IZA

DISCUSSION PAPER SERIES

IZA DP No. 4623

The Dynamics of Job Creation and Job Destruction: Is Sub-Saharan Africa Different?

Admasu Shiferaw
Arjun Bedi

December 2009

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

The Dynamics of Job Creation and Job Destruction: Is Sub-Saharan Africa Different?

Admasu Shiferaw
University of Göttingen

Arjun Bedi
ISS, Erasmus University Rotterdam
and IZA

Discussion Paper No. 4623
December 2009

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

IZA Discussion Paper No. 4623
December 2009

ABSTRACT

The Dynamics of Job Creation and Job Destruction: Is Sub-Saharan Africa Different?

This paper analyzes the creation, destruction and reallocation of jobs in order to understand the micro-dynamics of aggregate employment change in African manufacturing. The nature and magnitude of gross job flows are examined using a unique panel data of Ethiopian manufacturing establishments over the period 1996-2007. We also assess the relative importance of firm demographics, industry effects and business cycles for job flows. The rates and patterns of job creation and destruction in our sample are comparable to the findings from developed and emerging economies suggesting that African firms adjust their labor force in a manner broadly similar to firms elsewhere and that African labor markets are not uniquely restrictive in terms of undermining job reallocation across firms. We also find, as in many other countries, that job reallocation is relatively higher in industries dominated by smaller and younger establishments. However, unlike other regions, job reallocation in our sample is pro-cyclical and its variation across industries bears little similarity to the patterns found in other developed and emerging economies. Small firms in Africa create jobs mainly at the point of market-entry and play a limited role in terms of contributing to manufacturing employment through post-entry expansion.

JEL Classification: J20, J23, J49

Keywords: job creation, job destruction, job reallocation, firm dynamics, Sub-Saharan Africa, Ethiopia

Corresponding author:

Arjun S. Bedi
Institute of Social Studies (ISS)
Erasmus University Rotterdam
Kortenaerkade 12
2518 AX Den Haag
The Netherlands
E-mail: bedi@iss.nl

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 labor 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% of employment[1]. From a macroeconomic perspective, this can to a large extent be attributed to the low level of domestic demand for manufactures in Sub-Saharan Africa and the lack of export orientation of its manufacturing sector. However, such aggregate level explanations do not exploit the rich firm level variation in job flows where actual employment decisions are taken. Recent micro level studies indicate that the behavior 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 (Bigsten and Gebreeyesus, 2007; Gunning & Mengistea, 2001; Van Biesebroeck, 2005) while relatively efficient firms stand better chances of survival as in other parts of the world (Frazer, 2005; Shiferaw, 2007, 2009; Söderbom, et al.,2006).

Notwithstanding the existing work on African manufacturing, the micro dynamics underlying the lackluster aggregate employment performance of African manufacturing and whether or not these underlying firm level processes are distinct from the rest of the world is not yet known. As reviewed briefly in the next section, a growing body of literature on gross job flows in developed countries and a few emerging economies has generated some stylized facts. This literature shows substantial firm heterogeneity in employment with simultaneous creation and destruction of jobs at rates in excess of 10% per annum even within narrowly

[1] This is far less than the nearly 30% employment share of manufacturing in East Asia, and about 20% share in developed countries

defined industries. It also shows that firm level employment adjustments are mostly persistent rather than transitory, and adjustment rates tend to be higher among smaller and younger firms as compared to larger and older firms. There is some evidence that the reshuffling of jobs across firms is countercyclical, especially in developed countries, meaning that it intensifies during periods of economic decline or slowdown. Researchers have also associated employment change 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 serves as an indicator of the degree of labor market flexibility and the efficiency of resource allocation. While Haltiwanger et al. (2008) provide the most recent cross-country analysis of job flows using harmonized firm level data for 16 countries, no African country features in their sample. In fact there are no comparable studies on the nature and magnitude of job creation and destruction in Sub Saharan African using establishment level data.

The current paper contributes to this literature by providing firm level analysis of job flows in the context of Sub-Saharan Africa. Apart from offering a rare description of job flows in this region, the analysis allows us to address the following interrelated and policy relevant questions: Is the lackluster aggregate employment performance of African manufacturing a result of limited job creation, relative to other countries, or is it a result of simultaneous processes of job destruction and job creation offsetting each other? After years of economic liberalization, are African labor markets flexible enough to accommodate a smooth reallocation of labor to its best use? How distinct are firm demographics in this region and their relative importance for job flows? Do business cycles play an important role in driving observed patterns of job flows as compared to industry and firm specific characteristics? These questions cannot be answered by looking at net employment change at higher levels of aggregation as the latter could be consistent with any underlying rates of job creation and

destruction. In this paper we address these questions directly by analyzing job creation and destruction rates in Ethiopian manufacturing using a unique census based establishment level panel data covering the period 1996-2007. The nature of the data also allows us to measure the relative importance of establishment entry and exit as well as establishment expansion and contraction for job flows so that we can draw a more complete picture of employment dynamics. Moreover, the relatively long span of the data and the distinct business cycles that it captures allows us to determine whether observed patterns of job creation and job destruction are primarily driven by business cycles or by technological factors and employer specific characteristics.

The remainder of the paper is organized as follows. In the next section we review the literature on job flows focusing on key stylized facts. In section 3 we provide a description of the panel data and some background information on the business environment in Ethiopia and its manufacturing sector. Section 4 introduces basic concepts and notation on the measurement of job flows followed by an analysis of job flows at the manufacturing sector level. Cross-industry variations in job flows are discussed in section 5 while section 6 presents a decomposition analysis in which we estimate the relative importance of establishment turnover and the expansion and contraction of incumbents. A regression analysis of job flows using industry level characteristics is provided in section 7 while section 8 provides conclusions and policy implications.

2. Stylized Facts on Job Flows

Firm heterogeneity in employment is a prominent feature of gross job flows in developed and emerging economies. Firms producing similar products not only experience simultaneous creation and destruction of jobs but also large variation in the rates of job creation and destruction. 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, Scarpetta and Schweiger (2008) studied job flows for a sample of 16 developed and emerging economies using harmonized 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 on 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%, 14.0% 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 et al., 2003).

Firm decisions to create and destroy jobs tend to be persistent, reflecting adjustments toward desired firm size rather than temporary layoffs and rehires (Davis and Haltiwanger, 1990, 1992). The literature also attempts to explain firm heterogeneity in job flows based on employer characteristics such as 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). Haltiwanger et al. (2008) find a positive rank correlation of job reallocation rates across industries in their sample of 16 countries suggesting that some industries have above average job reallocation rate across countries. Most studies also show that the overwhelming fraction of job reallocation occurs within sectors, defined in terms of industries, rather than across sectors.

With empirical evidence on job flows emerging for a growing number of countries, the cross country variation in job reallocation across firms has become an important

indicator of labor market flexibility. In this regard the experience of developed countries, particularly the US, serves as a benchmark to gauge the efficiency of labor allocation in emerging economies. Haltiwanger et al. (2008) show that while most of the cross country variation in job flows can be explained by industry and firm size effects (the firm size effect being dominant), a small yet significant part of the cross country variation maybe linked to differences in labor market regulations. Accordingly, countries with restrictive labor laws exhibit relatively less reallocation of jobs across firms, the reductions being stronger in those industries with inherently high job reallocation rates.

