

# SMEs, Age, and Jobs

## A Review of the Literature, Metrics, and Evidence

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## Abstract

The subject of which firms are the key employers—and which of these create or destroy jobs at a faster rate—is eminently important for academics and policy makers. The relative importance of small versus large firms and old versus young firms has in particular been extensively debated and studied. Nevertheless, the results often hinge on the questions that are asked. Moreover, the categorical definitions used to define firm size and age, and the nature and coverage of the data used have important effects. This paper lays out the relevant definitions and metrics that are central to the debate,

reviewing the main findings to date on the subject (with particular emphasis on results in developing economies). The paper adds updated results for 117 developing economies using the World Bank's Enterprise Survey Data, finding that (i) small and medium enterprises and older establishments are the dominant employers in the nonagricultural private sector labor force in developing economies, and (ii) net job creation is negatively correlated with establishment age and, although the effect of size is also negative, its significance is sensitive to the definition and methods used.

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## SMEs, Age, and Jobs: a Review of the Literature, Metrics, and Evidence<sup>1</sup>

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## I. Background and Motivation

The subject of job generation and preservation is key in economics, as it is through their jobs that most individuals generate their income. However, despite this central role, there is substantial confusion over which questions are being asked – let alone answered – and which measures are most appropriate. Understanding these questions is essential to framing the surrounding debate; and a good starting point is to ask those questions clearly as well as the metrics required to answer them. Specifically:

- 1) *Where are people employed?* This refers to where existing jobs are located in an economy, requiring figures that provide a snapshot of the stock of jobs at any period in time. We refer to this measure as the *share of the stock of employment*.
- 2) *What is the rate of job creation or destruction in an economy?* This concerns the addition or elimination of jobs over time, expressed as a ratio of existing jobs. This is oftentimes as important as understanding where people are employed as it illuminates the employment dynamism of an economy. Where appropriate firm-level data are available, researchers use measures not only of the net employment growth rate, but also of job creation and job destruction. These measures are referred to as the *net employment growth rate*, *gross job creation rate*, and *job destruction rate*, respectively.
- 3) *What are the relative contributions of different groups of firms to net employment growth, creation, and destruction?* A frequent focal point is the relative contribution of certain types of firms to these job dynamics. We call these measures the *share of net employment growth*, *share of gross job creation*, and *share of job contraction*.

Each of these measures provides complementary views of the jobs landscape: the first question helps identify the key areas for current employment; the second indicates where most jobs are created or destroyed; while the third measures the relative importance of certain types of firms in these changes. The answers offered to these questions by the literature – and the debate surrounding them – have been shown to be quite sensitive to the definitions employed, the metrics used, and data sources available. Nevertheless, several findings have become well-established. We address these in turn, laying out the definitional and measurement issues encountered.

This paper proceeds as follows. Section II discusses the key jobs metrics used in literature to date. Section III provides an extensive literature review, addressing measurement issues as well as data challenges in developing economies. Section IV elaborates results specific for developing economies based on these metrics. Section V concludes.

## II. Metrics of Job Creation and Firm Size

The last two decades have witnessed a substantial expansion of firm-level data that has in turn led to deepened analysis of the patterns of employment and job dynamics. These data helped to address important gaps, including the expansion of coverage to include both services and smaller firms, while building longitudinal databases has resulted in more precise measurements at shorter intervals, capturing entry and exit effects.<sup>2</sup> Importantly, these datasets incorporate firm-level characteristics, allowing for the comparison of the relative share of various groups of firms to the levels of employment and job growth (or contraction). As a result, the inclusion of these characteristics has effected a debate about where people are employed as well as where jobs are created or eliminated. Yet, despite this explosion of analysis in developed economies, similar sources are often unavailable in developing economies.

The resulting literature is far from unanimous. And conflicting findings are likely to be the result of underlying data sources – including whether data are panel or cross-sectional – and their coverage. Further, the metrics used also affect findings, stemming from issues such as what point is used as the starting base and how firms are classified. In fact, varying results can be obtained even using seemingly straightforward categories such as a firm’s size or its age. Adding further complications, whether data is collected at the “establishment” or “firm” level has non-trivial implications for the debate. An establishment is commonly understood to mean a singular physical business entity, while a firm is defined as the legal entirety of a business. In other words, a firm can encompass several establishments, a so-called multi-establishment firm. Measures of employment may be affected by the presence of multi-establishment firms as these firms may increase employment by opening new establishments rather than expanding employment in existing establishments.<sup>3</sup> Ayyagari et al (2014) note that the occurrence of multi-establishment firms in the developing world is infrequent and is likely to have little effect in those economies; however, the average number of multi-establishment firms in the World Bank’s Enterprise Surveys (which have been conducted in 215 rounds largely in the developing world) is 15 percent, indicating that this distinction must be taken into account.

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<sup>2</sup> Notably, the US Bureau of Labor Statistics (BLS) has developed and leveraged the microdata in the Business employment dynamics (BED) database for well over a decade (see Pivetz et al (2001) for example).

<sup>3</sup> In estimating firm-level figures for employment, moreover, changing ownership structure, either through mergers, acquisitions, or legal maneuvering, may have a substantial effect Haltiwanger et al (2013) and Pinkston and Speltzer (mimeo).

## 1. Share of the Stock of Employment

To define some basic terms for discussion, we refer to the total employment of each establishment  $i$ , by using  $E$ . We present the more general case with survey weights ( $w_i$ ), which account for establishment  $i$ 's varied probability of selection relative to the total number of establishments in an economy,<sup>4</sup> for census or administrative data sources,  $w_i$  would be equal to one for all establishments.<sup>5</sup> We start with the question of where people are employed, using a metric that is defined as the share of employment ( $s$ ) over each analytical category (e.g. firm size, age, exporting status) or “cut” ( $c$ ), given by:

$$(1) \quad s_{c,t} = \frac{\hat{E}_{c,t}}{\sum_c \hat{E}_{c,t}}$$

Where  $\hat{E}_{c,t}$  is the sum of establishment-level employment in a given analytical cut, given by  $\hat{E}_{c,t} = \sum_i E_{i,t} * w_i$ , where  $E_{i,t} * w_i$  is the (weighted) establishment-level estimate of total employment at time  $t$ . The share of employment by various cuts has garnered particular attention in the literature, yet this measure is partial as it only gives a measure of the current state of employment and not how it is changing over time.

## 2. Net Job Growth Rate, Job Creation Rate, Job Destruction Rate

To measure the changes in employment, we start with the measure of employment growth at the establishment level. In its most basic form, employment growth between period  $t$  and  $d$ , can be expressed as  $g_{i,t} = \frac{E_{i,t} - E_{i,t-d}}{E_{i,b}}$  Where  $E_{i,b}$  is employment in a base period,  $b$ . A natural choice for this base is the beginning period of measurement, here employment at a lagged time, that is  $b = t-d$  (where  $d$  is the time difference between the two periods). Davis et al (1996), however, note that using the initial size as the base can lead to upward bias in the growth estimate for smaller establishments: firms that reduce employment (say due to an adverse shock) are likely to be the quickest to increase employment after emerging from the shock. These same firms will then have a faster growth rate as they approach previous employment levels, showing a “regression to the mean” or “regression fallacy” effect. Using the end-period,  $t$ , as the base conversely may have an undesirable downward bias for smaller firms. Davis et al., in response, use a measure to mitigate this bias, where the difference in employment between the two time periods is divided by the average employment over the two periods.

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<sup>4</sup> Other weighting methodologies can include an establishment’s relative contribution to value added or sales.

<sup>5</sup> Official and administrative data sources, such as those produced by national statistical offices, are often considered as exhaustive and thus are by definition nationally representative. Where such sources are not available, nationally representative surveys can be employed; as these rely on randomly selected samples, though, they must be considered with their survey weights.

Arithmetically, this is given by:  $g_{i,t} = \frac{(E_{i,t} - E_{i,t-d})}{.5(E_{i,t} + E_{i,t-d})}$ . This measure has been commonly used in the literature (see Tornqvist et al 1985; Konings et al 1996; Pivetz et al 2001; Haltiwanger et al 2013; World Bank 2015). What is more, this measure mitigates the risk of higher growth rates due to a low starting base (as originally pointed out by Konings 1995) and shares similar qualities to rates based on log differences (Davis et al 1996).

But of course, these measures are often more helpful when aggregated. We denote the survey-weighted version of the establishment growth metric above as  $\hat{g}_{i,t}$ . Let  $\Delta E_i = (E_{i,t} - E_{i,t-d})$  represent the change in employment between the two periods;  $\Delta \hat{E} = \Delta E_i * wt_i$  gives the survey-weighted estimate. Likewise, simply express the two-period average employment as  $X_i = .5(E_{i,t} + E_{i,t-d})$ , with  $\hat{X} = X_i * wt_i$  being survey-weighted. The *net rate of employment growth* for a cut  $c$  then can be expressed as the sum of all establishment-level growth rates  $g_{i,t}$  multiplied by establishment  $i$ 's share of total employment in the cut; that is:

$$(2a) \quad g_c = \sum_{i \in C} \frac{\hat{X}_i}{\hat{X}_c} * g_{i,t}$$

Where:  $\hat{X}_c = \sum_{i \in C} \hat{X}_i$

Noting that cuts can be an economy as a whole, a given size category, sector, or others, the net rate of employment growth can be expressed in terms of the net employment growth rate of each sub-cut  $s$  multiplied by the relative employment contribution share of  $s$ , expressed as  $g_c = \sum_{s \in C} \frac{\hat{X}_s}{\hat{X}_c} * g_{s,t}$ .<sup>6</sup> A simplified but equivalent way to present equation (2a) is given by equation (2b) below<sup>7</sup>:

$$(2b) \quad g_c = \sum_{s \in C} \frac{\Delta \hat{E}_s}{\hat{X}_c}$$

<sup>6</sup> See Haltiwanger et al (2013).

<sup>7</sup> Equations (2a) and (2b) provide alternate ways of expressing the rates of sub-cuts. Consider sub-cut 1 accounting for 75% of  $X_c$  and sub-cut 2 accounting for the remaining 25%. Sub-cut 1 has a growth rate of 4%, while sub-cut 2 has a rate of 8%. Combining these two measures yields  $g_c = (4\% * 75\%) + (8\% * 25\%) = (3\%) + (2\%) = 5\%$ . Equation (2b) is simply expressed by  $g_c = (3\%) + (2\%) = 5\%$ , as all rates share the same denominator and thus are expressed additively. For presentation purposes, our results will be presented using the latter approach. Both styles of notation have been utilized in the relevant literature.

$\Delta E_i$  can be either positive or negative, and it is informative to separate positive-direction job creation rates from negative-direction job destruction (or contraction) rates. This distinction has been widely used and can be calculated separately for cases where  $\Delta E_i$  is positive and negative (using the absolute difference).

$$(2c) \quad g_{c,dir} = \sum_{i \in \mathcal{C}, dir} \frac{|\Delta \hat{E}_i|}{\hat{X}_c}$$

We distinguish *dir* to indicate the direction of  $\Delta E_i$ , and so includes (i) establishments with positive employment growth, or (ii) establishments with negative employment growth. These measures are referred to here as the *gross job creation rate* and *job contraction rate*, respectively.

### 3. Share of net job growth, share of gross job creation, and share of job contraction

A statement frequently heard among policy makers is that firms of a certain type contribute X% to job creation (or contraction). This metric simply represents the relative contribution to each rate by each sub-cut *s*. Using the formulae for the rates for net job growth, this rate is expressed as:

$$(3) \quad j_s = \frac{\Delta \hat{E}_s}{\sum_{s \in \mathcal{C}} \Delta \hat{E}_s}$$

Most often, the cut is considered at the economy-level and provides a measure for the contribution of various sub-cuts – small and medium enterprises (SMEs) versus large, young versus old, services versus manufacturing, etc.

