt}} \right) |g_{ijt}^{-}|, \tag{3}$$

where $|g_{ijt}^{-}|$ is the absolute value of negative employment growth rates. The weights in equations (2) and (3) reflect the size of an establishment relative to the size of the industry to which it belongs and both establishment and industry size are expressed as the average employment in periods $t - 1$ and t. The NEGR is the difference between the GJCR and the GJDR, while the sum of the GJCR and the GJDR is termed the gross job re-allocation rate (GJRR). To elaborate, the GJRR, which is the sum of the total jobs created and destroyed relative to the size of an industry, captures the extent of reshuffling of jobs across employers within an industry associated with a given NEGR.[13] The excess job re-allocation rate (EJRR) refers to the GJRR that is in excess of net employment change. This is calculated as the difference between the GJRR and the absolute value of the NEGR. To illustrate, since in principle a 5% NEGR can be achieved with a 5% GJRR (i.e., 5% GJCR and 0% GJDR), the EJRR is a measure of the depth of adjustment beyond that needed to accommodate a certain NEGR.

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establishments on employment growth. At the same time, it is monotonically related to the standard growth calculation up to a second-order Taylor series expansion (Davis *et al.*, 1996).

[13] GJRR also represents that part of the total movement of workers triggered by employers' decisions to create and destroy jobs, the other part of worker flows being explained by search and match processes and movements in and out of the labour force.

In the subsequent sections, we calculate these job flow rates for the manufacturing sector as a whole as well as for specific industries and decompose the aggregate flows across groups of firms defined by survival status, firm size and capital intensity. Finally, we also use these rates to examine whether job re-allocation is primarily within or across industries. If excess job re-allocation is mainly inter-industry, more jobs will be reassigned from shrinking to expanding industries relative to the re-allocation across firms within an industry. A formulation to decompose excess job re-allocation into these constituents, as suggested by Davis and Haltiwager (1992), is

$$[(\mathrm{GJRR}_{St} - |\mathrm{NEGR}_{St}|)M_{St}] = \left[\sum_{j\in S}(\mathrm{GJRR}_{jt} - |\mathrm{NEGR}_{jt}|)M_{St}\right] + \left[\sum_{j\in S}(|\mathrm{NEGR}_{jt}| - |\mathrm{NEGR}_{St}|)M_{St}\right], \quad (4)$$

where S stands for the manufacturing sector, M is the average size and j and t are index industry and time, respectively. The left-hand side of equation (4) represents the volume of excess job re-allocation for the entire manufacturing sector. The first term on the right-hand side captures intra-industry excess job re-allocation measured as the sum over all industries of the product of the EJRR and the average size of the manufacturing sector at time t. The second term captures inter-industry re-allocation of jobs expressed as the sum of weighted products of the deviation of industry-level NEGRs from that of the manufacturing sector.

5. Patterns of job flows

5.1 Temporal patterns

Based on the preceding discussion, we begin our empirical analysis by using equation (1) to calculate establishment-level growth rates. Unweighted and size-weighted frequency distributions of these growth rates for the entire period, 1997–2007, and for the two sub-periods, 1997–2001 and 2002–07, are provided in Figure 2a and b, respectively. These figures provide an assessment of the degree of firm heterogeneity in our sample. Figure 2a exhibits wide variation across manufacturing establishments in terms of employment growth rates. The growth distribution in Figure 2a shows that firm entry and exit are important aspects of the processes of job creation and destruction. The bars labelled 'entry' and 'exit' indicate that Ethiopian manufacturing

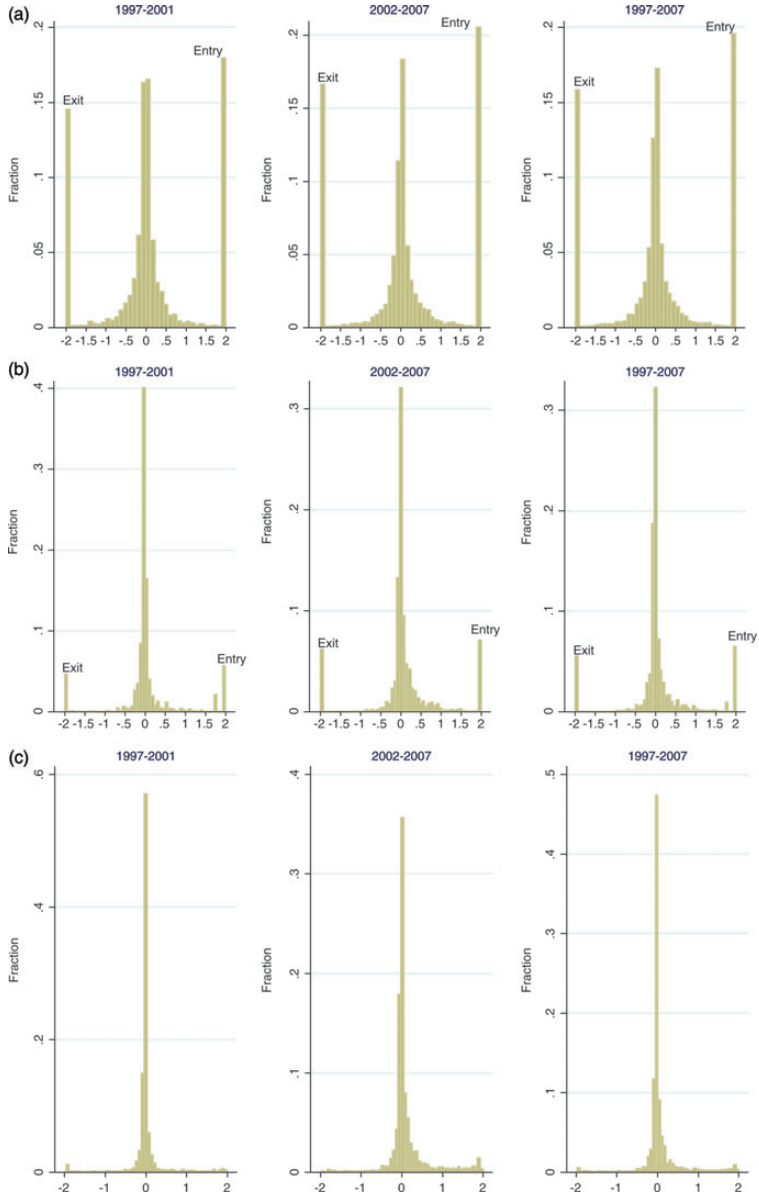

Figure 2: (a) Distribution of Unweighted Establishment-level Employment Growth Rate, Assuming Entry is Firm Birth and Exit is Firm Closure. (b) Distribution of Size-weighted Establishment-level Employment Growth Rate, Assuming Entry is Firm Birth and Exit is Firm Closure. (c) Distribution of Size-weighted Establishment-level Employment Growth Rate, Assuming Entry from and Exit to Nine Workers.

has an 18–20% establishment entry rate and a 14–17% exit rate per annum. A large percentage of the continuing establishments (about 36–40%) experience employment growth in the neighbourhood of zero ($\pm 1\%$) growth rates. Figure 2b depicts the same distribution weighted by establishment size. The collapse in the mass of the distribution corresponding to entry and exit reveals that such establishments are rather small in size and together account for about 10% of all size-weighted growth rate observations. The increased concentration (about 68–70%) around zero ($\pm 1\%$) growth rates in Figure 2b shows that large incumbents expand or contract rather slowly when compared with small establishments. Such an inverse relationship between firm size and employment growth is a widely recognised empirical regularity (Jovanovic, 1982; Evans, 1987; Gunning and Mengistae, 2001; Van Biesebroeck, 2005; Bigsten and Gebreeyesus, 2007).

Since our data do not distinguish between firm births and establishments that cross the ten-worker cut-off point, in Figure 2c we plot the size-weighted growth distribution assuming entrants are firms which employed nine workers prior to sample entry and exits are firms sliding below the threshold rather than firm deaths. As may be expected, given this assumption, there is a sharp drop in the mass associated with firm entry and exit. However, in qualitative terms compared with Figure 2b, both figures show a higher concentration around a zero growth rate and strong growth performance in 2002–07 marked by an increase in mass to the right of zero for this period.