The other interesting aspect of the literature on job flows is the cyclical nature of job reallocation across producers. In developed countries, job reallocation rate (the sum of the absolute values of job creation and destruction rates) is countercyclical, i.e., 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 US and Canada is accompanied by a reduction in job destruction rate without significant improvement in job creation rate. 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 countercyclical movement of job reallocation. Campbell and Fisher (2000) argue that this is partly because of asymmetric adjustment costs. Job creation not only involves the actual adjustment cost of hiring new workers but also the expected cost of future separation, making job creation less responsive to business cycles than job destruction. It should be indicated that the countercyclical nature of job reallocation in the US is observed mainly among larger and older firms. This finding seems to be corroborated by the observation that transition economies, where the average firm size is smaller than that of the US, exhibit pro-cyclical movements in job reallocation.

An advantage of micro-level analysis of job flows is that it allows researchers to associate employment dynamics with firm demographics. Decomposition analyses show the relative importance of firm births and expansions for job creation, and the relative importance of firm deaths and contractions for job destruction. During the 1970s and 1980s, new establishments accounted for 20% of job creation in the US manufacturing while firm closures accounted for 25% of job destruction (Davis and Haltiwanger, 1990). The bulk of labor adjustment therefore takes place among continuing firms. Comparable numbers are not available for transition economies as the firm level data for these countries do not capture firm entry and exit.

3. Data and Background

This paper uses establishment level panel data from Ethiopian manufacturing covering the period 1996-2007. The data come from the annual manufacturing census carried out by the Central Statistical Authority (CSA) of Ethiopia. The census covers all establishments with at least 10 workers each of which are identified by unique identification numbers. The number of establishments increases from 623 in 1996 to 1339 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 small producers with less than 50 employees.

In 1992, Ethiopia launched a comprehensive set of economic reforms marking the country's transition to a market based economy after 17 years of socialism and military dictatorship. The first few years saw the opening up of the economy to international trade and to wider participation of the private sector. The business environment has shown large improvements since then. Except for a rise in inflationary pressure since 2005, macroeconomic conditions have been stable and the government continues to spend aggressively on physical infrastructure. The

economy grew at a respectable 5.6% during the 1990s and has continued to grow at even higher rates (about 8%) since the turn of the century. According to the World Bank's "Doing Business" report for 2009, it takes 7 procedures to start a new business in Ethiopia as compared to an African average of 10 procedures. The time it takes to go through these procedures has declined from about 44 days in 2003 to 16 days in 2009 which is again far shorter than the 2009 regional average of about 45 days. However, other aspects of the business climate are not as favorable. 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 investors and registering property. Although labor laws has been adjusted twice (in 1993 and 2003), the country is ranked 94 in the world in terms of the ease of hiring and firing workers. Since the independence of Eritrea in 1993, Ethiopia became landlocked and has shifted its trade gateway almost entirely to the smaller and more expensive port of Djibouti in the aftermath of the 1998-2000 border conflict with Eritrea. Political tension and uncertainty remain high, particularly since the disputed elections in 2005 that seriously damaged the domestic and international standing of the current government.

Unsurprisingly, the Ethiopian manufacturing sector is dominated by light consumer goods industries. About 60% of total manufacturing employment 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. Figure 1 plots manufacturing employment and sales in Ethiopia between 1996 and 2007. It reveals very little change in manufacturing employment during the first six 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. One of our tasks in this paper is to breakdown this aggregate picture and investigate the underlying micro-dynamics in line with the literature on gross job flows. As indicated earlier, little is known about the nature of job creation and destruction in African manufacturing

although the performance of this sector has implications for long-term growth. Although there are a few studies on firm growth for the region, typically these studies examine age and size effects on firm level net employment growth without addressing the dynamics of gross job flows (Bigsten and Gebreeyesus, 2007; Gunning & Mengistea, 2001; Van Biesebroeck, 2005).

4. From Firm Growth to Job Flows

The questions raised in this paper require detailed information on establishment level employment changes. In this section we start by introducing key concepts and notation used in the literature to measure employment change at the micro and higher levels of aggregation. The empirical distributions of these measurements will be presented toward the end of this section. In doing so we gauge the degree of firm heterogeneity in our sample and address the question as to what lies behind the weak aggregate employment outcome of African manufacturing. The magnitude of gross job flows also provides a sense of the flexibility of African labor markets relative to advanced and emerging economies. Furthermore, we exploit the distinct break between periods of sluggish and relatively fast employment growth evident in our sample (see Figure 1) to assess the effect of business cycles on job flow patterns.

Employment growth at the establishment level between time *t-1* and *t* is given by:

$$g_{ijt} = \frac{\Delta X_{ijt}}{m_{ijt}} = \frac{X_{ijt} - X_{ijt-1}}{0.5\left(X_{ijt} + X_{ijt-1}\right)} \qquad (1)$$

Where g stands for growth rate, *X* is the number of employees and, *i* and *j* index establishments and industries, respectively. Equation (1) shows a growth rate calculation in which change in employment is divided by average establishment size between two periods $\left(m_{ijt}\right)$ rather than dividing by initial size as in the traditional way of calculating growth rates. This approach is widely used in the literature on job flows

for a number of reasons. It minimizes measurement problems in 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 also yields a symmetric distribution of growth rates centered about zero and is bounded in the interval -2 and 2 which correspond, respectively, to establishment exit and entry; growth rates calculated in the traditional way range between zero and infinity, and do not capture entry and exit. The fact that equation (1) includes establishment birth and death in a single growth measure also makes it attractive for a consistent aggregation at the industry or sector level while having a monotonic and straightforward relation to the standard growth calculation up to a second-order Taylor series expansion (Davis et al., 1996).

Gross job creation in an industry refers to the total number of new jobs created by new establishments and expanding incumbents. Gross job creation rate (GJCR) is a size weighted average growth rate of all establishments in an industry with a positive growth rate and can be represented as:

$$GJCR_{jt} = \sum_{i \in J} \left(\frac{m_{ijt}}{M_{jt}} \right) g^{+}_{ijt} \qquad (2)$$

Where g^{+}_{ijt} is positive employment growth rate, m_{ijt} is average establishment size and M_{jt} is average industry size.

Gross job destruction refers to the total number of job losses in an industry due to the closure and contraction of establishments. Gross job destruction rate is calculated in a similar fashion as:

$$GJDR_{jt} = \sum_{i \in J} \left(\frac{m_{ijt}}{M_{jt}} \right) \left| g^{-}_{ijt} \right| \qquad (3)$$

Where $\left| g^{-}_{ijt} \right|$ 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 it belongs to, where both establishment and industry size are expressed as the average employment in periods *t-1* and *t*.

Net employment growth rate (*NEGR*) is the difference between *GJCR* and *GJDR*. The sum of *GJCR* and *GJDR* is referred to as Gross Job Reallocation Rate (*GJRR*). GJRR represents the total number of jobs created and destroyed relative to the size of an industry and it is essentially a measure of the extent of reshuffling of jobs across employers associated with a given net employment growth rate[2]. Finally, the excess job reallocation rate (*EJRR*) refers to gross job reallocation rate that is in excess of net employment change. This is calculated as the difference between *GJRR* and the absolute value of *NEGR*. Given the fact that a 5% NEGR can be achieved with only 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. To sum up the relationship between the various rates may be written as follows:

$$NEGR_{jt} = GJCR_{jt} - GJDR_{jt}$$
$$GJRR_{jt} = GJCR_{jt} + GJDR_{jt}$$
$$EJRR_{jt} = GJRR_{jt} - \left|NEGR_{jt}\right|$$

Based on the preceding discussion, we begin our empirical analysis by presenting the density of establishment growth rate as calculated in equation (1). This provides an assessment of the degree of heterogeneity in our sample. Figure 2a shows wide variation across manufacturing establishments in terms of employment growth rates. The unweighted growth distribution in Figure 2a shows that the creation and destruction of establishments is an important aspect of the processes of job creation and destruction. The bars labeled ‘entry’ and ‘exit’ indicate that Ethiopian

[2] *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 labor force

manufacturing has an 18-20% establishment entry rate and about 14-17% exit rate per annum. Most continuing establishments, however, experience modest adjustments of labor that are clustered in the neighborhood of zero growth rates. Figure 2b depicts the same distribution weighted by establishment size. The collapse in the height of the bars corresponding to entry and exit reveals that new and dying establishments are rather small in size, while the increased concentration around zero growth rate shows that large incumbents expand or contract rather slowly as compared to small establishments. Such an inverse relationship between firm size and growth is a widely recognized empirical regularity (Evans, 1987; Bigsten and Gebreeyesus, 2007; Gunning & Mengistea, 2001; Van Biesebroeck, 2005).