## III. Literature Review of the Evidence on Employment Stock and Growth

### 1. Where are people employed? Share of Employment Stock<sup>8</sup>

Among the issues that have garnered the most attention in the literature is the role of firm size and whether large firms or SMEs are the largest employers in the private sector. Various theories predict that the answer to this question depends to a large extent on the economy's stage of economic development. Biggs and Oppenheim (1986) for instance argue that the size composition of firms evolves with the process of structural transformation, noting that – generally – the size distribution of manufacturing firms increases with the level of economic development. Several historical studies of the evolution of specific industries in the US and UK corroborate these findings (Sokoloff 1984; Berg 1992; Lloyd-Jones and Le Roux 1980). However, evidence

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<sup>8</sup> Annex I includes a comprehensive table of this literature, findings, coverage, and methods.



shows that elsewhere in most developed and developing economies, SMEs employ the largest proportion of the workforce.

In reality, the findings on where people are employed have showed marked sensitivity to the cutoff and method for defining firm-size categories. Just a handful of studies from the US make this clear. As noted above, Davis et al (1996) show that the base-size definition makes a substantial difference. They utilize manufacturing census data for the US spanning from 1972 to 1988 to illustrate the point. When size is defined using initial employment, large manufacturing establishments (over 250 employees) employ about 57% of the total private sector workforce; this share moves to about 60% when average employment size is used to categorize firms. For a size cutoff of 500 employees, large firms account for about 40% of employment (using the average size this figure is 42%). Neumark et al (2011) expand this work, using the US National Establishment Time Series (NEST) data from 1992 to 2001, covering manufacturing and services sector firms. In fact, contradicting the findings of Davis et al, they report that firms with fewer than 250 workers employ over half of the total private sector workforce, regardless of whether size is determined using initial or average employment.<sup>9</sup> Refuting this, Haltiwanger et al. (2013), employ a dataset<sup>10</sup> that covers all private sector establishments with at least one paid employee, from 1995 to 2005, finding that large firms are in fact the biggest employers of non-farm private sector labor in the US. In particular, they report that firms with 500 or more employees constitute roughly half of the total stock of employment in the US, with large and mature firms representing the single-largest plurality.

However, studies from other developed countries are less ambiguous on the role of SMEs as the major source of employment. Lawless (2014), for instance, uses panel data from Ireland (from 1972 to 2010) showing once again that the size cutoff matters. Firms with at least 50 employees account for less than one third of total employment while those with 250 or fewer employees constitute approximately two-thirds of the total workforce. Further, in a comprehensive study of census data from 18 (mostly OECD) countries, Criscuolo et al (2014) find that SMEs, defined as those with 250 or fewer employees, account for over 50% of total employment in all 18 countries except the US. In fact, in six of the countries (Brazil, Japan, Italy, New Zealand, Portugal, and Spain) firms with fewer than 50 employees account for the majority of employment. Using registry data from the UK (1997 to 2008), Hijzen et al (2010) report that firms with 250 or more employees account for about 53% of the total employment, although the contribution falls to approximately 42% when size is measured using average employment. Using manufacturing census data<sup>11</sup> from Norway (1976 to 1986), Klette and Mathiassen (1996) show that firms with 150 or fewer employees (regardless of whether firm size is

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<sup>9</sup> Using a size cutoff of 100 employees, the proportion accounted for by SMEs is 44%

<sup>10</sup> The US census Bureau's Longitudinal Business Database (LBD), updated and improved version of the data used by Davis et al (1996).

<sup>11</sup> Excluding firms where the owner is the only employee.

measured using initial or average size) account for about 60% of the total labor force. Similarly, Genda (1998), using census data of firms with 5 or more employees for Japan, reports that firms with fewer than 100 employees account for over 65% of the total, non-agricultural labor force.<sup>12</sup> In fact, Japan appears as somewhat of an outlier among OECD countries in that SMEs play such a large role. This is confirmed by Criscuolo et al (2014), who place the contribution of firms with fewer than 250 employees at about 85% of the total Japanese labor force.

In contrast to this wide body of findings for developed countries, there are few similarly comprehensive studies for developing countries. The results that are available, however, are fairly conclusive that SMEs are the majority source of private sector employment. Ayyagari et al (2014) provide evidence on this issue using cross-sectional data for 104 countries based on the World Bank's Enterprise Surveys.<sup>13</sup> They show that in low income and lower middle-income countries, firms with fewer than 100 employees (excluding those with fewer than 5), account for over 50% of total employment, but employ less than half the total workforce in upper middle-income and high-income countries. With a higher cutoff size of 250 employees, however, SMEs employ well over half of the total workforce. Similarly, Arrow et al (2014), using quarterly survey data from South Africa<sup>14</sup> between 2005 and 2011, report that firms with 250 or fewer employees account for over 50% of total employment.<sup>15</sup> Underscoring these findings is the well-documented and often-discussed dominance of very small (often self-employed and unregistered) enterprises in these economies (Tybout, 2000). Most available data for developing countries, such as the Enterprise Surveys exclude smaller (micro) and informal firms. Therefore, the contribution of small firms to employment share is likely to be underestimated in analysis using these data. Rijkers et al (2014) corroborate this using business registry data from Tunisia, covering firms of all sizes over the period 1996-2010.<sup>16</sup> Strikingly, self-employed workers alone account for about 28% of the total non-farm employment, while firms with fewer than 100 employees account for about 62% of total employment in an average year. Similar results reported for Egypt and the West Bank and Gaza find that firms with 5 or fewer employees account for over half of the total workforce in the private sector (World Bank 2015).<sup>17</sup>

Studies using manufacturing census data from Ethiopia and India underscore the effects of utilizing datasets that exclude the smallest firms. Bedi and Shiferaw (2013) use the annual Ethiopian manufacturing

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<sup>12</sup> This is even a conservative measure as taking into account firms with fewer than 5 employee would, therefore, raise this contribution.

<sup>13</sup> The World Bank's Enterprise Survey (ES) data is used for 64 of the countries; for the rest of the countries, data is from various sources.

<sup>14</sup> One of the countries not covered by Ayyagari et al (2014)

<sup>15</sup> The survey excludes firms that are not required to file for VAT (for instance, in 2009, only firms with a turnover of over one million South African Rand, roughly about \$130,000, were required to file for VAT), and hence is likely to underestimate the stock of employment accounted for by the SMEs.

<sup>16</sup> Though excluding agriculture and co-operatives.

<sup>17</sup> The study also finds that firms with 100 or fewer employees account for over half of the total employment in all 5 countries where data is available - Egypt, Jordan, Tunisia, Turkey and West Bank and Gaza.

census for firms with at least 10 employees from 1997 to 2007, reporting that firms employing fewer than 50 account for a scant 15% of total employment. However by excluding services firms as well as manufacturers with fewer than 10 employees this is likely a substantial underestimate: a survey conducted by the country's Central Statistical Agency (CSA) in 2011 shows that manufacturing firms with fewer than 10 workers<sup>18</sup> employed three times the total generated by all manufacturing firms with 10 or more employees (CSA, 2012, 2013). Hasan and Jandoc (2009) further illustrate the effect of this low-end censoring in India. They combine data from the annual manufacturing census of formally registered firms, conducted by India's Central Statistical Organization, with a similar dataset for unregistered manufacturing firms. They report that micro enterprises (with 1 to 5 employees) account for about 84% of total employment in manufacturing, while those with 200 or more employees account for only 10%. Excluding single-employee operations does not qualitatively change the picture: firms with 5 to 49 employees account for nearly 60% of the total manufacturing employment (ADB 2009).

Another important dimension in this debate is whether younger or older firms are more important in the share of stock of employment. Here there is greater consensus: older firms appear to be the most important contributors to the stock of employment, in developing and developed countries alike. In their recent comprehensive study for the US, Haltiwanger et al (2013) report that mature firms (10+ years) account for over 70% of the employment stock on average between 1992 and 2005. Further, Criscuolo et al (2014) also show that contributions to employment stock increases with firm age. In particular, mature firms account for over 60% of total employment. What is more, within each size category, older firms account for the largest share of employment stock, indicating that the results are not driven by the positive association between firm age and size. Klette and Mathiassen (1996) report similar results for Norway, showing that the share of the stock of employment steeply increases with firm age; in fact, firms 15 years or older alone account for over 85% of the total manufacturing sector employment.

The predominance of older firms holds in developing economies as well. Rijkers et al (2014) report that for Tunisia, employment shares increase with firm age, noting that firms that are 10 years or older account, on average, for about half of the total employment stock. Similarly, Ayyagari et al (2014) report that older firms, 11+ years of age, are the largest contributors to employment; large-old firms alone, for instance, account for about 35% of the total stock in their study. Eslava and Haltiwanger (2014) provide similar results using manufacturing census data in Colombia, noting that – at least among firms with 10 or more employees – the share of employment stock increases with age.

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<sup>18</sup> This survey excludes handcraft and cottage manufacturing establishments and is restricted to manufacturing establishments with less than 10 employees that utilize power-driven machines to produce goods and services.

## 2. Who creates (and destroys) jobs? Net employment growth, gross job creation, and job contraction

A strain of thought cites the predominance of (often older) SMEs as an indication of market failure; in efficient and undistorted markets, productive firms remain in business and grow, while unproductive ones leave the market. The persistence of small but old firms as majority employers can be regarded as problematic, and evaluating firm-growth dynamics is thus essential. However defining these metrics is often complicated: in developed economies a standard threshold of 500 or 250 employees is typically used as the SME threshold; in developing economies, the cutoff most commonly used is 100 employees. Complicating this issue are the clear and appreciable effects of whether initial or average firm size is used to categorize firms. Additionally, a growing number of studies focus on the role of firm age in the process of job creation. Although theoretical studies (e.g., Jovanovic 1982) assume that firm growth declines with age, the intuition behind this negative relationship is not often clear. On the one hand, younger firms may begin business with new and highly competitive ideas and strategies (Perez et al 2004), or these new firms are possibly more flexible to adapt to their environment than older ones. Alternatively, what new firms have in flexibility and preparedness, they lack in experience and resources. Younger firms may grow less as mobilizing suitable factors of production and establishing relations with customers and suppliers may take time. Further, models of learning by doing imply older firms benefit from their accumulated stock of experience and grow faster than younger ones (Coad et al, 2014).

Most existing studies focus on developed countries. In the US, Davis et al (1996) challenge the prevailing view that small firms are the largest contributors to net job creation, arguing that using initial size to categorize firms attributes undue credit to small firms. Using the average measure of size, they show that there is no systematic relationship between firm size and net job creation rates. Small firms indeed do have higher *gross job creation rates*. However, these firms also display higher *job destruction rates*. That is, they note that smaller firms demonstrate greater employment churning, observing that “[f]or both new jobs and the typical existing job, job durability increases with employer size” (p. 312). By contrast, the recent US study by Neumark et al (2011) shows that the association between firm size and *net job creation rates* is in fact negative. In particular, *net job growth rates* steeply decline with firm size (measured using the average employment level), although at a lower rate when the results are reported at the establishment instead of firm level. Underlying this pattern is the fact that *gross job creation rates* decline with firm size (when size is measured using the average employment size), albeit non-monotonically, while *job destruction rates* tend to slightly increase with firm size.<sup>19</sup>

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<sup>19</sup> The authors nevertheless did not report contributions to net job growth by firm size.