Before discussing industry-level job flows, a concern is whether establishment-level employment changes, which underlie the industry-level job flows discussed below, represent transitory fluctuations in size or adjustments towards a desired level of employment. Table 2 offers a 1-year transition probability in firm growth regimes as a way of examining this issue. It shows that for the period as a whole, 42% of firms which have created jobs in a certain year will continue to create jobs next year, 12% will maintain

Table 2: One period transition probabilities in firm employment growth regimes (%)

	1997–2001			2002–07			1997–2007		
	Positive	**Zero**	**Negative**	**Positive**	**Zero**	**Negative**	**Positive**	**Zero**	**Negative**
Positive	40.0	10.1	50.0	43.5	13.8	42.7	42.0	12.3	45.7
Zero	34.4	26.1	39.5	41.5	30.9	27.6	39.8	28.4	31.7
Negative	39.6	8.4	52.1	51.1	11.5	37.3	45.7	10.2	44.1

Source: Authors' calculation based on CSA's manufacturing census.
Notes: The figures exclude firm entry and exit.

their size, while a larger percentage of the job-creating firms (46%) will contract. Similarly, among firms which have contracted in a certain year, about 44% will continue to contract, while 46% will grow the following year. While there is a relative increase in the persistency of creation of jobs across the two sub-periods, the main point emerging from this analysis is that in the Ethiopian context both job creation and job destruction are not particularly persistent. This contrasts with the experience of the US manufacturing sector, where Davis and Haltiwanger (1992) report persistence rates of 67% for job creation and 81% for job destruction.

Based on equations (1) to (3), Table 3 presents annual gross job flows for the manufacturing sector over the period 1997–2007. As mentioned earlier, we provide upper and lower bound estimates of job flows as well as a mean of the two. Over the entire period, the upper bound average annual GJCR is 17.3%, and the lower bound is 11.4% with a mean of 14.3. The GJDR varies within a narrower interval of 9.4–10.3%, while the average NEGR ranges between 2 and 7% per annum with a mean of 4.5%. The figures show that the job destruction rate is less susceptible to assumptions about firm exits, indicating that job destruction is attributable mainly to contraction of incumbents rather than exits, while job creation is more likely to be driven by firm entry.

A look at the year-specific figures shows that, every year, there is substantial job creation and job destruction and even during periods of high net employment growth, job destruction never falls below 7%. This observation highlights the point that the weak aggregate performance of manufacturing employment during 1996–2001, as depicted in Figure 1, was not the result of a particularly low job creation rate but due to a simultaneous process of job creation and destruction. The average GJCR during 1997–2001 ranges between 8 and 12.4% and never falls below 6.5% as shown in Table 3. However, this is matched by a job destruction rate of between 9.8 and 11.7% leading to an NEGR of at best 0.7% between 1997 and 2001. The strong expansion of manufacturing employment during 2002–07 was the result of a 6–9 percentage point increase in the GJCR relative to 1997–2001, coupled with a modest decline (maximum of 2.5 percentage points) in the GJDR which translates into a minimum of 5% and a maximum of 12% annual increase in net employment growth between 2002 and 2007.

Turning to the remaining columns in the table, we see that the average GJRR is very high relative to the NEGR. The upper (lower) bound of the GJRR is 27.6 (21.8) % during the entire period, with noticeable temporal variation ranging from a low of 19.7 (14.3) % in 1999 to a high of 42.9 (28.0) % in 2007. Based on the upper bound, this implies a 4% job re-

Table 3: Gross Job Flows in Ethiopian Manufacturing (%)

	GJCR			GJDR			NEGR			GJRR			EJRR		
	Upper	Lower	Mean	Upper	Lower	Mean	Upper	Lower	Mean	Upper	Lower	Mean	Upper	Lower	Mean
1997	0.1342	0.0810	0.1076	0.1861	0.0987	0.1424	−0.0519	−0.0177	−0.0348	0.3202	0.1797	0.2500	0.2683	0.1620	0.2151
1998	0.1248	0.0987	0.1118	0.1049	0.0889	0.0969	0.0199	0.0097	0.0148	0.2297	0.1876	0.2087	0.2098	0.1779	0.1938
1999	0.1042	0.0647	0.0844	0.0929	0.0788	0.0859	0.0112	−0.0141	−0.0015	0.1971	0.1434	0.1703	0.1859	0.1293	0.1688
2000	0.1335	0.0833	0.1084	0.1019	0.0778	0.0899	0.0316	0.0055	0.0185	0.2354	0.1611	0.1982	0.2038	0.1556	0.1797
2001	0.1230	0.0716	0.0973	0.0973	0.1447	0.1210	0.0256	−0.0732	−0.0238	0.2203	0.2163	0.2183	0.1946	0.1431	0.1945
2002	0.2238	0.1639	0.1938	0.0849	0.0963	0.0906	0.1389	0.0675	0.1032	0.3088	0.2602	0.2845	0.1698	0.1926	0.1813
2003	0.1306	0.1059	0.1182	0.0834	0.0799	0.0817	0.0473	0.0259	0.0366	0.2140	0.1857	0.1999	0.1667	0.1598	0.1632
2004	0.1463	0.1016	0.1240	0.0736	0.0841	0.0789	0.0727	0.0175	0.0451	0.2199	0.1858	0.2028	0.1472	0.1683	0.1577
2005	0.1966	0.1474	0.1720	0.0882	0.0949	0.0915	0.1085	0.0525	0.0805	0.2848	0.2423	0.2635	0.1763	0.1897	0.1830
2006	0.2980	0.1672	0.2326	0.0789	0.0754	0.0772	0.2192	0.0918	0.1555	0.3769	0.2427	0.3098	0.1577	0.1509	0.1543
2007	0.2871	0.1672	0.2266	0.0789	0.0754	0.0772	0.1453	0.0521	0.0987	0.4289	0.2800	0.3545	0.2836	0.2279	0.2557
Standard deviation	0.1146	0.0398	0.0533	0.0827	0.0204	0.0218	0.1213	0.0460	0.0589	0.1589	0.0435	0.0562	0.1323	0.0272	0.0292
Period averages															
1997–2001	0.1239	0.0798	0.1019	0.1166	0.0978	0.1072	0.0073	−0.0180	−0.0053	0.2406	0.1776	0.2091	0.2333	0.1536	0.1904
2002–07	0.2138	0.1420	0.1779	0.0918	0.0908	0.0913	0.1220	0.0512	0.0866	0.3055	0.2328	0.2692	0.1836	0.1815	0.1826
1997–2007	0.1729	0.1137	0.1433	0.1031	0.0940	0.0985	0.0698	0.0198	0.0448	0.2760	0.2077	0.2419	0.1967	0.1688	0.1861
Other regions															
OECD			0.127			0.127			0.000			0.254			0.223
Latin America			0.148			0.140			0.008			0.288			0.248
Transition economies			0.174			0.128			0.046			0.303			0.227

Source: Authors' calculations based on CSA's manufacturing census data for Ethiopia and Table 3 of Haltiwanger *et al*. (2008) for other regions.
Notes: 'Upper' refers to estimates of job flows when a new firm in the sample is treated as firm birth, while the disappearance of a firm from the sample is treated as firm closure. 'Lower' refers to estimates of job flows when it is assumed that firms enter from and exit to a firm size of nine employees rather than firm births and closures. 'Mean' refers to the average of the job flows based on these two extreme assumptions.

allocation rate for a 1% growth in net employment, while the proportion could rise to as high as 10:1 if we work with the lower bound. This amounts to an EJRR of about 17 to 20%. The rates of excess job re-allocation, therefore, remain high regardless of the NEGR.

It is interesting to note that throughout the period, job creation exhibits greater variation compared with job destruction. As a result, the GJRR increases by about 6 percentage points during the upswing (2002–07) compared with the period 1997–2001, which illustrates the pro-cyclical nature of job re-allocation.

While comparisons are impeded by differences in data coverage, it is nevertheless interesting to see how the evidence from Ethiopia compares with job flows in other parts of the world. We provide a comparison with the cross-country evidence provided in Haltiwanger *et al.* (2008).[14] The comparison with other countries is based on the average of the upper and lower bounds of job flows reported in Table 3.

The simultaneous occurrence of high rates of job creation and destruction in Ethiopian manufacturing is similar to the patterns that have been observed in other developed and emerging economies. The 14.3% average GJCR during 1997–2007 is at par with the Latin American average, somewhat higher than the OECD figure of 12.7% and lower than that observed in transition countries. At about 10%, the job destruction rate in Ethiopia is slightly below the job destruction rates of OECD, transition and Latin American countries; it is, however, comparable with that of the USA during the 1970s and 1980s (Davis and Haltiwanger, 1992). In terms of GJRRs, for the entire period the figure for Ethiopian manufacturing (24%) is very close to that observed in other regions (25–30%). Indeed, had labour market regulations been excessively restrictive in Ethiopia compared with the other regions, then the GJRR should have been lower.