An important consideration in assessing establishment level employment changes is whether they represent transitory fluctuations in size or adjustments towards a desired level of employment. Table 1 offers a one year transition probability in firm growth regimes as a measure of persistence. It shows that about 54% of firms which have created jobs this year will continue to create jobs next year (41.4%) or maintain their current size (12.5%). Similarly, about 55% of establishments that shed jobs in the current period will either continue to cut jobs in the next period (44.5%) or maintain their current size (10.3%). This pattern suggests that most of the jobs created or destroyed are relatively persistent reflecting changes in desired employment rather than temporary layoffs and rehires. The degree of persistence in our sample is however far less than that of the US manufacturing partly because of the difference in the size composition of manufacturing industries.

Table 2 presents job flows for the entire manufacturing sector during 1996-2007 calculated on the basis of industry level flows. Employment shares of two-digit industries are used as weights to calculate the job flow rates at the manufacturing sector level. Similar to the patterns observed in other studies, we find relatively high annual rates of job creation and destruction. Over the period under scrutiny, the average annual rate of job creation is 17.3% while the average annual rate of job

destruction is 10.3%. Thus, over time, the manufacturing sector experiences a net employment growth of 7% between 1996 and 2007. This observation highlights the point that the weak aggregate performance of manufacturing employment during 1996-2001, as depicted in Figure 1, was not a result of inadequate job creation rate. The average GJCR during 1997-2001 was about 12.4% and it never fell below 10% at any point over that period. However, there was an equivalent and simultaneous job destruction of about 11.7% leading to a low net employment growth of about 0.7% during 1997-2001. The strong expansion of manufacturing employment during 2002-2007 was on the other hand the result of a close to 10 percentage point increase in GJCR relative to 1997-2001, coupled with a modest decline (of 2.5 percentage points) in GJDR. These patterns result in a remarkable 12.2% average net employment growth between 2002 and 2007. Even during this period of rapid employment growth, job destruction never fell below 7.4%; the maximum job destruction rate was observed in 1997 at 18.6%.

Table 2 also shows a 26.7% average gross job reallocation rate in our sample. This means that more than a quarter of all manufacturing jobs have either been created or destroyed each year to accommodate the 7% average net employment growth rate during 1996-2007. This amounts to an excess job reallocation rate of about 20% which is more surprising particularly in the first-half of the sample period where there was literally no change in aggregate employment. The reallocation of jobs across employers intensified to 30.55% during the upswing (i.e. 2002-2007) suggesting a pro-cyclical nature of job reallocation — a point which will be discussed in some detail later on in the text as it seems to be different from the counter-cyclical nature of GJRR in other countries.

How do these observations compare with job flows in other parts of the world? We provide a comparison with the cross country evidence in Haltiwanger et al. (2008) for the 1990s. The simultaneous occurrence of high rates of job creation and

destruction in Ethiopian manufacturing is quite similar to the patterns that have been observed in other developed and emerging economies. The 17% GJCR in our sample is, however, well above the 12.7% and 14.8% average GJCR in the OECD and Latin American countries, respectively, while being almost equal to the average job creation rate for transition economies. In terms of job destruction, the 10% average for Ethiopian manufacturing is slightly below the 12.7% GJDR for both the OECD and transition economies, and the 14% average for Latin American countries; it is however comparable to that of the US during the 1970s and 1980s. Apart from being pro-cyclical, the gross job reallocation rate in Ethiopian manufacturing is much closer to the OECD average of 25%, taking the entire sample period, while the reallocation rate accelerated during the upswing to match that of transition economies, a region with the highest job reallocation rate in the Haltiwager et al. (2008) sample.

5. Job Flows Across Industries

Having seen the sector wide employment dynamics, we continue our analysis of job creation and destruction at industry level as represented in equations 2 and 3 above. While the manufacturing sector as a whole shows high job creation and destruction rates, the rates vary across industries presumably due to differences in industry specific technologies and market structures. Figures 3 and 4 plot GJCR and GJDR, respectively, for eight two-digit 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 shown in Figure 3, the rapid increase in job creation during the second half of the sample period is experienced by all industries, albeit at different rates. 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 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 differences in technology and market structure. At the same time, there is evidence of convergence in job creation rates during the upswing as the gain in job creation rate since 2002 has been more pronounced in industries with below average performance[3].

Figure 4 shows that all industries, except food and beverage, have experienced a reduction in gross job destruction rate in the second sub-period. In comparison with GJCR, there is less disparity across industries in GJDR; the standard deviations are 8% and 4.5%, respectively. The spread in job destruction has also narrowed down since 2002 as job destruction rates declined sharply for industries with above average GJDR. While the ranking of industries is not very distinct particularly for industries with job destruction rate close to the sector average, there is enough variation to suggest that certain industries have relatively higher job destruction rates than others irrespective of business cycles. It is worth noticing 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 created more job opportunities and employment growth is associated with sizable readjustment of employment positions across firms. This point is further supported by Figure 5.

Figure 5 shows an interesting aspect of job flows where net employment growth is positively correlated with gross job reallocation rate. This suggests that fast growing industries in Ethiopian manufacturing are characterized by massive reallocation of labor across establishments. On the one hand, this suggests that labor market

[3] The coefficient of variation of GJCR was about 0.54 until 2001 and has declined to 0.34 since 2002.

regulations that simplify the hiring and firing of workers could have a positive effect on net employment growth in these industries. On the other hand, despite the country's low ranking in terms of the ease of hiring and firing of workers, the job reallocation rate in Ethiopia is comparable to that of developed and emerging economies suggesting that labor market regulations are not exceptionally restrictive. A likely explanation is that the labor law may still be restrictive but it is not strictly adhered to by businesses because of weak law enforcement mechanisms.

Haltiwanger et al. (2008) find a strong rank correlation between industry level job flows in OECD, Latin American and transition economies and US manufacturing industries – meaning that industries with higher/lower job creation rates in the US also tend to have higher/lower job creation rates in comparator countries. Looking at the rank correlation of GJRR for the eight industries in Ethiopian manufacturing with that of the US and Canada during 1972-1992 as reported in Baldwin et al. (1998), we find a very small positive correlation which is not statistically significant. This outcome is unsurprising given the vast difference in the composition and degree of sophistication of Ethiopian manufacturing as compared to advanced and emerging economies. We also find that the industries with better than average net employment growth in our sample are not the priority areas indicated in the Ethiopian government's industrial policy which include the food processing, textile and leather industries. The latter are given priority mainly because they fit well with the government's overall development strategy which is widely known as ADLI (Agricultural Development Led Industrialization) and seeks to promote backward linkages of manufacturing with agriculture.