Again, Haltiwanger et al (2013) add a further twist to the debate. They show that the inverse relationship between firm size and *net job growth* persists even when the average measure of firm size is used. However, an interesting pattern emerges once start-up firms are singled out and treated separately. Start-up firms account for a large share of net job creation in almost all firm size classes, and particularly so among small firms. To disentangle the effect of start-ups, the authors employ regression analyses, reporting that the negative association between firm size and *net job creation rates* disappears (or becomes positive) once firm age is included, regardless of how firm size is measured.<sup>20</sup> In terms of job loss due to exit, there is an inverse relationship between size and exit, in line with findings elsewhere that small firms are more likely to exit than large ones.<sup>21</sup> They note, thus, “that the firms that have the most jobs create the most jobs, so workers looking for the places where the most jobs are being created should go where the jobs are: large and mature firms.” (p. 350). Since exit rates decline with firm age, the authors argue that this indicates the “up-or-out” phenomenon where new firms either grow fast or exit the market altogether.

Similar findings have been reported for other developed economies. Criscuolo et al (2014) show that small- and medium-young firms have higher net job growth rates than old-large firms (that is, firms 5 years or older and with 250 or more employees) in the 18 countries studied. Lawless (2014) likewise reports that firm size and *net job growth rates* are negatively associated. However, as in Haltiwanger et al (2013), start-ups play an important role, and when they are removed from the analysis, *net job growth rates* increase with firm size, lending support to the view that firm age is perhaps what truly matters. Although smaller firms exhibit high *gross job creation rates*, they also have the highest *job destruction rates*, resulting in a substantially negative *net job growth rate*. The Hijzen et al (2010) study on the UK did not report the association between firm size and *net job creation rates*. However, they show that small firms, with fewer than 20 employees, contribute more to *gross job creation* than they do to *job destruction*. Further, jobs created by smaller firms are no less durable than the ones created by larger firms.

Ayyagari et al (2014) argue that SMEs are the main contributors to net job growth in most developing economies. Of the 104 countries in their sample, 85 have positive *net job growth rates*. Among these, in the median country, firms employing 5 to 99 individuals account for about 75% of the total net jobs created. Moreover, in the 18 countries with negative *net job growth rates*, small firms in fact registered positive *net job growth rate*, meaning that job destruction by large firms (with 250+ employees) is so high as to outweigh the jobs created by small

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<sup>20</sup> It is important to note that even without controlling for firm age, the association between firm size and net job creation rates depends on how firm size is defined. Using average measure of firm size, the negative association disappears even without controlling for firm age and the association becomes positive when firm size is controlled for.

<sup>21</sup> See, for instance, Jovanovic (1982); Pakes and Ericson (1998); Aldrich and Auster (1986); Aga and Francis (2015).

firms. Nevertheless, given that the data they use is cross-sectional, firm exit and the associated job destruction is not accounted for, and limited information is provided on jobs created by new entrants.

Rijkers et al (2014) confirm the notion that SMEs account for a larger share of net job growth in Tunisia. In fact, every year from 1996-2010, on average, firms with fewer than 10 employees account for about 55% of total net employment growth and those with fewer than 100 employees account for 73%. Strikingly, for almost all firm size groups, all net jobs are created by firms that are one year-old or younger, indicating again the importance of firm age. They also confirm that, as s in Haltiwanger et al (2013), firm size and *net job creation rates* are negatively correlated without controlling for firm age. However, when firm age is controlled for, the association becomes positive indicating that net job growth rates are higher among larger firms. This is again an indication that firm age is perhaps more important than size to explain net job growth. Firm exit is negatively associated with size, but the association becomes mute once firm age is accounted for.<sup>22</sup> They report that firms with fewer than 100 employees account for about 49% (based on the average measure of size) to 56% (based on the base size) of *gross job creation*. With a higher cutoff size of 250 employees, the contribution becomes 56% and 67%, respectively. Contribution to *job destruction* by these firm categories is generally lower than their contributions to gross job creation. As a result, *net job growth rates* by firms with 250 or fewer employees is substantial. In fact, based on the base size definition, firms with fewer than 10 employees alone account for almost all the *net job growth*, although the figure drops to 60% when using the average measure of firm size.

Bedi and Shiferaw (2013) provide some additional evidence pointing to the importance of larger firms to job creation in Ethiopia. Although entry, often by smaller firms, accounts for over 50% of job creation, these jobs tend to be transitory as small firms have a higher likelihood of exit and a limited likelihood of graduating to a larger size category. As a result, over the 10 year period studied, there was a significant re-allocation of jobs from smaller to larger firms. In fact, small firms, between 10 and 50 employees, accounted for just about 28% of the gross job creation, on average. Similarly, Arrow et al (2014) show that larger firms exhibit higher *net job growth rates* in South Africa. Although the *gross job creation rate* (at 10%) is roughly similar across various firm size categories, *job destruction rates* decline monotonically as firm size increases, resulting in higher *net job growth rates* among larger firms.<sup>23</sup>

In terms of job dynamics and firm age, younger firms appear to play a dominant role than the older ones, both for developing and developed economies. Haltiwanger et al (2013) report the negative association between firm age and *net job creation rate* for the U.S is mainly driven by higher net job creation rates by start-up

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<sup>22</sup> World Bank (2015) provides similar results for Lebanon and Tunisia.

<sup>23</sup> The authors note that the dataset is likely to underestimate firm birth, potentially underestimating *gross job creation rates* among smaller firms since, as is widely documented, entrants tend to be smaller firms. Nevertheless, the authors conjecture that this fact doesn't substantively change the fact that larger firms have higher net job creation rates.

firms. Taking out these firms from the analysis substantially weakens the association. Nevertheless, if the analysis is restricted to surviving firms (i.e., firms that remained in business during the period studied), there is a clear negative association between *net job creation rates* and firm age, indicating younger firms create new jobs at a faster rate. In Norway, Klette and Mathiassen (1996) report that gross job creation and destruction rates decline with firm age for manufacturing sector firms. In particular, they show that the *gross job creation rates* fall off more quickly than *job destruction rates* as firms mature: consequently, the *net job creation rate* declines with firm age. Lawless (2014) likewise reports a negative relationship between firm age and *net job growth rates*. She shows that *gross job creation rates* decline with firm age while no systematic relation is observed between age and *job destruction rates*. Consequently, *net job growth rates* decline with firm age. Criscuolo et al (2014) furthermore indicate that young firms, 5 or less years old, have higher *net job growth rates*. Although young and older firms have roughly comparable *job destruction rates*, younger firms have higher *gross job creation rates* than their older counterparts; hence the higher *net job growth rates among younger firms*.

For developing countries, Ayyagari et al (2014) also find that younger firms, 5 years or less, grow faster than older ones. Regarding the contribution to *gross job creation*, however, the pattern is not clear: younger firms are the largest contributors to gross job creation among small firms (fewer than 20 employees), while older firms are the largest contributors to gross job creation for medium and larger firms.<sup>24</sup> Ma et al (2015) report results using census data for Chinese manufacturing firms over 1998 to 2007, showing that *gross job creation rates* steeply decline with firm age while *job destruction rates* increase. Consequently, *net job growth rates* and firm size are negatively correlated. Eslava and Haltiwanger's (2014) study on Colombia reports results that are consistent with recent findings for the US (Haltiwanger et al 2013). They show that *net job growth rates* decline with firm age, noting that the high growth performance by young firms is driven largely by a small group of high growing start-up firms. Nevertheless, they report a pattern where surviving firms grow, but job destruction due to firm exit is not systematically related to firm age, indicating less of the "up-or-out" dynamic reported for US firms. Using manufacturing census data from Ethiopia, Bigsten and Gebreeyesus (2007), report a non-linear relationship between firm age and net job growth rates: job growth declines with firm age for firms 9 years or younger, but increases with age for those over 9 years perhaps indicating that the learning-by-doing benefits are realized only in the later stages of a firm's life cycle.

#### **IV. Updated Results Using Data from the Enterprise Surveys**

In this section we provide estimates for 117 developing economies based on data from the World Bank Group's Enterprise Surveys. As the bulk of the debate around these measures is centered on the role of size

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<sup>24</sup> Results are not reported on contribution to net job creation and job destruction by firm age

and age, we focus on these analytical cuts. In doing so, we update measures presented by Ayyagari et al (2014), hereafter “ADM”, expanding on their results by including additional economies published since their contribution as well as by disaggregating net job growth into gross job creation and job contraction separately. We also consider alternate specifications from Haltiwanger et al (2013), denoted by “HJM”. We find evidence confirming several findings from both studies, showing that these results are markedly sensitive to specifications and the definitions used to classify establishments.

The Enterprise Surveys are a standardized and globally comparable database, providing establishment-level data representative of the non-agricultural private sector economy. As such, they cover clearly defined economic sectors, in manufacturing and services, following a stratified survey design and thus are interpreted here using survey weights to account for the varied probability of selection of each establishment. As noted in several studies, including ADM, these data are subject to several caveats, including issues of non-response and data coverage. For instance, by design for practical implementation, the surveys do not cover micro establishments (with fewer than 5 employees) nor do they cover the informal (un-registered) economy. Therefore, these data are likely to underestimate the importance of SMEs. The surveys are also answered voluntarily and therefore they may face some degree of non-response. Nevertheless, the surveys provide a widely comparable data source for most developing economies and they constitute the best approximation for employment dynamics in the aggregate. Annex II provides descriptive statistics of the data used for the results provided below.

#### 1. The Share of the Employment Stock: Where are the Jobs?

In 70 of the 117 economies, SMEs, with fewer than 100 employees, account for the majority of employment. On average, this share is 57%, with large establishments accounting for 43%. Once the cutoff is changed to 250 employees, SMEs employ the majority of employees in 104 of 117 economies, with a resulting average of 75% of the stock of employment (columns 1-4 of Table 1). These results are robust to the categorization of establishments using the average employment, and these are shown in columns 5-8. That is, no matter how size is defined, SMEs constitute the majority of employment in the developing world. Columns 9-11, moreover, show that establishments that are ten years or younger account for over two-fifths of employment in the developing world; mature establishments that have been operating for 11 years or more constitute over 60% of the stock of employment, consistent with findings reported by ADM. What is more, in line with their findings, the employment share of SMEs is highest among low-income economies, when compared to their counterparts elsewhere.<sup>25</sup>

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<sup>25</sup> Averages by income group not shown.



**Table 1: Share of the Employment Stock**

Based on Initial				Based on Average				Young <=5 yrs.	Mid-age 6-10 yrs.	Mature 11+ yrs.
100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff				
SME	Large	SME	Large	SME	Large	SME	Large			
57.2	42.8	75.4	24.6	60.3	39.7	79.0	21.0	17.9	19.8	62.3

*Age and initial size defined by the re-call period prior to the survey. Average-period categories defined by average establishment size between t and t-d. For age cuts the share of period average employment is reported.*

Table 2 shows these results further divided by establishment size-age categories, where establishments are divided between SMEs and large and by age categories (young, mid-age, and mature).<sup>26</sup> Following the methodology used by ADM and elsewhere, both age and size groupings are defined by the initial period recorded in the survey. Where the period average is used to define size cuts, age remains defined by the initial period. In line with findings from ADM, mature establishments constitute the largest single share of employment stock by all size groups and definitions. As a departure from their findings though, we find that mature SMEs are the largest plurality, though very closely followed by large mature establishments; their findings indicate that these two groupings are likewise the largest source of employment, but in the reverse order.