A key difference between the time-series patterns observed in Ethiopia and developed countries is the cyclical nature of job re-allocation. In developed countries such as the USA and Canada, as shown by Baldwin *et al.*, (1998), the temporal variance of job destruction is higher than that of job creation, which implies that gross job re-allocation is counter-cyclical. As highlighted earlier, job re-allocation in Ethiopia is pro-cyclical. The shift from a sluggish performance during 1996–2001 to strong employment growth during

[14] Haltiwanger *et al.* (2008) provide information on job flows in the 1990s for sixteen countries. For most countries, their data cover firms that employ more than one worker, except for Chile and Colombia, where, as given in the current paper, the threshold is set at ten or more workers.

2002–07 is characterised by a sharp increase in gross job creation with a modest change in job destruction. While the Ethiopian case is different from those of the USA and Canada, it is not unique. As shown in Table 3, similar patterns are observed in transition economies, where rates of job creation outstrip rates of job destruction. One explanation for the different cyclical pattern of job flows in our sample compared with the USA is the incipient nature of the manufacturing sector, where the skill mix of workers is likely to be simple and less specific to an industry or to a firm. This is more likely to be the case among small firms that dominate the industrial landscape in developing countries. Assuming that the level and asymmetry of adjustment costs increases with the skill level of workers, as jobs that demand specialised skills are harder to fill, small manufacturers in countries like Ethiopia may have a relatively high elasticity of job creation with respect to demand than job destruction, resulting in a different outcome than predicted by Campbell and Fisher (2000).

5.2 Job flows across industries

While the manufacturing sector as a whole exhibits high rates of job creation and destruction, it is likely that there are variations across industries due to differences in industry-specific technologies and market structure. To investigate such variations, this section analyses gross job flows at the two-digit industry level. Figures 3 and 4 depict average annual rates of the GJCR and the GJDR, respectively, for eight industries. The industries are sorted in ascending order of average job flows during 1996–2001 for easy comparison across industries and over business cycles.

As in the previous section, we analyse these rates by treating firms entering (exiting) our sample as firm births (deaths) and also assuming that sample entry is based on employing nine workers before entry and sample exit is based on dropping to nine workers. Figure 3a and b show that, regardless of assumptions about firm entry, the rapid increase in job creation during the second half of the sample period is experienced by all industries, albeit at different rates.[15] The food and beverage industry represents the average job creation rate for the entire manufacturing sector, while the textile, leather and printing industries have below-average job creation rates and the chemical, non-metal, metal and wood industries record above-average

[15] The sectoral pattern of job creation is not very sensitive to assumptions about firm entry. As comparisons between Figure 3a and b show, the change in assumption changes the relative position of only one industry.

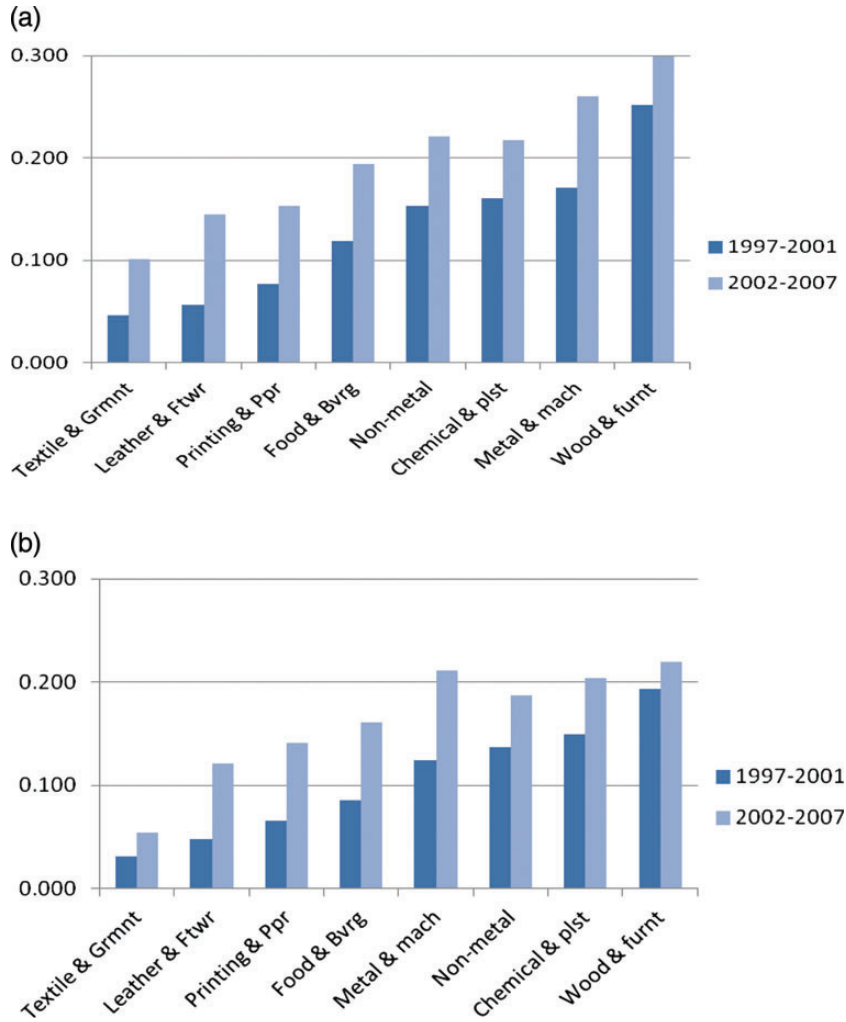

Figure 3: (a) Gross Job Creation by Industry (Assuming Entry Is Firm Birth). (b) Gross Job Creation by Industry (Assuming Entry from Initial Employment of Nine Workers).

performance. The ranking of industries remains essentially the same during periods of slow and rapid change in aggregate employment, suggesting that cross-industry variation in job creation is not randomly distributed but reflects systematic differences in technology and market structure. At the same time, there is evidence of convergence in job creation rates during the

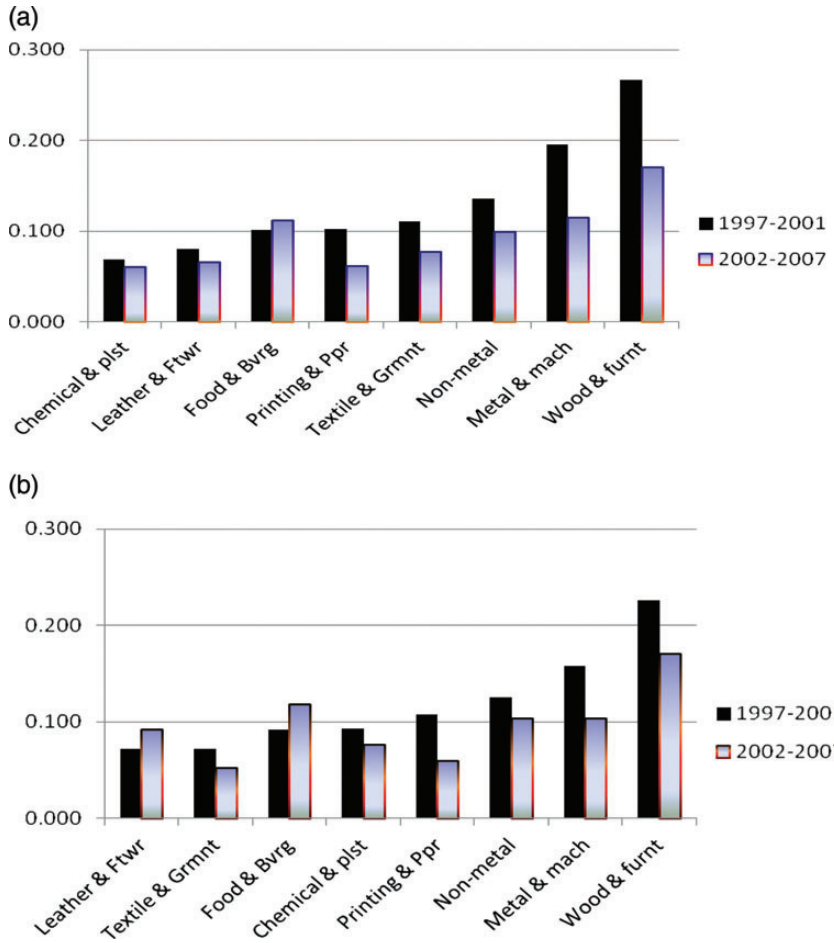

Figure 4: (a) GJDR by Industry (Assuming Exit Is Firm Closure). (b) GJDR by Industry (Assuming Exit to Employment of Nine Workers).