As already indicated, the other noticeable difference between our results and the observation from developed countries is the cyclical nature of job reallocation. In advanced economies job reallocation is countercyclical while in the Ethiopian sample it is pro-cyclical. In the US and Canada this is underpinned by relatively higher variability in job destruction rates during economic boom and bust as

compared to job creation. The reverse is true in our sample. The shift from a sluggish performance in manufacturing employment during 1996-2001 to a strong expansion during 2002-2007 is characterized by a sharp increase in gross job creation with a modest change in job destruction. Not only is the cyclical nature of job reallocation different in our sample but the underlying cause is also distinct.

6. Decomposition of Job Flows

As indicated in Figure 2, Ethiopian manufacturing experiences very high establishment entry and exit rates which are likely to play a critical role on job flows. In this section we associate the life-cycle of establishments with job creation and destruction. Our objective is to show the relative importance of producer turnover for gross job flows in juxtaposition with the role of expansion and downsizing of incumbents. We do so by providing a simple decomposition of gross job creation into the fraction of jobs created by the expansion of incumbents and by the entry of new establishments. Similarly, gross job destruction is broken down into jobs lost due to downsizing and bankruptcy of incumbents.

Figure 6 shows that most new jobs, about 55%, are created by new establishments while the expansion of incumbents accounts for the remaining 45%. This relative importance is not sensitive to business cycles and seems to reflect the underlying structure of the sector. Since most entrants are relatively small in size, this observation corroborates the well recognized fact that small firms play a disproportionately larger role in gross job creation (relative to their share in total employment). Job destruction in our sample occurs mainly through the contraction of incumbents which contributed for about 60% and 52% of job losses during 1997-2001 and 2002-2007, respectively. The slowdown in sector-wide job destruction during the upswing is thus entirely due to a decline in the rate of contraction of incumbents, as the share of job losses due to firm closure actually increased from 40% to about 48%. It is interesting to note that both the rate of establishment exit (Figure 2a) and its contribution to job destruction (Figure 6) went up rather than

down during the rapid aggregate expansion since 2002 pointing to the relentless pressure of competitive selection in this market. Nonetheless, the fact that most exiting establishments are small producers which probably joined the market recently explains why the net effect is a drop in sector-wide job destruction rate during the upswing, albeit by only 2.5 percentage points.

The size distribution of firms is known to play a crucial role on job flows. Considering manufacturers that employ at least 50 workers as large establishments, we report in Table 3 the decomposition of job flows by establishment size. Although small establishments account for about 15% of total employment in our sample, Table 3 shows that they contribute to one-third of new jobs both during periods of slow and rapid aggregate employment growth. Small producers contribute to job creation mainly at the point of entry to a market (21.57%), about twice their contribution through post-entry expansion (10.52%). Large establishments account for the remaining two-thirds of new jobs with a slight increase in contribution during the upswing. The relative importance of entry and expansion for job creation among large establishments is nearly symmetric with entry having a slight edge.

Figure 6 has shown that the decline in GJDR is due to a slowdown in the degree of contraction of continuing establishments rather than a reduction in the rate of exit. The lower panel of Table 3 reveals that the slowdown in job losses due to establishment contraction is evident only among large producers where its contribution has dropped from 47% of all job losses during 1997-2001 to 41.4% during 2002-2007. At the same time, job losses by small producers have gone up from about 27% of total job losses during 1997-2001 to nearly one-third during 2002-2007 an increase both in terms of contraction as well as exit. The expansion of manufacturing employment in the second sub-period is therefore accompanied by a reallocation of labor from small to large establishments.

The heterogeneity in job flows across producers may partly be traced to the choice of production technology, an important aspect of which is the choice of input proportions. Accordingly, we carry out a decomposition analysis based on capital intensity defined in terms of the capital-labor ratio; establishments with above average capital-labor ratio are considered to be capital intensive. It emerges from Table 4 that capital intensive establishments account for nearly 60% of job creation while producers with labor intensive technologies account for the balance. It shows that the rise in gross job creation during 2002-2007 was in fact mainly driven by the entry and 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, coupled with a higher rate of job retention among labor intensive establishments. However, since the reduction in overall GJDR during 2002-2007 (2 percentage points) is much less than the gain in GJCR (10 percentage points), there seem to have been a reallocation of employment toward the capital intensive end of the Ethiopian manufacturing sector.

The sizable excess reallocation of jobs raises the issue as to whether the excess churning is mainly an intra- or inter-industry reallocation jobs. In the latter case jobs will be reallocated from shrinking to expanding industries while in the former the adjustment is within industries. This can be shown by decomposing excess job reallocation using the method suggested by Davis and Haltiwager (1992):

$$\left[\left(GJRR_{St}-\left|NEGR_{St}\right|\right)M_{St}\right]=\left[\sum_{j\in S}\left(GJRR_{jt}-\left|NEGR_{jt}\right|\right)M_{St}\right]+\left[\sum_{j\in S}\left(\left|NEGR_{jt}\right|-\left|NEGR_{St}\right|\right)M_{St}\right] \qquad (4)$$

Where *S* stands for the manufacturing sector, *M* is average size and, *j* and *t* index industry and time. The left hand side of equation (4) represents the volume of excess job reallocation for the manufacturing sector expressed as the product of average manufacturing sector employment and excess job reallocation rate (the

difference between gross job reallocation rate and the absolute value of net employment growth rate). The first term on the right hand side of the equation captures the intra-industry excess job reallocation measured as the summation over all industries of the products of excess job reallocation rate and average size of the manufacturing sector at time *t*. The second term is the part of the excess job reallocation due to inter-industry reallocation of jobs underpinned by the deviation of net employment growth at the industry level from that of the manufacturing sector as a whole.

We find that 86% of excess job reallocation takes place within industries and only 14% occurs between industries. Excess job reallocation is therefore overwhelmingly an intra-industry phenomenon reflecting the reshuffling of jobs across establishments producing broadly similar products. There is some variation over time where the inter-industry reallocation of jobs accounted for about 20% of excess job reallocation during 1997-2001 which has come down to 10% during the rapid growth of 2002-2007[4]. This finding is consistent with the observation from US manufacturing (Davis and Halitwanger, 1992) and from transition economies (Faggo and Konings, 2003) where the share of between-industry effect is even less than the Ethiopian case.

This section used a decomposition analysis to provide insights on the relative job flow contribution of firms at different points in their life cycle. The 55% contribution of firm entry/birth to job creation in our sample is well above the 40% contribution made by entrants in transition economies which in turn is higher than the 35% contribution in OECD countries as documented in Haltiwanger et al. (2008). The latter also show some variation in the contribution of small and large firms for job creation and destruction across the 16 countries they studied. Large firms that employ at least 50

[4]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.

workers account for about 60-70% of total job creation and destruction in a number of countries in the OECD (US, UK and France), in Latin American (Chile, Columbia and Mexico) as well as in emerging economies (Slovenia and Hungary).[5] Our findings in Table 3 are closer to the experiences of countries where large firms account for most of the job flows.

7. Econometric Analysis of Job Flows

The preceding sections have shown that job flows vary over time and across groups of establishments defined in terms of industries, producer size and capital intensity. In this section we consolidate this analysis by estimating econometric models of job reallocation taking into account time varying industry level characteristics, and industry and time fixed effects. The time varying covariates include the average age, capital intensity and productivity of establishments in an industry as well as the share of small establishments in an industry. Productivity is measured in terms of real value added per worker.