**Table 2: Share of the Employment Stock – By Establishment Size-Age**

	Based on Initial				Based on Average			
	100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff	
	SME	Large	SME	Large	SME	Large	SME	Large
Young	11.5	4.0	13.6	1.8	13.7	4.2	16.2	1.7
Mid-age	13.4	6.6	16.1	3.9	13.7	6.1	16.7	3.1
Mature	32.4	32.2	45.6	19.0	32.9	29.4	46.1	16.2

*Age and initial size defined by the re-call period prior to the survey. Average-period categories defined by average establishment size between t and t-d.*

## 2. Job Growth Rates: What Establishments Are Creating or Contracting Jobs?

Among developing economies, the net employment growth rate, i.e., the rate at which the stock of employment is growing, is 5.2% per annum. On net, this rate is driven by SMEs, supporting the results from

<sup>26</sup> It should be noted however that the ES data while stratified by criteria for size, sector, and location, the methodology is not stratified by firm or establishment age and thus does not ensure representativeness on that dimension beyond the random sampling within the specified strata.

ADM, with a rate roughly equal to the overall average (Table 3). Using categories based on the initial employment, in fact, the net growth rate for large establishments is 0.4%, while the rate among SMEs is 4.8%. The net growth rate for SMEs decreases (as the rate among large establishments increases) when using the period average, confirming the upward (downward) bias of using initial size for SMEs (large establishments) as pointed out by Davis et al (1996). Panel b additionally shows gross job creation rates, indicating again that these rates are highest among SMEs, by all metrics. The gross job creation rates are highest among mature establishments, at a rate of 3.4%, followed by young establishments; however taken together establishments that have been operating for ten years or less (young and mid-age establishments) demonstrate a gross job creation rates slightly above the rate for mature establishments (5% for establishments in operation for 10 years or less compared to 3.4% for mature establishments).

**Table 3: Job Growth Rates**

(a) Net Employment Growth Rate

Based on Initial				Based on Average				Young <=5 yrs.	Mid-age 6-10 yrs.	Mature 11+ yrs.
100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff				
SME	Large	SME	Large	SME	Large	SME	Large			
4.8	0.4	5.1	0.1	4.0	1.3	4.7	0.5	2.9	1.1	1.2

(b) Gross Job Creation Rate

Based on Initial				Based on Average				Young <=5 yrs.	Mid-age 6-10 yrs.	Mature 11+ yrs.
100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff				
SME	Large	SME	Large	SME	Large	SME	Large			
6.5	2.1	7.5	1.1	5.9	2.7	7.3	1.4	3.3	1.7	3.4

(c) Job Contraction Rate

Based on Initial				Based on Average				Young <=5 yrs.	Mid-age 6-10 yrs.	Mature 11+ yrs.
100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff				
SME	Large	SME	Large	SME	Large	SME	Large			
1.7	1.7	2.4	1.0	1.9	1.5	2.6	0.8	0.5	0.6	2.2

*Age and initial size defined by the re-call period prior to the survey. Average-period categories defined by average establishment size between t and t-d.*

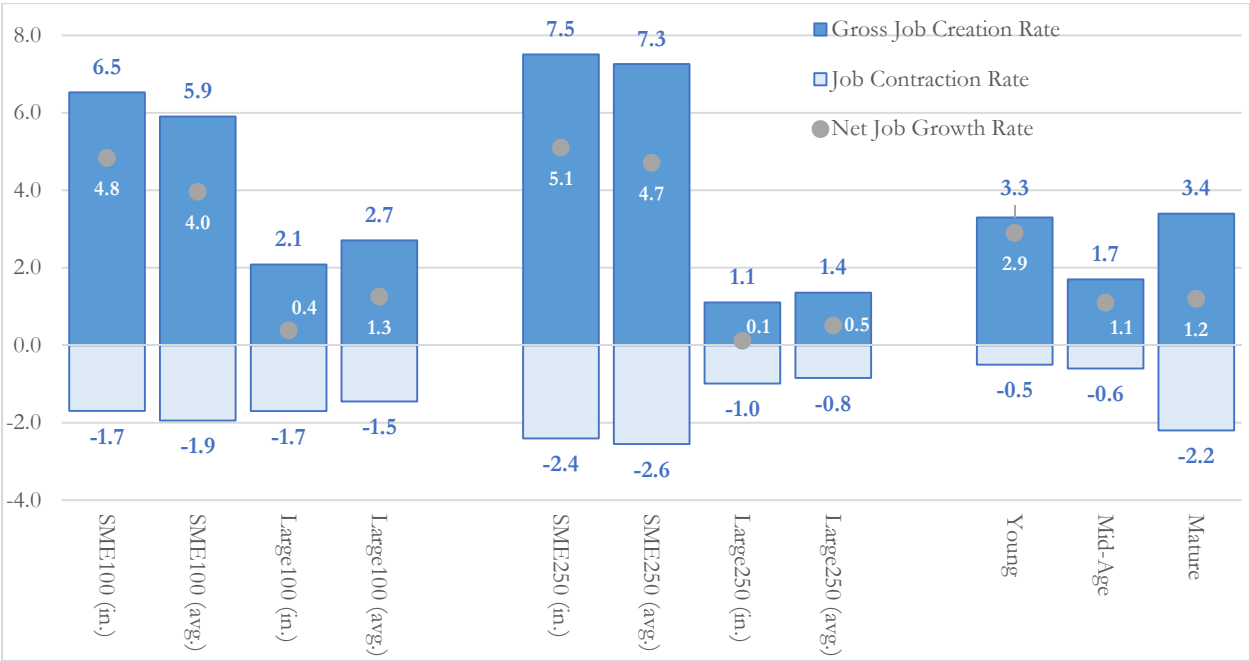
Gross job growth rates are more instructive when also compared with job contraction rates<sup>27</sup> as shown in panel c of Table 3. Taken together, a fuller picture emerges: while SMEs show higher gross job creation rates, they also have higher job contraction rates (in all but the SME100, categorization based on initial employment, in which case SMEs and large firms share the same rates of contraction), indicating greater employment churning for these enterprises. Moreover, the differential between SMEs and larger establishments (by all

<sup>27</sup> We refer to these rates as “contraction”, instead of destruction, as the ES data do not contain information on exiting establishments and thus may effect a survival bias. Contraction rates are thus only calculated for surviving establishments that have reduced their employment numbers.

metrics) is smaller in terms of job contraction than in gross job creation; this explains the higher *net job growth rates* seen among SMEs. Notably, older establishments show higher contraction and gross creation rates, which result in a lower net rate: mature firms reveal higher churning than younger firms. This is a possible indication of a momentum of incumbency whereby older establishments that show employment contraction remain in the market, while young and mid-age may exit the market rather than being capable or willing to weather shocks, a so-called liability of age (for some discussion see Aga and Francis 2015).

Figure 1 further illustrates this point, particularly the volume of job churning (meaning creation and contraction combined) that is substantially higher among SMEs and among mature firms. What is more, the bias between using initial employment values to categorize establishments (as opposed to the average) is also clearly seen: both the gross creation rate and the net growth rate for SMEs are lower using the period average employment to categorize establishments than when using the initial level of employment, while both rates are higher among larger establishments when using the average level of employment for categorization. The opposite trend is shown for contraction rates (shown below the x-axis at zero). In the figure, this creates a convex U-shaped pattern for both gross job creation and job contraction (noting for bars 1-4 and 5-8 of Figure 1).

**Figure 1: Net Job Growth, Gross Job Growth, and Job Contraction**



Source: World Bank Enterprise Surveys. Categories defined by base values defined by initial value (in.) or the average value between the two periods (avg.).

Table 4 presents the relative scale of these rates by expressing each group’s share of net employment growth, gross job creation, and job contraction. Using categories defined by initial employment, SMEs account for nearly all net employment growth, at a rate well above 90%. Using the more conservative categories based on average employment, SMEs under 100 employees account for more than three quarters of net job creation; 90 percent of net employment creation in these economies is accounted for by establishments with fewer than 250 employees, as shown in panel a. Table 4, Panel b presents the relative share of establishments in gross job creation. Again, SMEs dominate. SMEs with fewer than 100 employees account for 76% of gross job creation; establishments smaller than 250 employees account for roughly 90% of gross job creation. In terms of job contraction (panel c), however, SMEs (those with fewer than 100 employees) and large establishments constitute roughly equal shares. Using the SME250 threshold, however, SMEs account for more than 70% of job contraction. This movement is only exaggerated by using the average establishment size.

Generally then, while SMEs account for the vast majority of job creation, they also constitute the majority of job contraction. The relative share of these establishments to large establishments is such that on net SMEs still contribute positively to the majority of net job growth. Older establishments additionally account for the majority of job contraction and in fact it is this high relative contraction among older establishments that accounts for the low relative share of these establishments to net job creation. This finding is undergirded by several others in the literature in line with vested older establishments such as Jovanovic (1982) That is, older establishments are more likely to remain in the market (thus captured in the ES data) and contract, while younger establishments are predicted to exit the market altogether (which is not captured by the ES data).<sup>28</sup>

**Table 4: Job Growth Shares**

(a) Net Employment Growth Shares											
Based on Initial				Based on Average				Young <=5 yrs.	Mid-age 6-10 yrs.	Mature 11+ yrs.	
100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff					
SME	Large	SME	Large	SME	Large	SME	Large				
92.6	7.4	97.8	2.2	75.9	24.1	90.2	9.8	56.0	21.6	22.4	

(b) Gross Job Creation Shares											
Based on Initial				Based on Average				Young <=5 yrs.	Mid-age 6-10 yrs.	Mature 11+ yrs.	
100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff					
SME	Large	SME	Large	SME	Large	SME	Large				
75.8	24.2	87.2	12.8	68.6	31.4	84.3	15.7	39.5	20.3	40.2	

<sup>28</sup> Though this finding does in fact hold up in analysis based on ES panels, such as in Aagaard and Francis (2015).

(c) Job Contraction Shares

Based on Initial				Based on Average				Young <=5 yrs.	Mid-age 6-10 yrs.	Mature 11+ yrs.
100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff				
SME	Large	SME	Large	SME	Large	SME	Large			
49.9	50.1	70.9	29.1	57.2	42.8	75.1	24.9	14.0	18.3	67.7

Table 5 shows these growth rates by age-size categories. Again, confirming previous results from ADM young SMEs show the largest rate of net employment growth across all age groups regardless of the size thresholds used to define SMEs and the method used to classify establishments. The table furthermore shows the same trend in the gross job creation rates. Regarding job contraction rates, in Table 5, mature large firms exhibit greater contraction rates than SMEs when the cutoff threshold is 100 employees.

**Table 5: Job Growth Rates by Establishment Size-Age**

(a) Net Employment Growth Rate

	Based on Initial				Based on Average			
	100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff	
	SME	Large	SME	Large	SME	Large	SME	Large
Young	2.6	0.3	2.8	0.1	2.4	0.5	2.7	0.1
Mid-age	0.9	0.2	1.0	0.1	0.7	0.4	0.9	0.2
Mature	1.2	0.1	1.3	0.1	0.8	0.3	1.0	0.1

(b) Gross Job Creation Rate

	Based on Initial				Based on Average			
	100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff	
	SME	Large	SME	Large	SME	Large	SME	Large
Young	2.9	0.5	3.2	0.2	2.7	0.6	3.1	0.2
Mid-age	1.3	0.4	1.5	0.2	1.1	0.6	1.4	0.3
Mature	2.2	1.2	2.7	0.7	1.9	1.5	2.6	0.8

(c) Job Contraction Rate

	Based on Initial				Based on Average			
	100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff	
	SME	Large	SME	Large	SME	Large	SME	Large
Young	0.3	0.2	0.4	0.1	0.3	0.1	0.4	0.1
Mid-age	0.4	0.2	0.5	0.1	0.5	0.1	0.6	0.1
Mature	1.0	1.3	1.5	0.8	1.1	1.2	1.5	0.7

Table 6 shows the same rates as shares, broken down by establishment size-age categories. Here again, young SMEs constitute the largest share of both net employment growth and gross job creation. This is the result of a combination of both their relatively high gross job creation share and also a small relative share of job contraction. For larger-mature establishments, by contrast, gross job creation shares are also notably high, consistently higher than mid-age and young, large establishments. However, mature, large establishments also

show the highest contraction shares which explains why their net employment growth share is lower than SMEs. This is visually clear in Figure 2, which shows an appreciable peak for mature establishments; together mature SMEs (29%) and large (39%) make up nearly 68% of job contraction, both a possible indication that their longer tenure in the market may dissuade them from exiting altogether (as opposed to younger SMEs, in line with models set out by for instance Jovanovic 1982).