upswing, as the gain in job creation rate since 2002 has been more pronounced in industries with below-average performance.[16]

Figure 4a and b shows that, except for two industries (food and beverage, and leather and footwear), others have experienced a reduction in the GJDR in the second sub-period. In comparison with the GJCR, there is less disparity across industries in the GJDR; the standard deviations, based on the upper

[16] Until 2001, the coefficient of variation for the GJCR was about 0.54. This has declined to 0.34 since 2002.

bound estimates, are 8 and 4.5%, respectively. The industry-wise variation in job destruction has narrowed further since 2002, as the reduction in job destruction is more noticeable among industries with higher GJDR values. Job destruction, therefore, shows less variability across industries and over time compared with job creation, although there is enough variation to suggest that certain industries (metal and non-metal, and wood and furniture) have higher job destruction rates irrespective of business cycles. It is remarkable that the industries with above-average job creation rates also feature above-average job destruction rates, with the exception of the chemical industry. This implies that job losses are, on average, higher in industries that create more job opportunities, and net employment growth is associated with sizable re-adjustment of employment positions across firms. This point is further supported by Figure 5.

Figure 5a shows an interesting aspect of job flows where net employment growth is positively correlated with the GJRR. Industries with above-average NEGR have distinctly above-average GJRRs. This suggests that faster growing industries in Ethiopian manufacturing are characterised by re-allocation of labour across establishments. In fact, despite the country's low ranking in terms of the ease of hiring and firing of workers, the high job re-allocation rate in Ethiopia suggests that labour market regulations are not exceptionally restrictive. A likely explanation is that while labour laws may seem restrictive on paper, they are not strictly adhered to due to weak law enforcement mechanisms. A second point is that the industries with better-than-average net employment growth (chemical and plastic, and metal and non-metal) are not the priority areas indicated in the Ethiopian government's industrial policy which include food processing, textile and leather industries. The latter are given priority mainly because they fit well with the government's ADLI strategy and that they account for nearly two-thirds of total manufacturing employment.

5.3 Decomposing job flows

As discussed above, Ethiopian manufacturing firms simultaneously generate and destroy jobs. To characterise these patterns and to obtain additional insights into the process of job creation and destruction, this section pushes the analysis in several directions. In turn, we examine the link between job flows and firm demographics, job flows and firm size, job flows and production technology, and finally the extent to which job re-allocation may be attributed to within-sector re-allocation as opposed to

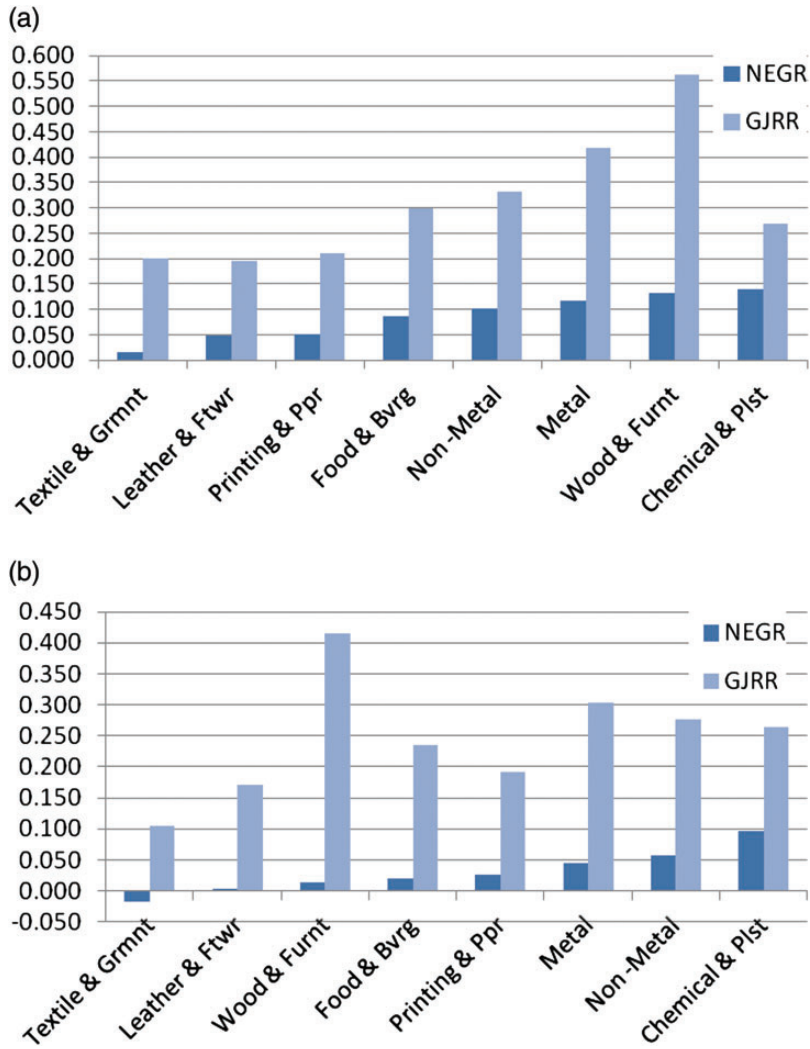

Figure 5: (a) NEGR and GJRR (Assuming Entry Is Firm Birth and Exit Is Firm Closure). (b) NEGR and GJRR (Assuming Entry from and Exit to Nine Workers).

across sectors. In all cases, we provide estimates based on both the upper and lower bound assumption.

To examine the link between the life cycle of establishments and job creation and destruction, we decompose gross job creation into the fraction of jobs created by the expansion of incumbents and by firm entry. Similarly, gross job destruction is decomposed into jobs lost due to

downsizing and exit of incumbents. If all entrants to our sample are treated as firm births (Figure 6a), they would account for about 55% of new jobs, while employment expansions by incumbents would account for the remainder. As may be expected, assuming that all new sample entrants already existed and employed nine workers leads to a reduction in the contribution of firm entry