The choice of covariates is motivated by theory and existing empirical evidence. Models of passive learning in the industrial evolution literature suggest that as compared to young and small firms, older and larger firms grow at a slower pace as they are more likely to have approached the scale of operation dictated by their innate relative efficiency (Jovanovic, 1982; Lippman and Rumelt, 1982). This is essentially the result of market selection based on time invariant initial conditions generating simultaneous job creation and destruction within narrowly defined industries, an effect that is expected to taper off as the industry matures. One would therefore expect a negative firm size and age effect in a model of job reallocation. Theories of active learning however suggest that firms can change their fate by engaging in productivity enhancing activities. In this case the basis for selection and job reallocation is the degree of success in productivity enhancing activities, i.e.,

[5] There are also countries like Italy, Portugal, Argentina and Latvia where firms with less than 50 workers account for the majority of job turnover.

establishments that succeed in improving productivity expand while establishment that fail to do so lose jobs (Ericson and Pakes, 1995; Pakes and Ericson, 1998). In addition to changes in the capital-labor ratio we intend to capture such active learning processes by including labor productivity to represent other sources of productivity growth. Given the interest in the literature about the cyclical nature of job reallocation, we include net employment growth on the right hand side to capture the expansion or contraction at the industry level. The estimation model has the following structure:

$$GJRR_{jt} = \beta' X_{jt-1} + u_{jt}$$
$$u_{jt} = j + t + e_{jt} \qquad (5)$$

Where $GJRR_{jt}$ is gross job reallocation rate in industry *j* at time *t*, X_{jt-1} stand for industry level covariates lagged by one period, and u_{jt} is a composite error term with industry and time fixed effects as well as a white noise(e_{jt}).

We estimate (5) using a fixed-effect and a random-effects estimator. While a statistical test (a Hausman test) supports the use of a fixed effects model, we report estimates based on both specifications. The Hausman test may not be reliable in this particular application because the consistency of the test requires, as do the underlying panel data estimators, a large cross section and a short time span. Our sample contains eight industries observed over 11 years which is not the ideal setup for panel data estimation. Moreover, since industry level job flows tend to be persistent, we also estimate (5) using a feasible generalized least squares (FEGLS) estimation technique which provides efficient estimates in the presence of autocorrelated and heteroscedastic idiosyncratic errors (e_{jt}) . This estimator allows the autocorrelation coefficient to vary across industries and it is ideal under conditions where the time span is at least as large as the number of panels. All variables enter the estimation models with a one period lag as the contemporaneous values will obviously be influenced by current job flows.

Table 5 presents estimates based on the three estimators. All three sets of estimates reveal a similar story. Consistent with models of passive learning, job reallocation is higher in industries dominated by new/young establishments but it declines in a non-linear fashion as the industry matures. This result is statistically significant in the random effects and FGLS estimators but not in the fixed effects model. After controlling for the age effect, we find that the rate of job reallocation increases with the share of small firms in an industry across all estimators – a one percentage point increase in the share of small firms increase job flows by about 0.5 to 0.7 percentage points. The decrease in job reallocation with age and size suggests that passive learning is indeed an important explanation for the variation in job reallocation. However, the non-linearity of the age effect suggests that not all of the job flows in our sample are the result of selection based on initial conditions. There is no strong evidence for selection based on active learning as a crucial source of inter-industry variation in job flows – the coefficients on labor productivity and capital intensity are both statistically insignificant except for the fixed effects model which shows a small positive association with capital intensity.

Interestingly, all estimators indicate a statistically significant positive association between net employment growth and gross job reallocation rates suggesting that job reallocation in our sample is strongly pro-cyclical. While this result confirms the previous observation in Table 2 and Figure 3, it is quite different from the findings from OECD countries, particularly the US and Canada, where job reallocation is consistently counter-cyclical.

Estimating the fixed effects model with OLS (not reported here) shows that 52% of the total variation in job reallocation is explained by industry fixed effects. Including time dummies increases the explanatory power by additional 20%. The time varying industry level indicators collectively explain no more than 10% of the total variation. This is consistent with our discussion in section 5 which shows that most of the

excess job reallocation in our sample is intra-industry rather than inter-industry similar to the findings for other developed and emerging economies.

8. Conclusions

This paper represents the first attempt at a detailed analysis of gross job flows in Sub-Saharan Africa using establishment level data. Key findings include the existence of high rates of simultaneous job creation and destruction behind the seemingly unimpressive contribution of manufacturing to overall employment in the region. The rates and patterns of job flows reported in this paper are very similar to the findings of other studies for developed and emerging economies. The manner in which African firms adjust their work force is thus broadly similar to the behavior of firms in other parts of the world. The reallocation of jobs across firms also does not seem to be restrained by restrictive labor laws and regulations as the job reallocation rates in our sample are consistent with the finding for developed and emerging economies. This might however be the result of inadequate law enforcement rather than a reflection of labor market reforms as seems to be the case in Ethiopia.

There are important cross-industry variations in job flows which seem to persist throughout the business cycle underscoring differences in technology and market structure. As in other countries the excess job flows we observed occur predominantly within two-digit industries rather than between industries. Somewhat different from OECD countries we find gross job reallocation to be pro-cyclical rather than counter-cyclical; this could partly be because of the deindustrialization process in developed countries with an ever decreasing share of manufacturing in total employment. While there is strong rank correlation of two digit industries in developed and emerging economies with that of the US in terms of job creation and destruction rates, such a correlation does not exist with industries in Ethiopian manufacturing probably because of differences in the degree of sophistication and industrial structure. This indicates, perhaps unsurprisingly, that African

manufacturing is not growing in the same direction as in OECD and emerging markets.

Some of the other findings are also quite informative. The growth of manufacturing employment in Ethiopia during the second half of the study period was driven mainly by new establishments joining the sector for the first time, a degree of contribution well above that of new firms in transition economies which in turn is bigger than that of OECD countries. Further improvements in the business environment to reduce entry barriers will therefore be instrumental for the continuation of the current momentum. However, equally important is the ability of incumbents to create more jobs and retain them. At the moment downsizing of large incumbents is the main source of job destruction.

Moreover, our results suggest that while there is no shortage of business startups which create jobs at the moment of entry, such small establishments contribute less to job creation through subsequent expansion. A similar observation has been made by other firm level studies in Africa which show a lack of graduation of small firms into medium and large size categories. While it is true that small firms grow faster than large firms, as documented in a number of firm level studies, the growth rate does not seem to be strong enough to catapult them into a different size category at least in the African context. More needs to be done therefore to enhance the post-entry performance of small establishments. Given the cut-off point of 10 workers in our sample, the problem is likely to be more binding for firms that fall below this size threshold. As indicated earlier, the industries that showed better than average performance in terms of job creation and net employment growth are not the priority areas indicted in the Ethiopian government's industrial policy. While this does not necessarily imply a radical policy shift based on employment considerations alone, the study provides enough evidence to revisit the industrial policy such that fast growing industries also receive policy support.

References:

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, 3, 347-356.

Bigsten, A., and M. Gebreeyesus. 2007. “The Small, the Young, and the Productive: Determinants of Manufacturing Firm Growth in Ethiopia.” *Economic Development and Cultural Change* 55, 813-840.

Bigsten, A., P. Collier, S. Dercon, M. Fafchamps, B. Gauthier, J.W. Gunning, R. Oostendorp. C. Pattillo, M. Soderbom, and F. Teal. 2005. “Adjustment Costs and Irreversibility as Determinants of Investment: Evidence from African Manufacturing,” *The B.E. Journals in Economic Analysis and Policy* 4, 1, 1-29.