**Table 6: Job Growth Shares by Establishment Size-Age**

(a) Net Employment Growth Share

	Based on Initial				Based on Average			
	100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff	
	SME	Large	SME	Large	SME	Large	SME	Large
Young	48.6	5.4	51.8	1.6	46.8	9.2	53.2	2.8
Mid-age	17.3	3.6	18.0	2.7	13.2	8.5	17.1	4.5
Mature	23.3	1.7	23.6	2.3	15.9	6.4	20.0	2.4

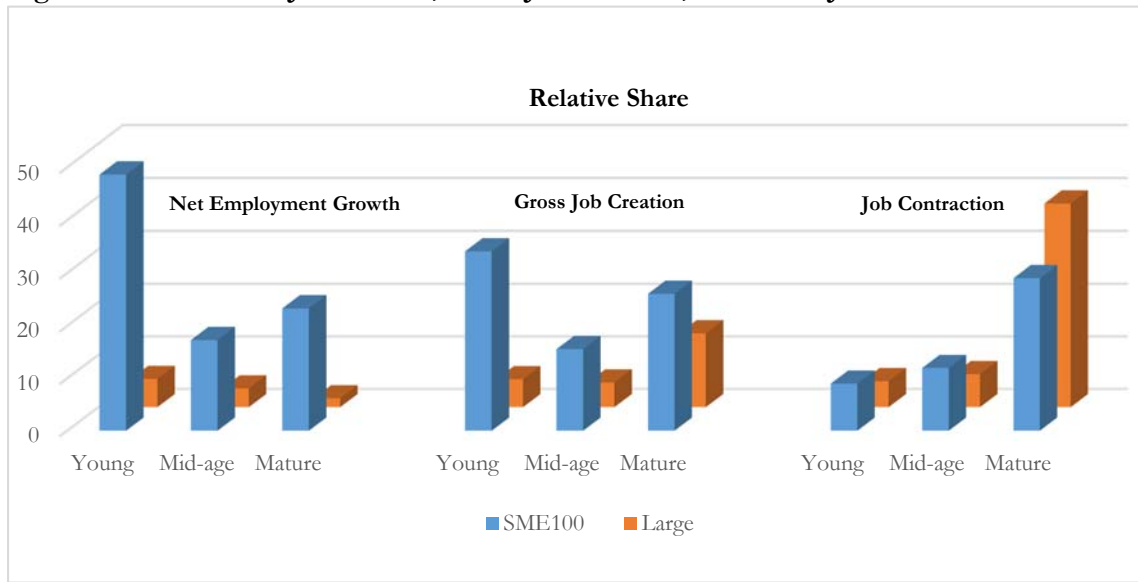
(b) Gross Job Creation Share

	Based on Initial				Based on Average			
	100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff	
	SME	Large	SME	Large	SME	Large	SME	Large
Young	34.1	5.3	37.3	2.1	32.3	7.2	36.9	2.6
Mid-age	15.6	4.7	17.6	2.8	13.6	6.8	17.0	3.4
Mature	26.1	14.1	32.3	7.8	22.6	17.6	30.4	9.8

(c) Job Contraction Share

	Based on Initial				Based on Average			
	100 emp. cutoff		250 emp. cutoff		100 emp. cutoff		250 emp. cutoff	
	SME	Large	SME	Large	SME	Large	SME	Large
Young	9.0	5.0	11.2	2.8	9.9	4.1	11.7	2.2
Mid-age	12.0	6.3	15.5	2.8	14.2	4.2	16.7	1.6
Mature	29.0	38.7	44.1	23.7	32.8	34.9	46.4	21.3

**Figure 2: Share of Net Job Growth, Gross Job Creation, and Gross Job Contraction**



Source: Enterprise Surveys. Figure shows establishments based on initial size. Patterns hold when using the initial or the average size.

### 3. The Relationship between Size, Age, Income, Population, and Jobs: Regression Analysis

In this section, we turn again to evidence from the Enterprise Surveys to re-visit the discussion on size, age and the relative contributions of each factor to job growth as it pertains to the developing world. We initially adapt the estimation strategy utilized in ADM, with survey-weighted results<sup>29</sup>; notably though we separately consider net employment growth, gross job creation, and job contraction as differentiated by the direction of establishment-level growth. This is a slight departure from their approach, as ADM run regressions over subsets of economies with positive and negative net employment growth exclusively.<sup>30</sup> We then adapt an approach amended to also weight by employment shares, as outlined in the measures for HJM, investigating the sensitivity of results to their specifications.

Table 7 shows regression results for net employment growth from establishment-level results available for the 117 economies presented above. Establishments are classified by their initial size in columns 1-4 and by their average size in 4-8; the second set of eight columns shows estimations using employment weights, as laid

<sup>29</sup> Weights are re-scaled within the sample to sum to 1 within economy so that each economy is considered equally regardless of country size.

<sup>30</sup> Moreover, ADM divide economies where net growth is positive from economies where net growth is negative. Rather, we consider a) all establishments pooled; 2) positive-growth establishments (regardless of the economy's overall growth); and negative-growth establishments, separately. Our approach also differs in that we use the establishment-level employment growth by taking the level difference in employment divided by the two-period average, while they consider the log difference, two measures which share notable qualities. Results are robust to using the log-difference (results are available on request).

out by HJM, as defined in equation (2a) in section 2 above. Using the initial size as the base (columns 1-4), the dummy for large establishments is negative and significant, indicating lower net employment growth compared to small establishment, all else equal. This holds even after age is introduced as a control.<sup>31</sup> These findings closely follow those by ADM, with largely comparable coefficients (note that here employment growth figures are scaled by 100). Likewise once establishment age is used as a control, it is associated with lower net employment growth. These findings also remain significant once the SME size threshold is raised to 250 employees (columns 3-4). However a divergence is also clear: when using the period-average size to categorize establishments (columns 6-7), the coefficient of large versus SMEs is notably smaller (though still significant). In fact, once the size threshold is raised to 250, in fact, there is no statistical difference between SMEs and large establishments. By contrast, the effect of an establishment's age is negative and persistent across all specifications, indicating a strong effect that older establishments are less dynamics in terms of employment growth.

The second panel of Table 7 presents regression results that are weighted by each establishment's employment share.<sup>32</sup> While columns 9-12 hold closely to the results in the first panel, when using the average size to classify establishments, once age is controlled for, the difference between SMEs and large establishments becomes insignificant (column 14). This aligns with the conclusions arrived at by HJM, that while establishment size is negatively associated with employment growth, this effect loses significance after controlling for age. The fact that size becomes less important when using the average size – even though all specifications control for age – underscores the importance of how establishment size is defined.

[Insert table 7 here]

It is also worth noting that part of this divergence is definitional. Columns 1-8 present establishment-level results, and thus are indicative of the average experience at this level; they show, in other words, young and small establishments on net are the most dynamic. By weighting observations by their employment share, columns 9-16 provide results in broader strokes, that is, in terms of the aggregate effects on the whole private sector. This distinction is likely to be of particular relevance for informing policy makers, as the former results speak to firm-level interventions (such as training programs), while the latter lend themselves to more broadly administered policies (for example, lowering policy barriers to firm entry).

Tables 8 presents similar results for the sub-set of establishments that report positive employment growth, so-called gross job creation. Here there is no apparent distinction between using either initial

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<sup>31</sup> Table 7 includes categorical age variables; Appendix II (online) shows results are robust to using the continuous measure of age.

<sup>32</sup> This is the weight as determined by the joint survey and employment weight.



establishment size or the two-period average: in all columns, the coefficient for large establishments as well as mid-age and mature dummies are negative and significant, indicating that small and young establishments are expected, *ceteris paribus*, to have higher job creation. This is likewise consistent whether using the basic estimations in columns 1-8 or using employment weights as shown in columns 9-16. More generally, the divergence between specifications shown in table 7 does not appear to be effected by positive-growth establishments.

[Insert table 8 here]

By contrast, Table 9 presents estimates of job contraction using establishment-level data for establishments that reported contraction in employment, providing a potential explanation for the divergence of results using either the initial or average establishment size to classify establishments. Only in column 2 is the coefficient for large establishments negative and significant, meaning that these establishments on average contract jobs at a higher rate compared to SMEs. However, interestingly, in columns 5-6, the coefficient for large establishments is *positive*, reversing its sign, but retaining significance. In other words, by using the two-period average to categorize establishments, large establishments actually contract significantly *less* than SMEs. This finding holds when using employment weights (Columns 13-14), confirming the sensitivity of results to using either initial or average size, through the job contraction channel. Lastly, we observe no effect using categorical age variables, but do see a positive (meaning less contraction) and significant effect when using the continuous measure (Annex III, A5).

[Insert table 9 here]

These results indicate a corollary of the *regression fallacy* effects discussed by Davis et al.; namely that smaller contracting establishments are limited in terms of their relative contraction (a smaller establishment can only shed so many employees), while larger establishments can experience much larger adverse shocks. Thus, using the initial size, smaller establishments are more likely to exhibit lower contraction rates, which is borne out by the results; using the average yields greater contraction. These differing results likewise underscore the importance of considering exit effects by using longitudinal data as opposed to only cross section, as those establishments that are small and exit (that is those that will shed all jobs) are not included. By not including these exit effects, therefore, the effect of larger firm size and age is likely to be over-estimated. Nonetheless, this differential helps explain the loss of significant effect for small and medium establishments when estimating net effects using the average size.

## V. Discussion and Conclusion

A comprehensive comparison of the existing evidence on relative contributions to employment stock and job creation is complicated by the diversity of data used in various studies. Nevertheless, a pattern emerges from reviewing the literature. In terms of the static snapshot of where people are employed, SMEs are the largest employers, employing in most cases over half of the total labor force in the non-agricultural and non-financial private sector. What is more, this patterns holds both for developing and developed countries, although the US is somewhat of an exception in that large firms appear to be the largest employers.

The evidence on the dynamic aspect of which types of firms create jobs at a faster rate is a bit scattered, particularly for developing countries and as it relates to firm size. Studies on developed economies increasingly show that firm size is less of an important variable, but rather employment creation is driven by a small set of young and fast-growing firms pointing to the importance of firm age rather than size. For developing countries, however, there are generally few studies that use suitable dataset to satisfactorily answer this question. The limited studies that are available provide mixed results regarding size and job creation, and what is more, these are sensitive to the definitions and methods that are used. In terms of firm age, by contrast, there appears to be a consensus in that older firms are the largest employers, but the younger firms are the ones that create jobs at a faster rate. Taken together, these findings indicate that policy aimed at fostering job creation should carefully consider how firm size is defined.

We also illustrate how sensitive the results can be, focusing on developing economies and using the World Bank's Enterprise Surveys data. Three salient points emerge. The first is one of interpretation based on different specifications. As noted above, the use of OLS results such as those employed by ADM provides a best approximation of establishment-level activity and thus provides a picture of each establishment's adding or shedding of jobs. Our replication of their topline results then clearly confirms that young establishments and SMEs are the most dynamic in terms of adding jobs. On net, these are also the fastest growing firms when considering only establishments that added to their workforce. By contrast, employment-weighted measures provide a relative measure of establishments based on their underlying share of the stock of employment and thus illuminate the relative dynamism of sectors of the economy. Here, in line with findings from HJM, we find that establishment age, not size, predominates. As we have shown, this distinction matters as results are sensitive to the use of either specification. This finding has certain policy-making relevance as well. The latter method indicates which establishments are themselves the most dynamic and so may be of interest for interventions targeted toward fast-growing recipients; the former, by contrast, paints such policies in broader brushstrokes and may be especially relevant for sector-level actions.