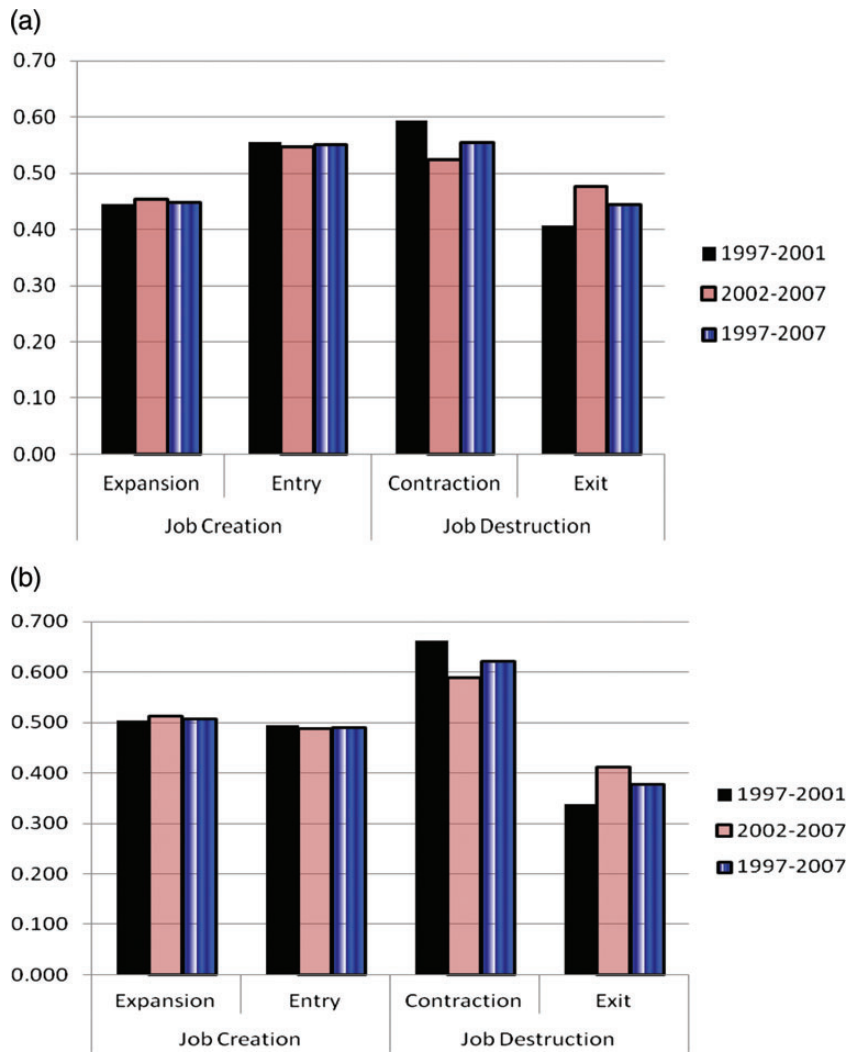

Figure 6: (a) Decomposition of GJCR and GJDR: Assuming Entry Is Firm Birth and Exit Is Firm Closure (%). (b) Decomposition of GJCR and GJDR: Assuming Entry from and Exit to Nine Workers (%).

to job creation where both entry and expansion account for equal proportions of job creation (Figure 6b). Hence, firm entry contributes at least 50% to job creation and at most 55%. The relative importance of entrants does not vary much with the business cycle. In terms of international comparisons, the lower bound (50%) contribution of firm entry to job creation in Ethiopian manufacturing is higher than the 40% contribution of entrants in transition economies, which in turn is higher than the 35% contribution in OECD countries as documented in Haltiwanger *et al.* (2008). The figures corroborate the well-recognised fact that small firms play a disproportionately larger role in gross job creation (relative to their share in total employment).

If all firms dropping out from the sample are treated as firm closures, they would account for about 40% of job losses in 1997–2001 and 48% in 2002–07. Allowing for the possibility that they might still be in business and employing nine workers reduce their contribution to job destruction to 33% in 1997–2001 and 41% in 2002–07.[17] This is a relatively small difference in view of the radically different assumptions about firm exits and suggests that most firms dropping out from the sample either experience deeper cuts in employment or close down entirely rather than downsizing temporarily to just under the survey cut-off point. Regardless, the main point is that the bulk of job destruction occurs through downsizing of surviving firms and that the slowdown in sector-wide job destruction during the upswing is entirely due to a decline in the rate of contraction of incumbents. Indeed, both the rate of establishment exit (Figure 2b) and its contribution to job destruction (Figure 6) went up rather than down during the faster employment expansion since 2002, pointing to the relentless pressure of competitive market selection.

A more explicit examination of the link between firm size and job flows is provided in Table 4. Manufacturers that employ at least fifty workers are classified as large establishments.[18] Although small establishments account for about 15% of total employment in our data, their contribution to new jobs ranges between 24 and 33% and does not show much variation across the different time periods. Small producers are more likely to contribute to

[17] Assuming that firms which disappear from the sample are still surviving and retain nine workers reduces the total number of job losses by 12% compared with total firm closure.

[18] The choice of small and large is, indeed, somewhat arbitrary. The choice was motivated in part by a practice in some of the existing firm-level studies such as Haltiwanger *et al.* (2008), where 50 is used as a cut-off. Using the same threshold enhances comparability. In addition, using the same data, Shiferaw (2009b) has shown that firms smaller than this threshold have an investment behaviour which is quite different from that of firms larger than this threshold.

Table 4: Decomposition of Job Creation and Destruction by Firm Size (%)

	Contribution to job creation						Contribution to job destruction					
	Small firms			Large firms			Small firms			Large firms		
	Expansion	Entry	Total	Expansion	Entry	Total	Contraction	Exit	Total	Contraction	Exit	Total
(a) Assuming entry is firm birth and exit is firm closure												
1997–2001	0.0980	0.2353	0.3332	0.2773	0.3894	0.6668	0.0941	0.1747	0.2688	0.4701	0.2611	0.7312
2002–07	0.1052	0.2157	0.3209	0.3484	0.3306	0.6791	0.1097	0.2140	0.3237	0.4144	0.2619	0.6763
1997–2007	0.1019	0.2246	0.3265	0.3161	0.3574	0.6735	0.1026	0.1961	0.2987	0.4398	0.2615	0.7013
(b) Assuming entry from and exit to nine employees												
1997–2001	0.0977	0.1307	0.2284	0.4019	0.3697	0.7716	0.0964	0.0871	0.1834	0.5569	0.2597	0.8166
2002–07	0.1184	0.1361	0.2545	0.3932	0.3523	0.7455	0.1227	0.1340	0.2568	0.4650	0.2782	0.7432
1997–2007	0.1090	0.1336	0.2426	0.3972	0.3602	0.7574	0.1108	0.1127	0.2234	0.5068	0.2698	0.7766
(c) Average of panels (a) and (b)												
1997–2001	0.0979	0.1830	0.2808	0.3396	0.3795	0.7192	0.0952	0.1309	0.2261	0.5135	0.2604	0.7739
2002–07	0.1118	0.1759	0.2877	0.3708	0.3414	0.7123	0.1162	0.1740	0.2902	0.4397	0.2700	0.7098
1997–2007	0.1055	0.1791	0.2846	0.3566	0.3588	0.7154	0.1067	0.1544	0.2611	0.4733	0.2656	0.7389

Source: Authors' computations based on CSA's manufacturing census.
Notes: Job creation (destruction) rates through entry (exit) and expansion (contraction) by small and large firms add up to 1 (100%) for each period, row-wise. A large firm employs fifty or more workers.

job creation at the point of market entry. The relative importance of entry and expansion for job creation among large establishments is quite evenly split. The patterns in terms of job destruction are similar, with small firms accounting for between 22 and 30% of job losses during the entire period, mainly due to firm exit under upper bound estimates.[19]

Figure 6 shows that the decline in the GJDR since 2002 is due to a slowdown in the degree of contraction of continuing establishments rather than to a reduction in the rate of exit. The right panel of Table 4 reveals that the slowdown in job losses due to establishment contraction is evident only among large producers. Indeed, job losses which may be attributed to small producers increase during the upturn in terms of both contraction and exit. The fast expansion of manufacturing employment in the second sub-period is, therefore, accompanied by a re-allocation of labour from small to large establishments.

The tendency for small firms to contribute to employment primarily at entry, and the re-allocation of labour from small to large establishments are also revealed by variations in the probability of transiting to larger firm size categories. Table 5 shows 1-year transition probabilities for firms belonging to different size categories. For instance, 84% of firms with less than twenty workers remain in the same category a year later, with only 12% transiting to the next size category. Similarly, among firms employing twenty to twenty-nine workers, there is 80% chance that they remain in the same size category or slip to the lower category in the following year.

Although transitions across firm size categories are quite rare in a short interval, firms could make this transition over a longer time period. To examine this dynamic, we track firm sizes of surviving firms between 1998 and 2007 (see Table 6). The figures illustrate the difficulty of transiting to larger firm size especially for small firms. For instance, only 3% of the firms with less than twenty employees grew to the fifty-to-ninety-nine size category, while 73% exited. In contrast, 29% of the firms in the fifty-to-ninety-nine size category in 1998 moved to a higher category in 2007. Other things being equal, this suggests that industries dominated by small firms rely heavily on a high entry rate for job creation.

Heterogeneity in job flows across establishments may partly be traced to the choice of production technology, an important aspect of which is the

[19] The figures for Ethiopia match the patterns observed in other settings. Haltiwanger *et al.* (2008) show that large firms that employ at least fifty workers account for about 60–70% of total job creation and destruction in a number of countries in the OECD (Italy, Portugal, France, the UK and the USA), in Latin American (Argentina, Chile, Columbia and Mexico) as well as in emerging economies (Latvia, Slovenia and Hungary).

Table 5: Annual Average Probability of Transiting across Firm Size Categories

Firm size categories	<20	20–29	30–49	50–99	100–499	≥500	Total
<20	83.91	11.86	3.26	0.84	0.13	0.00	100
20–29	23.55	55.52	16.72	3.36	0.84	0.00	100
30–49	5.35	13.37	64.42	15.35	1.51	0.00	100
50–99	2.20	2.20	11.36	73.58	10.66	0.00	100
100–499	0.33	0.50	1.08	5.80	90.14	2.15	100
≥500	0.00	0.00	0.00	0.00	6.25	93.75	100
Total	33.46	14.27	13.68	13.52	18.73	6.34	100

Source: Authors' computation based on CSA's manufacturing census.
Notes: Numbers add up to 100% row-wise.