Bigsten, A., P. Collier, S. Dercon, M. Fafchamps, B. Gauthier, J.W. Gunning, A. Isaksson, A. Oduro, R. Oostendorp. C. Pattillo, M. Soderbom, M. Sylvain, F. Teal, and A. Zeufack. 1999. “Investment in Africa’s Manufacturing Sector: A Four Country Panel Data Analysis,” *Oxford Bulletin of Economics and Statistics* 61, 489-512.

Campbell, J., and J. Fisher. 2000. “Aggregate Employment Fluctuations with Microeconomic Asymmetries.” *American Economic Review* 90, 5,1323-1345.

Davis, S., and J. Haliwanger. 1990. “Gross Job Creation and Destruction: Microeconomic Evidence and Macroeconomic Implications.” *NBER Macroeconomic Annuals* 5, 123-168.

Davis, S., and J. Haliwanger. 1992. “Gross Job Creation, Gross Job Destruction, and Employment Reallocation.” *The Quarterly Journal of Economics* 107, 3, 819-863.

Davis, S., J. Halitwanger, and S. Schuh. 1996. *Job Creation and Destruction*. The MIT Press, Cambridge, Massachusetts.

Ericson, R. and A. Pakes. 1995. " Markov-Perfect Industry Dynamics: A Framework for Empirical Work," *Review of Economic Studies* 62:53-82.

Evans, S.D. 1987. "The Relationship Between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries." *Journal of Industrial Economics* 35, 567-81.

Faggio, G., and J. Konings. 2003. "Job Creation, Job Destruction, and Employment Growth in Transition Countries in the 90s." *Economic Systems* 27,129-154.

Frazer, G.2005. 'Which Firms Die? A Look at Manufacturing Firm Exit in Ghana.' *Economic Development and Cultural Change* 53, 3, 585-617.

Gunning, J.W., and T. Mengistae. 2001. "Determinants of African Manufacturing Investment: The Microeconomic Evidence," *Journal of African Economies* 10,2,48-80.

Haltiwanger, J., S. Scarpetta, and H. Schweiger. 2008. "Assessing Job Flows Across Countries: The Role of Industry, Firm Size and Regulations." *NBER Working Paper* No. 13920.

Jovanovic, B. 1982. 'Selection and the Evolution of Industry.' *Econometrica* 50,3, 649-70.

Lippman, S., and R. Rumelt. 1982. "Uncertain Imitability: An Analysis of Interfirm Differences Under Competition." *Bell Journal of Economics*, XIII, 418-438.

Pakes, A. and R. Ericson.1998. “Empirical Implications of Alternative Models of Firm Dynamics, ” *Journal of Economic Theory* 79, 1, 1-46.

Shiferaw, A. 2007. “ Firm Heterogeneity and Market Selection in Sub-Saharan Africa: Does it Spur Industrial Progress?” *Economic Development and Cultural Change* 55, 2, 393-423.

Shiferaw, A. 2009. “ The Survival of Private Sector Manufacturing Establishments in Africa: The Role of Productivity and Ownership?” *World Development* 37, 3, 572-584.

Soderbom, M., F. Teal, A. Harding. 2006. “ The Determinants of Survival Among African manufacturing Firms,” *Economic Development and Cultural Change* 54, 533-555.

Tybout, J. 2000. “Manufacturing Firms in Developing Countries: How Well Do They Do, and Why?” *Journal of Economic Literature* 38 (March): 11-44.

Van Biesebroeck, J. 2005. “Firm Size Matters: Growth and Productivity Growth in African Manufacturing.” *Economic Development and Cultural Change* 53, 3, 545-583.

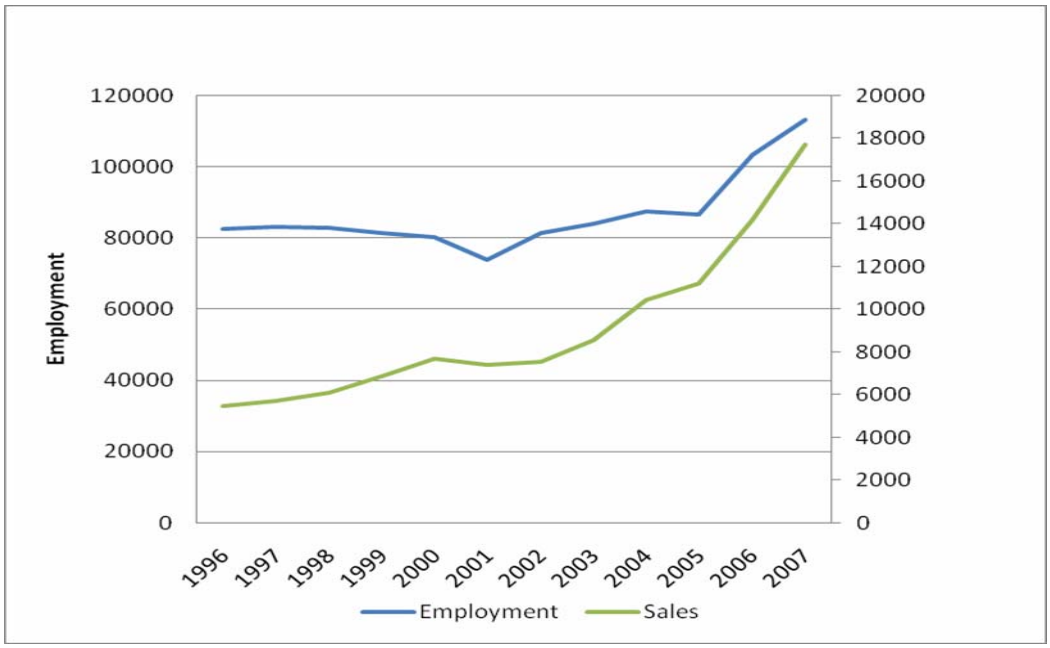

Figure 1: Manufacturing Employment and Sales in Ethiopia.

Note: Sales values are on the second y-axis in million Ethiopian Birr and employment figures are number of employees in the manufacturing sector

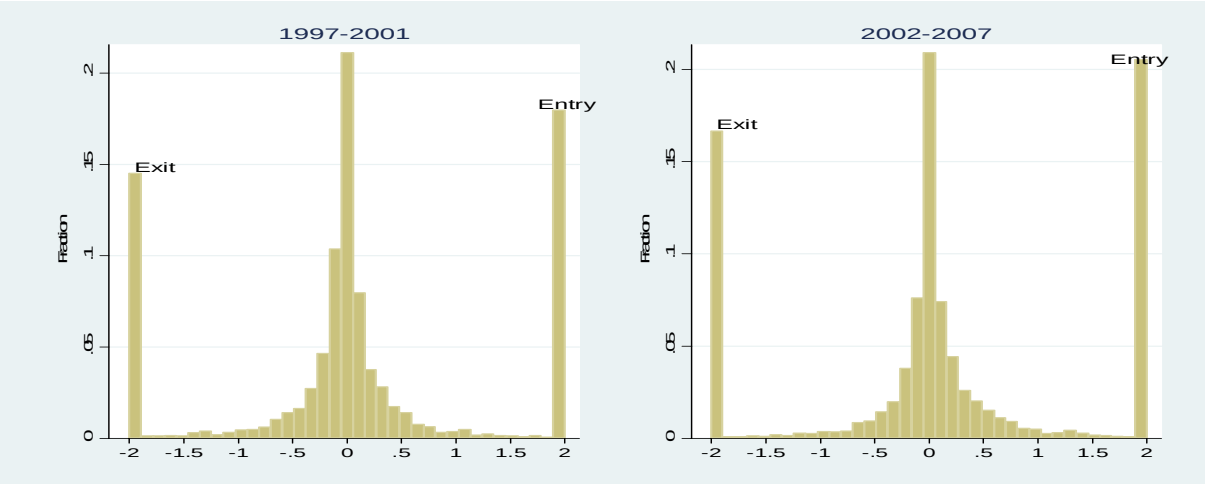

Figure 2a : Unweighted Distribution of Establishment Level Employment Growth Rate