Secondly, despite these distinctions for findings regarding *net* employment growth, we find consistent and robust results for the role of establishment size and age in terms of gross job creation. That is, where

establishments are growing, they tend to be smaller and younger. From these results, we also cannot say anything about the quality of these jobs: if new jobs added are higher-quality than the ones that are shed, welfare gains are likely to be positive. By contrast, we find that results for establishments with job contraction are particularly sensitive to researchers' choice and specifications, indicating that careful consideration should be paid to the effects of job contraction as well. We show that the use of initial or average establishment size has particular implications for results obtained for job-contracting establishments. This not only underlines the need to consider in particular those establishments for analysis, but also highlights a future need for research into establishment exit and robust panels, both of which can act as complements to periodic survey databases such as the ES.

A last point of discussion, then, is perhaps the most pertinent: the revealed sensitivity of job dynamics estimates to the means and thresholds used to define SMEs should give researchers and policy makers occasion to consider the use of those definitions. Clear implications have been shown following the analysis of Davis et al. of regression-to-the-mean/fallacy effects, indicating the appropriateness of period-average definitions. Their initial study as well as many subsequent ones relies on longitudinal data – thus with each firm being classified between  $t$  and  $t-1$  – and it is not clear what these effects will be using a  $t-d$  recall variable (in addition to potential measurement error introduced by using recall questions). Moreover, in actuality surveyed establishments do not report their average employment but rather at specific moments in time. Nor do practitioners know an establishment's future size when implementing policy interventions that are themselves designed to foster growth. Discussions of the relevance of policy interventions will need to be based on directly applicable definitions. What is more, it is precisely the business cycle shocks that result in reversion effects – in reality the quick addition or shedding of jobs – that policy makers may be interested in addressing.

Does this then undermine a policy focus on SMEs? We find evidence that establishment age matters and the size of an establishment also plays an important role, a role that is sensitive to the definition used by researchers. Moreover, we find that this sensitivity comes from the consideration of job contraction, and that this picture is incomplete without the consideration of exit effects. While this is a limitation, it highlights the need for robust and complete panels, using further data collection efforts and techniques – for instance the construction of “synthetic” panels to account for non-response. Several previous studies highlight that the likelihood of exit is higher among SMEs; rather than removing the impetus for policies targeting those establishments, this finding may indicate a need for interventions that enable smaller firms to grow as they would in the face of, for example, lower business environment obstacles. This is another area of potential research.

## ANNEX I

Study, country and period covered	Data used and Sectors covered	Definition of SMEs	Key findings				
			SMEs and Employment Share	SMEs and Net Employment Growth	SMEs and Gross Job Creation	SMEs and Job Destruction	SMEs and exit
Wagner (1995); Germany, 1978-1993	Longitudinal data of all manufacturing sector firms that were in operation at least one year during the period 1978 to 1993; Covers only Lower Saxony	No explicit definition of SMEs; various size cutoffs provided.	Large firms (250+ employees), account for over 60% of the total workforce employed by the manufacturing sector.	No systematic relationship between firm size and net job creation when size is measured as the average of employment in year t and year t-t.	Gross job creation declines with firm size.	Gross job destruction declines with firm size.	No discussion on exit rates by firm size.
Klette and Mathiassen (1996); Norway; 1976 to 1986	Census of all manufacturing firms, except firms where the owner is the only employed person.	No explicit definition of SMEs; various size cutoffs provided.	Small firms are the major employers; firms with 150 or fewer employees account for over half of manufacturing sector employment.	Net job creation rates and firm size are negatively related. In fact, only firms with fewer than 20 employees had a positive net job creation rate during the period, and net job destruction rates accelerate with firm size.	Gross job creation declines with firm size.	Gross job destruction declines with firm size.	No discussion on exit rates by firm size.
Genda (1998); Japan; 1991-1995.	Employment Trend Survey (ETS), a bi-annual employment survey conducted by the Ministry of Labor of Japan; covers firms with at least five employees, in all sectors.	No explicit definition of SMEs; various size cutoffs provided.	Based on initial size, firms with 300 or fewer employees account for over half of the total workforce employed by the private sector.	Net job creation does not appear to be systematically related to firm size, but is generally higher among firms with 30-99 employees.	Gross job creation declines with firm size; so does the contribution to gross job creation.	Gross job destruction rates decline by firm size, as does the contribution to gross job destruction.	No discussion on exit rates by firm size.
Faggio and Konings (2003); Bulgaria, Estonia, Poland, Romania and Slovenia; 1993-1997	Panel data of firms with at least 100 employees; all sectors and both private and government-owned firms.	No explicit definition of SMEs; various size cutoffs provided.	No discussion on employment shares.	Net job creation increases with firm size (except for Romania where net job creation does not appear to be systematically linked to firm size).	Gross job creation declines (increases) with firm size in Poland and Romania (Estonia), and is not systematically related to firm size in Bulgaria and Slovenia.	Gross job destruction declines by firm size in all the five countries	No discussion on exit rates by firm size.
Fuchs and Weyh (2010); Germany; 200-2006	Data from Institute of Employment Research; includes all plants where at least one employee is required to make social security contributions; all sectors.	No explicit definition of SMEs; various size cutoffs provided.	No discussion on employment shares.	Net job creation rates increase with firm size, although it begins to decline for firms with 500+ employees, both form firms in Eastern and Western Germany.	No discussion on firm size and gross job creation	No discussion on firm size and gross job creation	No discussion on exit rates by firm size

Davis et al (1996), US, 1978-1988	US Census's Longitudinal Research Database (LRD); only manufacturing sector.	Firms with fewer than 100 employees are defined as SMEs.	Large firms are the largest employers; Firms with (100+) 500+ employees employed about 65(77%) % the workforce employed by the manufacturing sector.	No systematic relation between plant size and net job creation rates using the average measure of size. (Jobs are more durable in large firms than in smaller firms.)	Large firms (100+) accounted for about 70% of the gross jobs created, while those with at least 500 employees accounted for 53% of the jobs created by manufacturing firms.	Large firms (100+) accounted for about 70% of newly created jobs and newly destroyed jobs; while those with at least 500 employees accounted for 56% of the jobs created by manufacturing firms.	No discussion on exit rates by firm size
Neumark et al (2011), US, 1992-2004	National Establishment Time Series (NETS); both manufacturing and services sector	Firms are categorized by size, and not as SMEs and otherwise.	Firms with fewer than 250 employees account for about 51% of the total employment, whether size is measured using the base or average employment.	Clear negative association between firm size and net job creation rate if firm size is measured using the base employment. This result holds when analysis is done at a firm or establishment level, for all firms combined or separately for manufacturing and service firms. When firm size is measured using the average level of employment, the negative association is muted, but nevertheless persists. The paper does not discuss the contribution to net job creation by firm size category. (Taking out start-ups as a separate group substantially reduces the contribution of small firms to gross job creation.)	Firms with 100 (250) or fewer employees account for about 61(67) % of the average gross job creation over the 12year period when size is measured using the base level of employment. The corresponding figure when firm size is measured using the average employment size is 49(56)%.	Firms with 100 (250) or fewer employees account for about 43(60) % of the average gross job creation over the 12 year period when size is measured using the base level of employment. The corresponding figure when firm size is measured using the average employment size is 47(53)%.	No discussion on exit rates by firm size.
Haltiwanger et al (2013), US, 1995-2005	US Census Bureau's Longitudinal Business Database (LBD); all non-farm private sector with at least one employee.	Firms with fewer than 500 employees are categorized as small while those with 500+ as large.	On average over the 13 year period (1992-2005), firms with 500 or fewer employees accounted for just about half of the non-farm private sector employment.	Inverse relationship between firm size and net job creation rate (regardless of how size is measured); however, the association disappears or becomes positive once firm age is controlled for. (For surviving firms, controlling for net job creation and firm size is still negatively associated even after controlling for firm size, when size is measured using the base employment level. However, using the average measure of employment reverses the association, indicating that for these types of firms, the regression fallacy is perhaps most important.)	No discussion on firm size and gross job creation.	No discussion on firm size and gross job creation.	Exit rate and firm size are negatively correlated regardless of whether firm size is measured using the base or average employment.
Haltiwanger et al (2014), mostly discussion based on Haltiwanger et al 2013	Various; paper reviews recent study on firm dynamics using US Census Bureau's data.	No explicit definition of SMEs.		No systematic link between firm size and job creation; start-ups are the drivers of job creation.			

Hijzen et al (2010), UK; 1997-2008.	UK Business Registry Data; all sectors	No explicit definition of SMEs; various size cutoffs provided.	Based on average measure of size, firms with less than 250 employees account for about two thirds of the total private sector employment.	The paper does not provide clear discussion on net job creation and firm size. However, small firms contribute more to job destruction than they do to job creation.	Contribution to gross job creation declines with firm size, although firms with 5000+ employees account for over 15% of the total gross job creation.	Based on average measure of size, firms with fewer than 250 employees account for about two third of the gross job destruction. In general, gross job destruction declines with firm size, but is higher for firms with over 5000 employees.	No discussion on exit rates by firm size.
Lawless (2014), Ireland, 1972 to 2010	Panel data based on firms sampled every year; the survey covers manufacturing as well as service sector firms.	No explicit definition of SMEs	Firms with 250 or fewer employees account for about two thirds of the total private sector employment.	Large firms (100+ employees).Gross job creation rates declines by firm size	Small firms have a higher gross job creation rate. New entrants account for about 38% of the gross job creation; non-entrants with 250 or less employees account for 44% of the total gross job creation.	Small firms have higher gross job destruction rates. In fact, firms with 250 or fewer employees account for about 80% of the gross job destruction.	No discussion on exit rates by firm size.
Crisuolo et al (2014), 18 countries, 2001-2011, but year varies by country.	Firm level census data from 18 countries [Austria (2001-2010), Belgium (2001-2011), Brazil (2002-2010), Canada (2001-2011), Finland (2001-2011), France (2002-2007), Hungary (2001-2011), Italy (2001-2010), Japan (2001-2009), Luxemburg (2001-2010), Netherlands (2001-2010), Norway (2001-2010), New Zealand (2001-2011), Portugal (2006-2011), Spain (2003-2009), Sweden (2001-2010), United Kingdom (2001-2010), United States (2001-2010) ]. Data covers both manufacturing and service sector firms, except for Japan where data are limited to manufacturing sector firms.	No explicit definition of SMEs; various size cutoffs provided.	It depends on the firm size-cutoff used. Firms with fewer than 250 employees account for over 50% of the total employment in all the countries covered, except for USA. However, only in 6 of the 18 countries do firms with 50 or fewer employees account for at least 50% of total employment.	Net job creation declines with firm size, and strongly so when firm age is controlled for.	Gross job creation declines with firm size.	Gross job destruction declines with firm size.	No discussion on exit rates by firm size.
Ayyagari et al (2014), 104 countries; 2006-2010, but year varies by country	Firm level cross-section survey data, taken from the World Bank's Enterprise Survey (ES); both manufacturing and service sectors.	Firms with fewer than 100 employees are treated as SMEs.	Firms with 100+ employees account for over half of the total workforce employed by the private sector.	SMEs are the major contributors to net job creation. The authors categorize countries in to those with positive and negative net job creation. In a median country with a positive net job creation, firms with fewer than 100 employees accounted for over 70% of the net job created. In countries with net job contraction, SMEs actually registered a positive net job creation	No discussion on firm size and gross job creation.	No discussion on firm size and gross job destruction.	No discussion on entry and exit.