Table 6: Transition Probability across Firm Size Categories between 1998 and 2007

Firm size categories	<20	20–29	30–49	50–99	100–499	≥500	Exit	Total
<20	15.59	3.54	4.76	3.04	0.10	0.00	72.98	100
20–29	21.05	15.09	12.63	7.37	2.11	0.00	41.75	100
30–49	2.21	13.81	16.57	21.55	8.29	0.00	37.57	100
50–99	1.10	1.10	9.39	30.39	27.07	1.66	29.28	100
100–499	0.00	0.68	3.06	13.95	62.93	6.46	12.93	100
≥500	0.00	0.00	0.00	0.00	18.97	78.45	2.59	100
Entry	31.44	10.41	11.97	12.71	14.20	4.81	14.46	100
Total	27.34	9.38	10.95	11.99	14.08	4.95	21.31	100

Source: Authors' computation based on CSA's manufacturing census.
Notes: Numbers add up to 100% row-wise.

choice of input proportions. Accordingly, Table 7 presents the results of a decomposition of job flows conditional on capital intensity. Capital intensity is defined in terms of the capital–labour ratio, and establishments with above-sector-average capital–labour ratio are treated as capital intensive. The analysis shows that capital-intensive establishments account for nearly 60% of job creation and that the rise in gross job creation during 2002–07 was driven mainly by the expansion of capital-intensive establishments. While the latter created most of the new jobs, they also account for the bulk of job destruction mainly through contraction. The increase in net employment growth since 2002 is, therefore, the result of a higher rate of job creation among capital-intensive establishments—through expansion, coupled with a lower rate of job destruction among labour-intensive establishments. However, since the reduction in job destruction during 2002–07 is much less

Table 7: Decomposition of Job Creation and Destruction by Factor Intensity (%)

	Contribution to job creation						Contribution to job destruction					
	Labour-intensive firms			Capital-intensive firms			Labour-intensive firms			Capital-intensive firms		
	Expansion	Entry	Total	Expansion	Entry	Total	Contraction	Exit	Total	Contraction	Exit	Total
(a) Assuming entry is firm birth and exit is firm closure												
1997–2001	0.2558	0.1780	0.4339	0.1882	0.3689	0.5571	0.2489	0.2376	0.4865	0.3436	0.1608	0.5045
2002–07	0.1676	0.2239	0.3915	0.2855	0.3120	0.5976	0.1926	0.1985	0.3912	0.3267	0.2686	0.5953
1997–2007	0.2077	0.2030	0.4107	0.2413	0.3379	0.5792	0.2182	0.2163	0.4345	0.3344	0.2196	0.5540
(b) Assuming entry from and exit to nine employees												
1997–2001	0.2863	0.1377	0.4241	0.2168	0.3591	0.5759	0.2772	0.1986	0.4759	0.3787	0.1454	0.5241
2002–07	0.1910	0.1841	0.3751	0.3244	0.3004	0.6249	0.2194	0.1558	0.3752	0.3693	0.2555	0.6248
1997–2007	0.2344	0.1630	0.3974	0.2755	0.3271	0.6026	0.2457	0.1753	0.4209	0.3736	0.2054	0.5791
(c) Average of panels (a) and (b)												
1997–2001	0.2711	0.1579	0.4290	0.2025	0.3640	0.5665	0.2631	0.2181	0.4812	0.3612	0.1531	0.5143
2002–07	0.1793	0.2040	0.3833	0.3050	0.3062	0.6112	0.2060	0.1772	0.3832	0.3480	0.2620	0.6101
1997–2007	0.2210	0.1830	0.4040	0.2584	0.3325	0.5909	0.2319	0.1958	0.4277	0.3540	0.2125	0.5665

Source: Authors' computations based on CSA's manufacturing census.

Notes: Job creation (destruction) rates through entry (exit) and expansion (contraction) by labour- and capital-intensive firms add up to 1 (100%) for each period, row-wise. Capital-intensive firms have a capital–labour ratio which is higher than the industry average.

than the gain in job creation, there has been a re-allocation of labour in favour of more capital-intensive firms in the Ethiopian manufacturing sector.

Finally, we use equation (4) to identify whether excess churning is mainly due to an intra- or inter-industry re-allocation of jobs. On average, over time, we find that 86% of excess job re-allocation takes place within industries.[20] Overwhelmingly, excess job re-allocation is an intra-industry phenomenon reflecting the reshuffling of jobs across establishments producing broadly similar products. This pattern of adjustment is not sensitive to different assumptions about firm entry and exit. There is some variation over time with inter-industry re-allocation of jobs accounting for about 20% of excess job re-allocation during 1997–2001, which falls to 10% over the period 2002–07.[21]

6. Econometric analysis of job flows

The preceding section has shown that job flows vary over time and across groups of establishments defined in terms of industries, and are sensitive to firm age, size and capital intensity. The objective of this section is to consolidate the analysis and to assess the relative importance of these sources of variation by simultaneously analysing their effects on industry-level job flows. We estimate a set of econometric models with gross job re-allocation as a dependent variable, and industry and time fixed effects as well as time-varying industry-level characteristics as regressors. Motivated by the non-parametric analyses provided in the preceding sections, the time-varying covariates include the average age of firms in an industry, the share of small establishments (less than fifty employees) and capital intensity.[22] Descriptive statistics of these variables is provided in Table A1.

While this section focuses on job re-allocation, since it encompasses job creation and destruction, we also estimate similar specifications with job

[20] The dominant role of intra-industry movement is consistent with the patterns found in US manufacturing (Davis and Halitwanger, 1992) and in transition economies (Faggio and Konings, 2003), where the share of between-industry movements is even less than in the Ethiopian case.

[21] This is mainly the result of a sharp decline in the employment share of the textile sector during the late 1990s, a decline which has abated since 2004. The textile industry is dominated by public enterprises and was until recently the single most important employer in the manufacturing sector.

[22] Age is defined as the average age of firms in an industry. Similarly, firm size is the average number of employees of firms in an industry. Capital intensity is calculated annually for each industry and is defined as the average capital stock per worker of firms in an industry.

creation, job destruction and net job growth as dependent variables. The basic model has the following structure:

$$\text{GJRR}_{jt} = \beta' X_{jt-1} + u_{jt},\ u_{jt} = \delta_j + \mu_t + \varepsilon_{jt}, \tag{5}$$

where GJRR_{jt} is the GJRR in industry j at time t, X_{jt-1} stands for industry-level covariates lagged by one period and u_{jt} is a composite error term with industry (δ_j) and time (μ_t) fixed effects as well as a time-varying error term (ε_{jt}).

To isolate the sources of variation in GJRR, we start the analysis by controlling only for industry fixed effects; this is followed by the inclusion of time fixed effects and finally by including the time-varying industry-specific factors discussed above. We estimate these specifications using OLS. In addition, we also estimate equation (5) using a feasible generalised least squares (FGLS) technique which provides efficient estimates in the presence of autocorrelated and heteroscedastic errors (ε_{jt}). This estimator allows the autocorrelation coefficient to vary across industries and has desirable statistical properties when the time span is at least as large as the number of panels, which is the case in our data. All time-varying variables enter the estimation models with a one period lag, as the contemporaneous values will obviously be influenced by current job flows.

Estimates of these various specifications are presented in Table 8 (panel a) based on the assumption that firm entry and exit from the sample represent firm births and deaths. Similar regressions are also reported assuming that firms enter from and exit to nine workers [see Table 8 (panel b)]. The discussion here focuses mainly on estimates in Table 8 (panel a).[23] The first column of Table 8 (panel a) shows that industry-specific effects account for 57% of the variation in gross job re-allocation. Adding time fixed effects raises the proportion of the explained variation to 79%. Consistent with the descriptive statistics presented earlier (Figures 3–5), industries like metal and machinery and wood and furniture feature very high rates of job re-allocation relative to the food industry (omitted industry), which represents the average job re-allocation rate for the manufacturing sector.