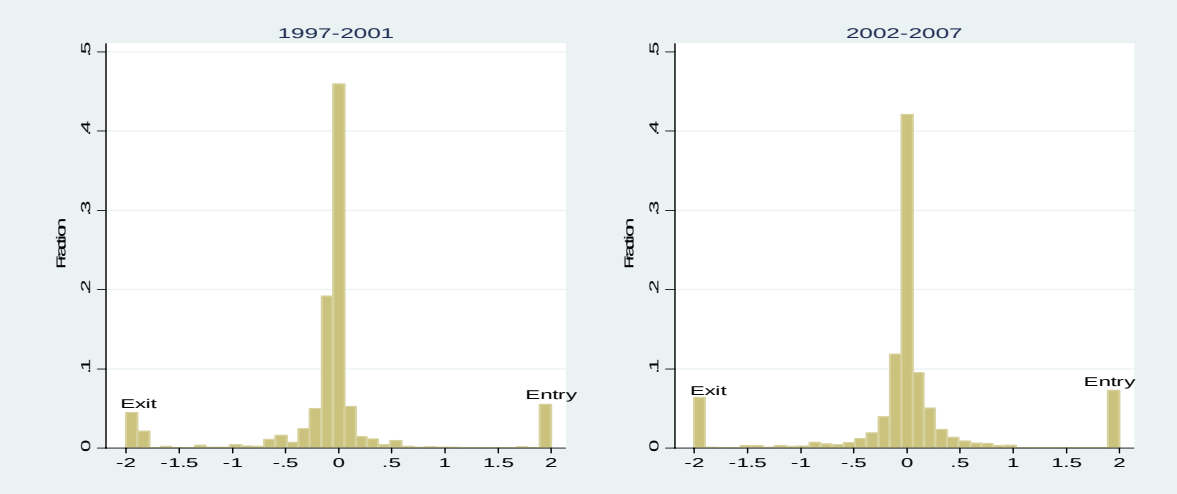

Figure 2b : Size Weighted Distribution of Establishment Level Employment Growth Rate

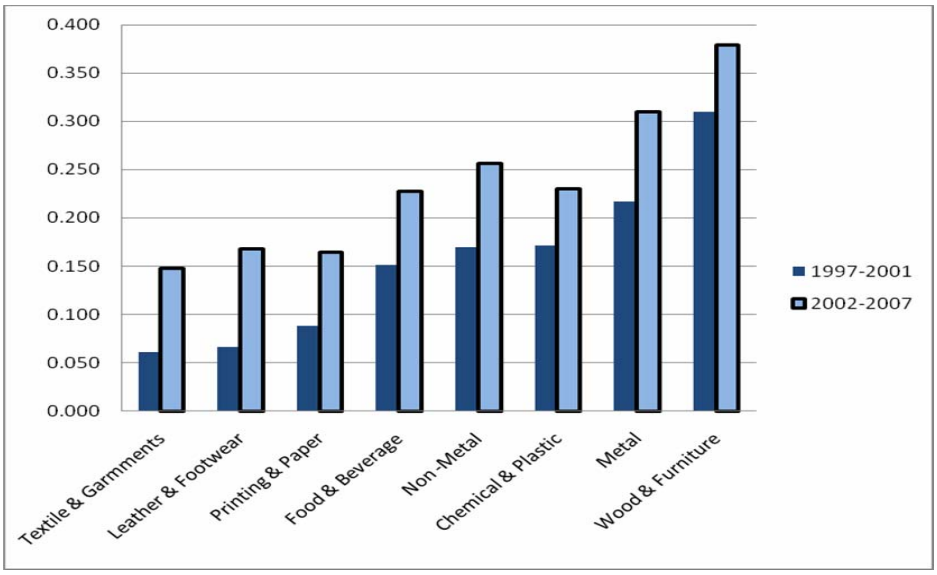

Figure 3: Gross Job Creation Rate by Industry

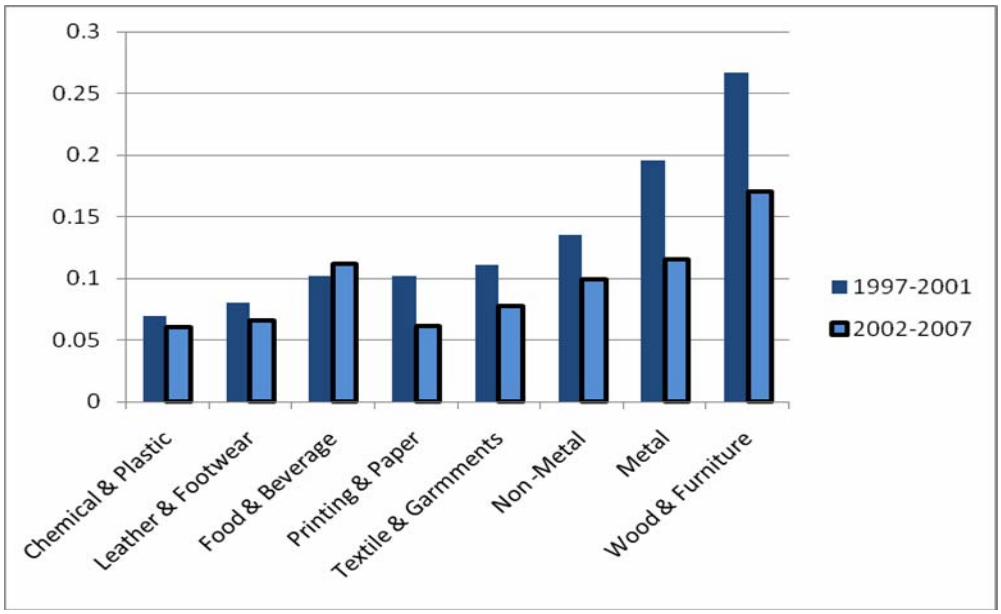

Figure 4: Gross Job Destruction Rate by Industry

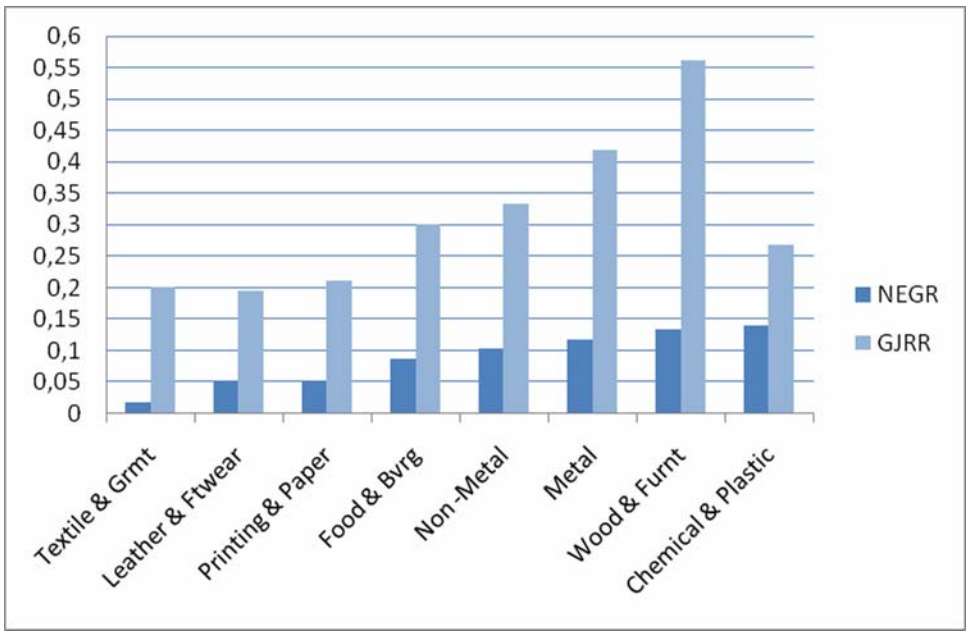

Figure 5: Net Employment Growth and Gross Job Reallocation (1997-2007)