Rijkers et al (2014), Tunisia, 1996-2010	Business registry data from Tunisia over the period 1996 to 2010; all non-farm private firms covered, including own-operated firms.	No explicit definition of SMEs; various size cutoffs provided.	Small firms are the major employers. Firms with just one employees employ about 28% of the total workforce employed by in non-farm private sector; firms with less than 50 employees account for 55% of the total workforce.	There is an inverse relationship between firm size and net job creation rates, but the relationship gets reversed once firm age is accounted for. Younger firms (especially with just one employees) are the drivers of net job creation; firms less than 10 years old account for almost all net jobs created. (For continuing firms, firm size and net job creation are positively correlated, regardless of whether firm age is controlled for or not and irrespective of whether firm size is measured using the base or average employment size.)	No discussion on firm size and gross job creation.	No discussion on firm size and gross job destruction.	(Employment weighted) firm exit declines with firm size.
Bedi and Shiferaw (2013), Ethiopia, 1997-2007	Manufacturing sector census data from Ethiopia; data covers only firms with 10 and above employees.	No explicit definition of SMEs; but firms with over 50 employees are defined as large.	Large firms (with 50+ employees) account for the larger share of employment.	No discussion on firm size and net job creation, but from the contributions to job creation and destruction, it appears that smaller firms (with 50 or fewer employees) perform better, as this category firms contribute more to gross job creation than they do to gross job destruction.	Large firms, on average, account for about 71% of the gross job creation.	Large firms account for about 74% the gross job destruction.	No discussion on exit rates by firm size.
Arrow et al (2014), South Africa, 2005-2011, quarterly data.	Quarterly Employment Statistics data based on Firm-level surveys.	No explicit definition of SMEs; various size cutoffs provided.	Firms with fewer than (100) 250 employees accounts for about (43) 53% of the total employment.	Net job creation rates are higher among large firms. For smaller firms, job destruction rates are higher than creation rates, resulting in a lower net job creation rates for this category of firms.	No clear association between firm size and gross job creation rates.	Gross job destruction rate declines with firm size.	No discussion on exit rates by firm size.
World Bank (2015), MENA countries, 2006-2010, but year varies by country	The report uses various data sources, but for discussion on the job creation and firm size, census data for Egypt, Jordan, Tunisia and Turkey, and West Bank and Gaza are used.	No explicit definition of SMEs; various size cutoffs provided.	Firms with fewer than 100 employees account for over half of the total employment in all the 5 countries for which results are reported. In particular, in Egypt and West Bank and Gaza, firms with fewer than 5 employees alone account for about 60% of total employment.	Net job creation and firm size are positively correlated once firm age is controlled for (at least for Tunisia and Lebanon where results are reported).	No discussion on gross job creation and firm size.	No discussion on gross job destruction and firm size.	No discussion on exit rates by firm size.

Aga and Francis (2015), 47 countries, 2006-2013, year varies by country	Two rounds of World Bank's Enterprise Survey data for 47 countries; manufacturing and service sectors.	Two definition of SMEs used SMEs 100 (250), defined as firms with 100 (250) employees or fewer.	No discussion on employment shares and firm size.	No discussion on net job creation and firm size.	No discussion on gross job creation and firm size.	No systematic relationship between firm size and gross job destruction.	Smaller firms have higher exit rates. However, size becomes less important once firm age and labor productivity are controlled for.
Teal (1999); Ghana; 1991-1995.	Panel survey of manufacturing firms in Ghana.	No explicit definition of SMEs. Results reported for three size cutoffs - micro (<6) small (6-29); medium (30-99); and large 100+.	No discussion on employment shares and firm size.	Net job creation tend to decline with firm size; micro and small firms have a higher net job creation rates than medium and large firms. However, job creation rates by medium size firms (30-99) is lower than that of large firms (100+).	Gross job creation declines with firm size.	Gross job destruction is higher among micro, small and medium sized firms.	No discussion on firm exit rates.
Bigsten and Gebreyessus(2007); Ethiopia; 1991-2003	Manufacturing sector census data from Ethiopia; census covers only firms with 10 and above employees.	No explicit definition of SMEs; various size cutoffs provided.	No discussion on employment shares and firm size.	Year on year employment growth rate declines, albeit non-monotonically, by firm size (for a given age class). Further, employment growth rate declines by firm age (with in a given size class).	No discussion on gross job creation and firm size.	No discussion on gross job destruction and firm size	Smaller and younger firms have a higher exit rate.
Biggs and Saha (1998); Ghana, Kenya, Tanzania, Zambia, and Zimbabwe;	Panel data of a sample of manufacturing firms	No explicit definition of SMEs firms with 100+ employees are defined as large.	No discussion on employment shares.	Large firms; in four of the five countries with positive net job creation, large firms (100+ employees) accounted for over 50% of the total jobs created. And in Zambia, where net job creation was negative, however, small firms outperform large firms by registering a positive net job creation.	No discussion on gross job creation and firm size.	No discussion on gross job destruction and firm size.	No discussion on firm exit rates.
Ma et al (2015); China; 1998-2007	Annual Survey of Industrial Enterprise; covers firms in manufacturing, mining and public utility sectors and those with annual revenue of US\$500,000 and above.	No explicit definition of SMEs; various size cutoffs provided.	No discussion on employment shares.	Negative association between firm size and net job creation. However, controlling for firm age, larger firms have a higher net job creation rate than smaller ones. As in Haltiwanger et al (2013), the paper also shows that young firms (one year old or less) are the drivers of job creation, with a net job creation rates ranging from 71 to 85%. (State-owned Enterprises (SOEs) had a net job contraction rates, and display a clear positive association between net job creation and firm size. On the other hand, net job creation was positive, and declines with firm size for private-owned firms.)	Gross job creation declines with firm size.	Gross job destruction rates appear to decline with firm size.	No discussion on firm exit rates.



Dougherty (2008); India;		No explicit definition of SMEs ;firms with 100+ employees are defined as large; those with fewer are categorized as small	No discussion on employment shares and firm size.	Net employment creation rate is higher for smaller firms; large firms in fact destroyed job, on the net.	Large firms display a higher gross job creation rates.	Gross job destruction rate is higher among large firms.	No discussion on firm exit rates.
Kaplan et al (2007)	Matched worker-employer data, based on Mexican Social Security Record; 1985-2001; establishments in all sectors.	No explicit definition of SMEs; various size cutoffs provided.	No discussion on employment shares and firm size.	Net job creation rates and firm size do not appear to be systematically correlated. However, for non-manufacturing sector firms, net employment growth declines with firm size.	Gross job creation rates decline with establishment size.	Gross job destruction rates decline with establishment size.	No discussion on firm exit rates.
Vergara (2005); Chile; 1979-2000.	Annual National Industrial Survey; data covers only manufacturing sector.	No explicit definition of firm size; various size cutoffs provided using firm sales.	No discussion on the association between employment shares and firm size.	Net job creation declines with firm size; in fact, only large and medium firms have a positive net job creation rates, with the value higher for large firms.	Gross job creation rates increases by firm size; as does the contribution to gross job creation.	Gross job destruction declines by firm size; so does contribution to gross job destruction.	No discussion on firm exit rates.
Page and Soderbom (2012); various countries.	World Bank Enterprise Surveys, and Manufacturing census data from Ethiopia.	No explicit definition of SMEs.	No discussion on the association between employment shares and firm size.	For manufacturing firms in Ethiopia, there appears to be no systematic difference between large and small firms in terms of employment growth. Specifically, small firms have a higher growth rate than larger firms, conditional on survival. However, survival rate is higher among larger firms. The expected job creation, therefore, does not differ between large and smaller firms.	No discussion on gross job creation and firm size.	No discussion on gross job destruction and firm size.	Small firms have a higher exit rates.

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## Tables

**Table 7: Establishment-Level Net Employment Growth**

<i>Size categorized by:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	<i>Initial</i> <u>ADM</u>	<i>Initial</i> <u>ADM</u>	<i>Initial</i>	<i>Initial</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Average</i> <u>HJM</u>	<i>Average</i> <u>HJM</u>	<i>Average</i>	<i>Average</i>
Large (100+)	-6.457*** (0.861)	-5.721*** (0.827)			-1.871*** (0.645)	-1.094* (0.625)			-5.649*** (0.701)	-5.146*** (0.681)			-1.345** (0.637)	-0.779 (0.629)		
Large (250+)			-5.694*** (1.050)	-4.842*** (1.011)			-1.896 (1.161)	-1.071 (1.113)			-4.760*** (0.859)	-4.215*** (0.842)			-1.192 (0.877)	-0.627 (0.859)
Mid-age (=1)		-3.540*** (0.531)		-3.574*** (0.535)		-3.587*** (0.536)		-3.592*** (0.536)		-2.964*** (0.709)		-2.940*** (0.709)		-3.049*** (0.717)		-3.040*** (0.716)
Mature (=1)		-5.350*** (0.529)		-5.538*** (0.540)		-5.569*** (0.541)		-5.604*** (0.540)		-5.053*** (0.646)		-5.370*** (0.668)		-5.637*** (0.684)		-5.684*** (0.673)
Constant	11.616*** (0.190)	13.568*** (0.320)	11.520*** (0.186)	13.529*** (0.319)	11.508*** (0.189)	13.517*** (0.319)	11.482*** (0.188)	13.510*** (0.319)	6.859*** (0.467)	9.715*** (0.684)	5.259*** (0.549)	8.404*** (0.566)	4.272*** (0.440)	7.446*** (0.604)	3.913*** (0.385)	7.243*** (0.599)
Observations	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921
R-squared	0.062	0.074	0.057	0.071	0.056	0.070	0.056	0.070	0.078	0.088	0.069	0.080	0.062	0.074	0.061	0.074
Economies	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Year, economy, and sector FE not shown. Robust standard errors clustered by economy in parentheses. Omitted category includes small (<99 and <250, respectively) and young (<5 yrs.) where applicable. All estimates survey-weighted OLS, with survey weights re-scaled to sum to 1 for each economy. ADM indicates estimations modelled on Ayyagari et al (2014); HJM following Haltiwanger et al (2013).

**Table 8: Establishment-Level Gross Job Creation**

<i>Size categorized by:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Employment Weighted							
	<i>Initial</i> <u>ADM</u>	<i>Initial</i> <u>ADM</u>	<i>Initial</i>	<i>Initial</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Average</i> <u>HJM</u>	<i>Average</i> <u>HJM</u>	<i>Average</i>	<i>Average</i>
Large (100+)	-8.140*** (0.648)	-7.320*** (0.627)			-5.546*** (0.667)	-4.695*** (0.654)			-7.179*** (0.693)	-6.558*** (0.687)			-3.930*** (0.611)	-3.248*** (0.585)		
Large (250+)			-7.806*** (0.868)	-6.776*** (0.786)			-4.516*** (1.215)	-3.534*** (1.157)			-5.813*** (0.721)	-5.029*** (0.696)			-2.425*** (0.892)	-1.628* (0.860)
Mid-age (=1)		-4.241*** (0.612)		-4.285*** (0.616)		-4.270*** (0.612)		-4.308*** (0.616)		-4.476*** (0.930)		-4.403*** (0.936)		-4.578*** (0.944)		-4.560*** (0.945)
Mature (=1)		-5.725*** (0.618)		-5.964*** (0.618)		-5.820*** (0.616)		-6.024*** (0.616)		-6.703*** (0.834)		-7.052*** (0.838)		-7.086*** (0.828)		-7.361*** (0.838)
Constant	12.896*** (0.434)	15.980*** (0.551)	12.276*** (0.425)	15.531*** (0.545)	12.632*** (0.440)	15.756*** (0.555)	12.159*** (0.432)	15.445*** (0.550)	14.754*** (0.178)	17.431*** (0.437)	9.870*** (0.273)	16.739*** (0.632)	14.625*** (0.183)	13.548*** (0.573)	9.019*** (0.326)	16.684*** (0.636)
Observations	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578
R-squared	0.157	0.176	0.148	0.169	0.151	0.170	0.145	0.167	0.162	0.185	0.140	0.166	0.137	0.163	0.128	0.156
Economies	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Year, economy, and sector FE not shown. Robust standard errors clustered by economy in parentheses. Omitted category includes small (<99 and <250, respectively) and young (<5 yrs.) where applicable. All estimates survey-weighted OLS, with survey weights re-scaled to sum to 1 for each economy. ADM indicates estimations modelled on Ayyagari et al (2014); HJM following Haltiwanger et al (2013).