In column 3, we include the time-varying covariates. Their inclusion leads to a small (4 percentage point) increase in the proportion of explained variation in GJRR. Confirming the patterns observed in the bivariate analysis, the results indicate that job re-allocation increases with the fraction of small

[23] For both sets of estimates, the industry and time-wise patterns are essentially the same, while for the estimates based on assuming entry and exit to nine workers the time-varying regressors are insignificant.

Table 8: Gross Job Re-allocation

	OLS	OLS	OLS	FGLS
(a) Assuming entry is firm birth and exit is firm closure				
Textile and garments	−0.0992** (0.0380)	−0.0992*** (0.0310)	−0.0080 (0.1006)	−0.0092 (0.0698)
Leather and footwear	−0.1058*** (0.0343)	−0.1058*** (0.0303)	−0.0814* (0.0460)	−0.0837** (0.0327)
Wood and furniture	0.2617*** (0.0653)	0.2617*** (0.0512)	0.2505*** (0.0749)	0.2451*** (0.0504)
Printing and paper	−0.0901** (0.0367)	−0.0901*** (0.0263)	−0.0788* (0.0458)	−0.0857*** (0.0327)
Chemical and plastic	−0.0320 (0.0389)	−0.0320 (0.0276)	0.0492 (0.0631)	0.0477 (0.0519)
Non-metal	0.0324 (0.0362)	0.0324 (0.0299)	0.0078 (0.0439)	0.0063 (0.0343)
Metal and machinery	0.1191** (0.0464)	0.1191*** (0.0328)	0.0969*** (0.0326)	0.0967*** (0.0322)
Age_{t-1}			−0.0201 (0.0438)	−0.0112 (0.0356)
Age^2_{t-1}			0.0010 (0.0012)	0.0007 (0.0011)
Small $firms_{t-1}$			0.5779* (0.3309)	0.5877** (0.2491)
Ln(Capital-intensity)$_{t-1}$			0.0847** (0.0405)	0.0852*** (0.0315)
Time dummies	No	Yes	Yes	Yes
Constant	0.3000*** (0.0275)	0.4063*** (0.0552)	−0.8782 (0.6124)	−0.9313* (0.5310)
Observations	88	88	80	80
R-squared	0.57	0.79	0.83	
(b) Assuming entry from and exit to nine workers				
Textile and garments	−0.1287*** (0.0291)	−0.1287*** (0.0234)	−0.0741 (0.0482)	−0.0596 (0.0389)
Leather and footwear	−0.0631** (0.0291)	−0.0631*** (0.0234)	−0.0821*** (0.0260)	−0.0695*** (0.0227)
Wood and furniture	0.1812*** (0.0291)	0.1812*** (0.0234)	0.2362*** (0.0515)	0.2027*** (0.0440)
Printing and paper	−0.0433 (0.0291)	−0.0433* (0.0234)	−0.0113 (0.0237)	−0.0132 (0.0217)
Chemical and plastic	0.0296 (0.0291)	0.0296 (0.0234)	−0.0099 (0.0376)	−0.0060 (0.0341)
Non-metal	0.0417 (0.0291)	0.0417* (0.0234)	0.0579* (0.0310)	0.0412 (0.0272)
Metal and machinery	0.0684** (0.0291)	0.0684*** (0.0234)	0.0579** (0.0241)	0.0490* (0.0258)
Age_{t-1}			−0.0085 (0.0318)	−0.0107 (0.0264)

(*continued on next page*)

Table 8: *Continued*

	OLS	OLS	OLS	FGLS
Age^2_{t-1}			−0.0000 (0.0009)	−0.0001 (0.0008)
Small $firms_{t-1}$			−0.1517 (0.1920)	−0.1650 (0.1701)
Ln (Capital-intensity)$_{t-1}$			0.0271 (0.0301)	0.0017 (0.0263)
Time dummies	No	Yes	Yes	Yes
Constant	0.2342*** (0.0206)	0.2353*** (0.0248)	0.1838 (0.4781)	0.5890 (0.4214)
Observations	88	88	80	80
R-squared	0.65	0.80	0.81	

Source: Authors' computations based on CSA's manufacturing census.

Notes: Robust standard errors in parentheses.*Significant at 10%; **significant at 5%; ***significant at 1%. 'Age' is the average age of firms in an industry, 'Small firms' represents the fraction of small firms in an industry, while 'Capital intensity' is the average capital per worker in an industry.

firms in an industry and is higher in capital-intensive industries. While the linear and quadratic terms of age have the expected signs, where job re-allocation decreases with age in a non-linear fashion, they are statistically insignificant. In column 4, we take into account heteroscedasticity and panel-specific autocorrelation using the FGLS estimator. These results show that the OLS estimates are largely immune to potential problems which may be associated with the error term. While the results in this section confirm a number of the bivariate patterns identified earlier, the main insight is that industry-specific factors account for the bulk of cross-industry differences in job re-allocation rates. While we do not explore the underlying sources of these industry-specific differences, these probably include differences in technology, the skill-mix required in such industries, the costs associated with creating a new job and demand conditions.

To complete the analysis, Tables A2–A4 provide, respectively, estimates of job creation, job destruction and net employment growth based on the assumption that entry and exit from the sample represent firm births and deaths. Similar to the patterns observed for job re-allocation, Tables A2 and A3 show that industry and time fixed effects explain large percentages of the variation in job creation (industry effects: 44%; time effects: 30%) and job destruction (industry effects: 32%; time effects: 31%). Thus, industry-specific technology and market structure are relatively less important in explaining job destruction than job creation. With regard to net job growth, the estimates show that there is very little cross-industry variation and only 12% of the variation in job growth is explained by industry fixed effects (Table A4). Most of the variation in net employment growth is, therefore, associated with business cycles as time fixed effects explain over 40% of the variation. This reaffirms the previous observation that industries with high job creation rates also tend to have high job destruction rates.[24]

7. Conclusion

This paper represents the first attempt at a detailed analysis of gross job flows in the case of a Sub-Saharan African country. While this paper focused on Ethiopia, for various reasons, as pointed out in the introduction, Ethiopia may be considered a good exemplar for a number of countries in the region. The paper was motivated by two issues. First, is the lackluster aggregate employment performance of Ethiopian manufacturing a result of

[24] The industry and time-wise patterns are similar for estimates based on assuming entry and exit to nine workers.

limited job creation or the result of simultaneous processes of job destruction and job creation offsetting each other? Second, do Ethiopian labour markets seem to be flexible enough to smoothly accommodate labour re-allocations? To deal with these questions, this paper offered an exploratory analysis of job flows using establishment-level data covering the period 1996–2007.

The analysis yielded several findings. First, the seemingly unimpressive contribution of manufacturing to overall employment masks high rates of job creation and destruction at the firm level. Second, economic dynamism and labour market flexibility are reflected in the high churning rate (24% per year) with more than a quarter of jobs either created or destroyed each year to accommodate a 4% annual average net employment growth. The re-allocation of jobs intensifies during periods of strong net employment growth displaying a pro-cyclical pattern which is different from that observed in advanced countries. Third, between 50 and 55% of new jobs may be attributed to firm entry. However, such contributions are transitory and small firms face a high risk of exit and a low likelihood of graduating to a larger firm size category. Consequently, during the time period under analysis, we find a movement of labour to larger, more capital-intensive firms. The bulk of this re-allocation is an intra-industry phenomenon (accounting for 86% of the job flows), reflecting substantial firm-level heterogeneity in job creation and destruction. Fourth, the regression analysis shows that most of the variation in gross job flows is explained by industry and time fixed effects. An exploration of the industry-specific differences such as differences in technology, the industry skill-mix, the costs associated with creating a new job and demand conditions which may determine job flows is still awaited.

The analysis reported here is based on a subset of manufacturing firms, that is, those with more than ten employees, and clearly a more comprehensive analysis is needed. However, firms in our sample account for more than two-thirds of paid employment in the formal manufacturing sector and in that sense provide a useful insight into employment dynamics in Ethiopia's modern manufacturing sector. Notwithstanding this limitation, the high rates of job re-allocation, substantial firm-level heterogeneity in job creation and the contribution of small firms to job creation and job destruction suggest that poor employment generation in Ethiopian manufacturing may not be attributed to lack of labour market flexibility.[25] This assessment

[25] While in general, labour laws that make it difficult to hire and fire workers may be expected to reduce labour market flexibility, given the high job re-allocation rate throughout the period under scrutiny, there is little evidence that such restrictions have a bearing on job flows in the current case. This may, of course, be the result of inadequate law enforcement rather than a reflection of labour market reforms (Caballero *et al.*, 2004). Nevertheless, this

is similar to the finding from recent firm-level studies on Africa (Frazer, 2005; Shiferaw, 2007) which show that the least productive firms are more likely to exit and that African manufacturing firms are subject to the same market scrutiny and competition as firms elsewhere. Thus, answers to the inability of Ethiopian and more generally African manufacturing firms in terms of creating and sustaining jobs probably lie in the broader political and economic constraints and uncertainties they face rather than lack of market competition and restrictive labour market regulations.