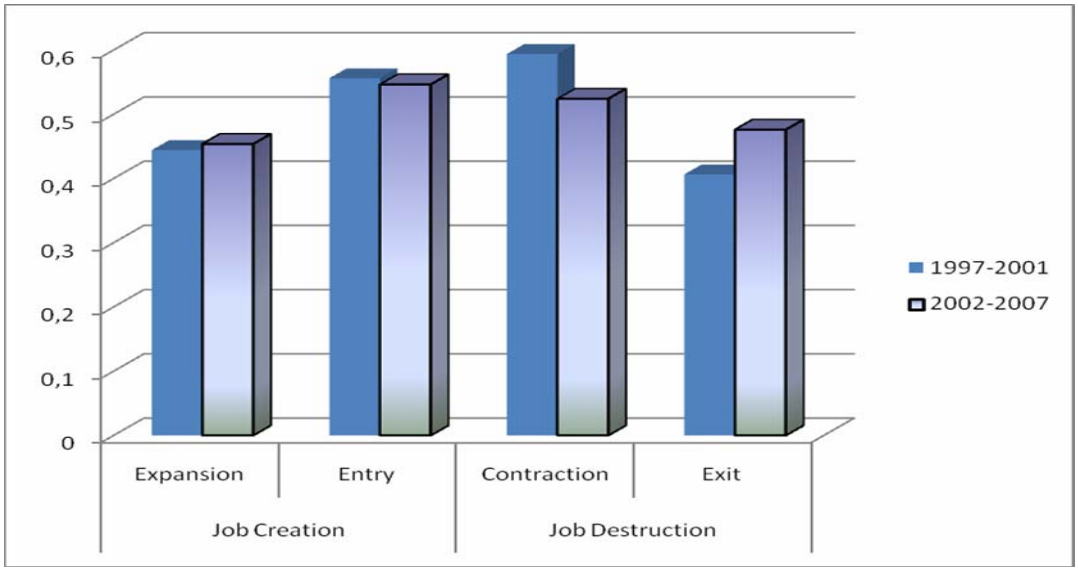

Figure 6: Decomposition of Gross Job Creation and Destruction Rates

Table 1: One period transition probabilities in firm growth regimes (%)

	Growth Regimes			
	Positive	**Zero**	**Negative**	**Total**
Positive	41.4	12.5	46.1	100
Zero	38.9	28.9	32.2	100
Negative	45.2	10.3	44.5	100

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

Figures exclude entry and exit.

Table 2: Job Flows in Ethiopian Manufacturing

	GJCR	GJDR	NEGR	GJRR	EJRR
1997	0.1342	0.1861	-0.0519	0.3202	0.2683
1998	0.1248	0.1049	0.0199	0.2297	0.2098
1999	0.1042	0.0929	0.0112	0.1971	0.1859
2000	0.1335	0.1019	0.0316	0.2354	0.2038
2001	0.1230	0.0973	0.0256	0.2203	0.1946
2002	0.2238	0.0849	0.1389	0.3088	0.1698
2003	0.1306	0.0834	0.0473	0.2140	0.1667
2004	0.1463	0.0736	0.0727	0.2199	0.1472
2005	0.1966	0.0882	0.1085	0.2848	0.1763
2006	0.2980	0.0789	0.2192	0.3769	0.1577
2007	0.2871	0.1418	0.1453	0.4289	0.2836
Period Averages					
1997-2001	0.1239	0.1166	0.0073	0.2406	0.2125
2002-2007	0.2138	0.0918	0.1220	0.3055	0.1836
1997-2007	0.1729	0.1031	0.0698	0.2760	0.1967
Other Regions (1990s)					
OECD	0.127	0.127	0.000	0.254	0.223
Latin America	0.148	0.140	0.008	0.288	0.248
Transition Econ.	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.(2006) for other regions.

Table 3: Decomposition of Job Creation and Destruction by Firm Size

	Small Firms			Large Firms		
Job Creation	Expansion	Entry	Total	Expansion	Entry	Total
1997-2001	0.0980	0.2353	0.3332	0.2773	0.3894	0.6668
2002-2007	0.1052	0.2157	0.3209	0.3484	0.3306	0.6791
1997-2007	0.1019	0.2246	0.3265	0.3161	0.3574	0.6735
Job Destruction	Contraction	Exit	Total	Contraction	Exit	Total
1997-2001	0.0941	0.1747	0.2688	0.4701	0.2611	0.7312
2002-2007	0.1097	0.2140	0.3237	0.4144	0.2619	0.6763
1997-2007	0.1026	0.1961	0.2987	0.4398	0.2615	0.7013

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

Note: Job creation and destruction rates in the two size groups add up to 1 (or 100%) in a raw

Table 4: Decomposition of Job Creation by Factor Intensity of Firms

	Labor Intensive			**Capital Intensive**		
Job Creation						
	Expansion	Entry	Total	Expansion	Entry	Total
1997-2001	0.2558	0.1780	0.4339	0.1882	0.3689	0.5571
2002-2007	0.1676	0.2239	0.3915	0.2855	0.3120	0.5976
1997-2007	0.2077	0.2030	0.4107	0.2413	0.3379	0.5792
Job Destruction						
	Contraction	Exit	Total	Contraction	Exit	Total
1997-2001	0.2489	0.2376	0.4865	0.3436	0.1608	0.5045
2002-2007	0.1926	0.1985	0.3912	0.3267	0.2686	0.5953
1997-2007	0.2182	0.2163	0.4345	0.3344	0.2196	0.5540

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

Note: Job creation and destruction rates in the two groups add up to 1 (or 100%) in a raw.

Table 5: Panel Data Estimation of Gross Job Flows

	FE	RE	FGLS
Age_{t-1}	-0.0493 (0.0381)	-0.1151*** (0.0355)	-0.0977*** (0.0312)
Age^2_{t-1}	0.0015 (0.0011)	0.0032*** (0.0010)	0.0029*** (0.0009)
$Small\ Firms_{t-1}$	0.7760*** (0.2714)	0.5391*** (0.1315)	0.6581*** (0.1314)
K/L_{t-1}	0.0012*** (0.0004)	0.0003 (0.0004)	0.0005 (0.0003)
Y/L_{t-1}	-0.0001 (0.0004)	0.0000 (0.0006)	0.0002 (0.0003)
$NEGR_t$	0.2865*** (0.0966)	0.3610*** (0.1279)	0.3979*** (0.0835)
Constant	0.0753 (0.4050)	0.9233*** (0.3304)	0.6177** (0.2893)
Observations	77	77	77
Number of id	8	8	8
R-squared	0.70		

Source: Authors' computation based on CSA's manufacturing census

Note: Standard errors in parenthesis. *, ** and *** stand for statistical significance at 10%, 5% and 1%, respectively.