**Table 9: Establishment-Level Job Contraction**

<i>Size categorized by:</i>	Employment Weighted															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	<i>Initial</i> <u>ADM</u>	<i>Initial</i> <u>ADM</u>	<i>Initial</i>	<i>Initial</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Average</i> <u>HJM</u>	<i>Average</i> <u>HJM</u>	<i>Average</i>	<i>Average</i>
Large (100+)	-2.402 (1.458)	-2.533* (1.473)			2.278** (1.008)	2.122** (1.018)			-0.685 (1.030)	-0.906 (1.053)			2.712** (1.120)	2.503** (1.128)		
Large (250+)			0.026 (1.462)	-0.145 (1.470)			0.948 (1.608)	0.737 (1.616)				1.119 (1.292)	0.910 (1.301)			2.174 (1.316)
Age (years)																
Mid-age (=1)		-1.021 (0.805)		-1.018 (0.807)		-0.996 (0.802)		-1.016 (0.805)		-0.510 (1.378)		-0.475 (1.365)		-0.399 (1.348)		-0.421 (1.354)
Mature (=1)		0.608 (0.753)		0.498 (0.748)		0.402 (0.746)		0.481 (0.744)		1.688 (1.091)		1.541 (1.081)		1.342 (1.092)		1.503 (1.066)
Constant	-8.867*** (0.492)	-8.930*** (0.693)	-9.220*** (0.382)	-9.246*** (0.632)	-9.441*** (0.382)	-9.415*** (0.618)	-7.570*** (0.460)	-9.259*** (0.632)	-8.049*** (0.873)	-9.479*** (1.141)	-9.476*** (0.981)	-10.790*** (1.171)	-10.890*** (0.932)	-11.998*** (1.096)	-10.283*** (1.002)	-11.559*** (1.277)
Observations	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685
R-squared	0.143	0.145	0.140	0.142	0.142	0.144	0.141	0.142	0.178	0.181	0.178	0.181	0.183	0.185	0.180	0.182
Economies	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Year, economy, and sector FE not shown. Robust standard errors clustered by economy in parentheses. Omitted category includes small (<99 and <250, respectively) and young (<5 yrs.) where applicable. All estimates survey-weighted OLS, with survey weights re-scaled to sum to 1 for each economy. ADM indicates estimations modelled on Ayyagari et al (2014); HJM following Haltiwanger et al (2013).

## Annex II – Descriptive Statistics (online)

A2. Descriptive Statistics	All (net)		Positive Growth		Negative Growth	
	n	56,788	26,458		10,641	
Est. Level Empl. Growth (scaled by 100)	4.9		17.0		-16.1	
	<u>n</u>	<u>Share</u>	<u>n</u>	<u>Share</u>	<u>n</u>	<u>Share</u>
Small (5-19), initial as base	30,697	54.1%	14,306	54.1%	4,501	42.3%
Medium (20-99), initial as base	20,282	35.7%	9,356	35.4%	4,667	43.9%
Large (100+), initial as base	5,809	10.2%	2,796	10.6%	1,473	13.8%
Small (5-19), average as base	30,208	53.2%	13,100	49.5%	5,218	49.0%
Medium (20-99), average as base	20,630	36.3%	10,055	38.0%	4,316	40.6%
Large (100+), average as base	5,950	10.5%	3,303	12.5%	1,107	10.4%
Age, years (log)	2.6		2.6		2.8	
Young (0-5 yrs.)	11,576	20.4%	6,116	23.1%	1,553	14.6%
Mid-age (6-10 yrs.)	13,151	23.2%	6,543	24.7%	2,127	20.0%
Mature (11+ yrs.)	32,061	56.5%	13,799	52.2%	6,961	65.4%
Manufacturing	32,046	56.4%	14,813	56.0%	6,287	59.1%
Retail	9,583	16.9%	4,543	17.2%	1,619	15.2%
Other Services	15,159	26.7%	7,102	26.8%	2,735	25.7%
Sub-Saharan Africa (AFR)	15,455	27.2%	7,438	28.1%	2,738	25.7%
East Asia Pacific (EAP)	7,265	12.8%	3,806	14.4%	1,206	11.3%
Eastern Europe and Central Asia (ECA)	7,178	12.6%	2,956	11.2%	1,564	14.7%
Latin America and Caribbean (LAC)	9,992	17.6%	5,228	19.8%	2,370	22.3%
Middle East and North Africa (MNA)	5,512	9.7%	2,128	8.0%	1,615	15.2%
South Asia (SAR)	11,386	20.1%	4,902	18.5%	1,148	10.8%

Un-weighted

## Annex III – Establishment Age as a Continuous Measure

**Table A3: Establishment-Level Net Employment Growth (Age as Continuous)**

									Employment Weighted							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
<i>Size categorized by:</i>	<i>Initial</i> <u>ADM</u>	<i>Initial</i> <u>ADM</u>	<i>Initial</i>	<i>Initial</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Average</i> <u>HJM</u>	<i>Average</i> <u>HJM</u>	<i>Average</i>	<i>Average</i>
Large (100+)	-6.457*** (0.861)	-5.339*** (0.843)			-1.871*** (0.645)	-0.652 (0.630)			-5.649*** (0.701)	-5.167*** (0.718)			-1.345** (0.637)	-0.703 (0.662)		
Large (250+)			-5.694*** (1.050)	-4.102*** (0.968)			-1.896 (1.161)	-0.296 (1.069)			-4.760*** (0.859)	-4.088*** (0.869)			-1.192 (0.877)	-0.383 (0.854)
Age (years)		-0.141*** (0.015)		-0.151*** (0.015)		-0.154*** (0.016)		-0.156*** (0.015)		-0.066*** (0.013)		-0.077*** (0.014)		-0.089*** (0.014)		-0.092*** (0.013)
Constant	11.616*** (0.190)	13.045*** (0.256)	11.520*** (0.186)	13.063*** (0.258)	11.508*** (0.189)	13.070*** (0.258)	11.482*** (0.188)	13.072*** (0.258)	6.859*** (0.467)	7.778*** (0.503)	5.259*** (0.349)	6.405*** (0.397)	4.272*** (0.440)	5.512*** (0.469)	3.913*** (0.385)	5.271*** (0.456)
Observations	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921	60,921
R-squared	0.062	0.070	0.057	0.067	0.056	0.066	0.056	0.066	0.078	0.082	0.069	0.073	0.062	0.068	0.061	0.067

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Year, economy, and sector FE not shown. Robust standard errors clustered by economy in parentheses. Omitted category includes small (<99 and <250, respectively). All estimates survey-weighted OLS, with survey weights re-scaled to sum to 1 for each economy. ADM indicates estimations modelled on Ayyagari et al (2014); HJM following Haltiwanger et al (2013).

**Table A4: Establishment-Level Gross Job Creation (Age as Continuous)**

									Employment Weighted							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
<i>Size categorized by:</i>	<i>Initial</i> <u>ADM</u>	<i>Initial</i> <u>ADM</u>	<i>Initial</i>	<i>Initial</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Average</i> <u>HJM</u>	<i>Average</i> <u>HJM</u>	<i>Average</i>	<i>Average</i>
Large (100+)	-8.140*** (0.648)	-7.003*** (0.614)			-5.546*** (0.667)	-4.407*** (0.636)			-7.179*** (0.693)	-6.608*** (0.739)			-3.930*** (0.611)	-3.266*** (0.598)		
Large (250+)			-7.806*** (0.868)	-6.395*** (0.751)			-4.516*** (1.215)	-3.067*** (1.123)			-5.813*** (0.721)	-5.065*** (0.742)			-2.425*** (0.892)	-1.554* (0.826)
Age (years)		-0.153*** (0.021)		-0.168*** (0.021)		-0.160*** (0.021)		-0.172*** (0.021)		-0.094*** (0.023)		-0.111*** (0.023)		-0.111*** (0.022)		-0.123*** (0.021)
Constant	12.896*** (0.434)	14.936*** (0.520)	12.276*** (0.425)	14.604*** (0.520)	12.632*** (0.440)	14.768*** (0.526)	12.159*** (0.432)	14.533*** (0.527)	14.754*** (0.178)	15.776*** (0.312)	9.870*** (0.273)	14.408*** (0.525)	14.625*** (0.183)	15.838*** (0.314)	9.019*** (0.326)	14.364*** (0.532)
Observations	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578	28,578
R-squared	0.157	0.167	0.148	0.160	0.151	0.162	0.145	0.158	0.162	0.169	0.140	0.150	0.137	0.147	0.128	0.140
Economies	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Year, economy, and sector FE not shown. Robust standard errors clustered by economy in parentheses. Omitted category includes small (<99 and <250, respectively). All estimates survey-weighted OLS, with survey weights re-scaled to sum to 1 for each economy. ADM indicates estimations modelled on Ayyagari et al (2014); HJM following Haltiwanger et al (2013).



**Table A5: Establishment-Level Job Contraction (Age as Continuous)**

									Employment Weighted							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
<i>Size categorized by:</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Initial</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>
	<u>ADM</u>	<u>ADM</u>											<u>HJM</u>	<u>HJM</u>		
Large (100+)	-2.402 (1.458)	-2.828* (1.528)			2.278** (1.008)	1.859* (1.050)			-0.685 (1.030)	-1.328 (1.091)			2.712** (1.120)	2.120* (1.171)		
Large (250+)			0.026 (1.462)	-0.621 (1.504)			0.948 (1.608)	0.248 (1.643)			1.119 (1.292)	0.303 (1.345)			2.174 (1.316)	1.333 (1.349)
Age (years)		0.067*** (0.022)		0.059*** (0.020)		0.053*** (0.020)		0.058*** (0.020)		0.081*** (0.017)		0.074*** (0.016)		0.065*** (0.016)		0.070*** (0.015)
Constant	-8.867*** (0.492)	-9.827*** (0.447)	-9.220*** (0.382)	-8.370*** (0.468)	-9.441*** (0.382)	-8.888*** (0.467)	-7.570*** (0.460)	-10.110*** (0.431)	-8.049*** (0.873)	-9.472*** (0.748)	-9.476*** (0.981)	-10.642*** (0.912)	-10.890*** (0.932)	-11.963*** (0.886)	-10.283*** (1.002)	-11.329*** (0.966)
Observations	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685	11,685
R-squared	0.143	0.147	0.140	0.144	0.142	0.145	0.141	0.143	0.178	0.187	0.178	0.186	0.183	0.189	0.180	0.187
Economies	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Year, economy, and sector FE not shown. Robust standard errors clustered by economy in parentheses. Omitted category includes small (<99 and <250, respectively). All estimates survey-weighted OLS, with survey weights re-scaled to sum to 1 for each economy. ADM indicates estimations modelled on Ayyagari et al (2014); HJM following Haltiwanger et al (2013).