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does not change the claim that the figures tend to support the idea that restrictive labour regulations do not hamper job flows.

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Appendix

Table A1: Descriptive Statistics for Key Variables by Industry

Industry	Share (%) of number of workers in each category						Firm size (no. of employees)	Capital intensity (in thousand Birrs per worker)	Firm age (years)
	<20	20–29	30–49	50–99	100–499	≥500			
Non-metal	66.6	9.2	7.4	5.0	9.9	1.9	53.3	42.5	12.4
Wood and furniture	62.2	13.5	9.9	6.4	8.0	0.0	33.7	19.1	14.3
Food and beverage	47.6	13.3	10.3	10.2	14.2	4.4	95.7	74.0	15.2
Metal and machinery	44.5	16.5	12.1	11.4	14.3	1.2	60.5	93.9	13.1
Printing and paper	34.0	15.0	18.5	15.8	13.5	3.2	85.6	47.9	17.1
Leather and footwear	28.2	12.8	16.6	17.4	17.4	7.6	390.6	123.9	15.7
Textile and garments	25.7	9.1	11.3	12.7	17.8	23.4	97.0	37.1	22.0
Chemical and plastic	23.6	14.5	14.4	19.0	25.6	3.0	118.6	99.7	14.7
Manufacturing total	45.8	13.0	11.6	11.0	14.1	4.6	101.8	67.3	15.2
Standard deviation							292.5	39.7	15.2

Source: Authors' computation based on CSA data.
Notes: Figures are for the entire period of 1996–2007.

Table A2: Gross Job Creation (Assuming Entry Is Firm Birth and Exit Is Firm Closure)

	OLS	OLS	OLS	FGLS
Textile and garment	−0.0844** (0.0381)	−0.0844*** (0.0279)	−0.1242 (0.0774)	−0.0694 (0.0495)
Leather and footwear	−0.0713* (0.0381)	−0.0713** (0.0279)	−0.0773* (0.0448)	−0.0502* (0.0267)
Printing and paper	−0.0627 (0.0381)	−0.0627** (0.0279)	−0.0722* (0.0372)	−0.0713*** (0.0236)
Chemical and plastic	0.0107 (0.0381)	0.0107 (0.0279)	0.0188 (0.0653)	0.0595 (0.0407)
Non-metal	0.0239 (0.0381)	0.0239 (0.0279)	0.0339 (0.0427)	0.0061 (0.0287)
Metal	0.0746* (0.0381)	0.0746*** (0.0279)	0.0922** (0.0397)	0.0857*** (0.0239)
Wood and furniture	0.1545*** (0.0381)	0.1545*** (0.0279)	0.1490*** (0.0519)	0.1161*** (0.0332)
Age_{t-1}			0.0060 (0.0414)	0.0088 (0.0266)
Age^2_{t-1}			0.0002 (0.0012)	0.0001 (0.0007)
Small $firms_{t-1}$			0.1094 (0.2885)	0.3462* (0.1907)
Ln(Capital intensity)$_{t-1}$			0.0003 (0.0004)	0.0003 (0.0002)
Time dummies	No	Yes	Yes	Yes
Constant	0.1930*** (0.0269)	0.1776*** (0.0296)	−0.0368 (0.4595)	−0.2441 (0.3044)
Observations	88	88	80	80
R-squared	0.44	0.74	0.74	

Source: Authors' computations based on CSA's manufacturing census.

Notes: Robust standard errors in parentheses. *Significant at 10%; **significant at 5%; ***significant at 1%. 'Age' is the average age of firms in an industry; 'Small firms' represents the fraction of small firms in an industry, while 'Capital intensity' is the average capital per worker in an industry.

Table A3: Gross Job Destruction (Assuming Entry Is Firm Birth and Exit Is Firm Closure)

	OLS	OLS	OLS	FGLS
Textile and garment	−0.0148 (0.0303)	−0.0148 (0.0239)	0.0900* (0.0470)	0.0608** (0.0249)
Leather and footwear	−0.0345 (0.0303)	−0.0345 (0.0239)	−0.0156 (0.0272)	−0.0184 (0.0133)
Printing and paper	−0.0274 (0.0303)	−0.0274 (0.0239)	−0.0180 (0.0225)	−0.0315*** (0.0112)
Chemical and plastic	−0.0427 (0.0303)	−0.0427* (0.0239)	0.0162 (0.0396)	0.0082 (0.0218)
Non-metal	0.0085 (0.0303)	0.0085 (0.0239)	−0.0370 (0.0259)	−0.0298** (0.0130)
Metal	0.0445 (0.0303)	0.0445* (0.0239)	−0.0047 (0.0241)	0.0072 (0.0180)
Wood and furniture	0.1073*** (0.0303)	0.1073*** (0.0239)	0.0463 (0.0315)	0.0439** (0.0186)
Age_{t-1}			−0.0276 (0.0251)	−0.0088 (0.0141)
Age^2_{t-1}			0.0007 (0.0007)	0.0003 (0.0004)
$Small\ firms_{t-1}$			0.3823** (0.1751)	0.3069*** (0.0976)
$Ln(Capital\ intensity)_{t-1}$			0.0006** (0.0002)	0.0004*** (0.0001)
Time dummies	No	Yes	Yes	Yes
Constant	0.1070*** (0.0214)	0.2287*** (0.0253)	0.0574 (0.2788)	−0.0591 (0.1603)
Observations	88	88	80	80
R-squared	0.32	0.63	0.66	

Source: Authors' computations based on CSA's manufacturing census.

Notes: Robust standard errors in parentheses. *Significant at 10%; **significant at 5%; ***significant at 1%. 'Age' is the average age of firms in an industry, 'Small firms' represents the fraction of small firms in an industry, while 'Capital intensity' is the average capital per worker in an industry.

Table A4: Net Employment Growth (Assuming Entry Is Firm Birth and Exit Is Firm Closure)

	OLS	OLS	OLS	FGLS
Textile and garment	−0.0696 (0.0506)	−0.0696* (0.0388)	−0.2141** (0.1010)	−0.1158** (0.0526)
Leather and footwear	−0.0368 (0.0506)	−0.0368 (0.0388)	−0.0616 (0.0584)	−0.0273 (0.0316)
Printing and paper	−0.0353 (0.0506)	−0.0353 (0.0388)	−0.0541 (0.0485)	−0.0377 (0.0276)
Chemical and plastic	0.0534 (0.0506)	0.0534 (0.0388)	0.0026 (0.0852)	0.0586 (0.0451)
Non-metal	0.0154 (0.0506)	0.0154 (0.0388)	0.0708 (0.0558)	0.0297 (0.0314)
Metal	0.0301 (0.0506)	0.0301 (0.0388)	0.0968* (0.0518)	0.0798*** (0.0298)
Wood and furniture	0.0472 (0.0506)	0.0472 (0.0388)	0.1026 (0.0677)	0.0715* (0.0367)
Age_{t-1}			0.0336 (0.0541)	0.0158 (0.0288)
Age^2_{t-1}			−0.0006 (0.0015)	−0.0001 (0.0007)
Small $firms_{t-1}$			−0.2729 (0.3765)	0.0871 (0.2065)
Capital $intensity_{t-1}$			−0.0004 (0.0005)	−0.0001 (0.0003)
Time dummies	No	Yes	Yes	Yes
Constant	0.0860** (0.0358)	−0.0510 (0.0412)	−0.0941 (0.5997)	−0.2034 (0.3394)
Observations	88	88	80	80
R-squared	0.12	0.55	0.55	

Source: Authors' computations based on CSA's manufacturing census.

Notes: Robust standard errors in parentheses. *Significant at 10%; **significant at 5%; ***significant at 1%. 'Age' is the average age of firms in an industry, 'Small firms' represents the fraction of small firms in an industry, while 'Capital intensity' is the average capital per worker in an industry.