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Job Creation, Job Destruction, and Productivity Growth: The Role of Young Businesses

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Abstract

Recent improvements in the data infrastructure at US statistical agencies have dramatically enhanced the ability to measure and study job creation and job destruction. The longitudinal data now permit the tracking of all firms and establishments in the US private sector in a comprehensive and integrated manner. This allows researchers to distinguish between the contribution of new firms and that of new establishments. In addition, firm entry, growth, and survival dynamics can be tracked in terms of organic changes instead of changes associated with mergers and acquisitions or other forms of business ownership changes. These new developments have led to a burgeoning literature on US firm dynamics. The recent literature has especially focused on the role of young businesses for job and productivity growth. The findings from that literature are the focus of the current article. The recent developments are discussed in light of the large literature on firm dynamics (in terms of both theory and empirics) that has developed over the past few decades.

1. INTRODUCTION

Historically, the United States has exhibited a high pace of job reallocation.[1] The evidence shows that this has been largely productivity enhancing. That is, jobs are being reallocated away from less productive to more productive businesses. These empirical findings are consistent with rich theoretical models of firm dynamics that emphasize the importance of creative destruction for innovation and productivity growth. Recent developments in the data infrastructure for the United States have enabled these empirical findings to be extended on three key dimensions. First, evidence on job creation and job destruction is now readily available for all sectors of the US economy, whereas early evidence was confined to manufacturing. Second, the economy-wide evidence now enables researchers to distinguish between job creation and destruction by firms and that by establishments. This distinction is important for many reasons. One of the key reasons is that it is now possible to distinguish between new establishments and new firms. The former may be new establishments of existing firms—an interesting part of the dynamics of job creation but not a good proxy for new firms. Third, the ability to track new firms also yields the ability to track firm age at both the firm and establishment levels. It is this feature of the recent innovations in data infrastructure that is emphasized in this article.

There is great interest in the dynamics of new firms. Politicians, policy analysts, and pundits often highlight the importance of entrepreneurs for economic growth. Advocates of entrepreneurship highlight the critical role that entrepreneurs play as a source of innovation and job and productivity growth. This advocacy for entrepreneurs is widespread in advanced and emerging economies. Because data on firm age have only recently become available, much of the existing evidence, and in turn much of the advocacy about entrepreneurs, has been for small firms. For example, in the United States, President Obama (2009) noted, "Small Businesses have always formed the backbone of the American economy. These entrepreneurial pioneers embody the spirit of possibility, the tireless work ethic, and the simple hope for something better that lies at the heart of the American ideal." Likewise, President George W. Bush (2007) noted, "We've got to understand the decisions we're making today are going to make it more likely that the small-business sector, the entrepreneurial spirit of America will remain very strong tomorrow." Many commentators have described small businesses as the engine of growth in the US economy.

This articles builds on the newly emerging evidence on the contribution of young businesses to job creation and productivity growth. Evidence on the growth dynamics of young businesses is more informative about entrepreneurs compared to the traditional alternative, which is to study growth dynamics by firm size. Much of the focus in this article is on the evidence from the United States, but related findings for emerging economies are also discussed. The United States represents an interesting case study as it is widely viewed as one of the most entrepreneurial and dynamic economies. Interestingly, even in the United States, the role of entrepreneurs is complicated. On the one hand, entrepreneurs (as measured by start-ups and young, high-growth businesses) contribute disproportionately to job creation and productivity growth. Business start-ups account for approximately 20% of US gross job creation, and high-growth existing businesses (which are disproportionately young) account for almost 50% of gross job creation (Haltiwanger 2012, Haltiwanger et. al. 2013). On the other hand, most business start-ups in the United States exit within the first 10 years, and most surviving young businesses do not grow but stay small. Moreover, although the net entry of young businesses contributes to productivity growth, there is

[1]Several recent papers have documented and studied the decline in the pace of job reallocation in the United States over the past couple of decades. A good recent summary with many citations to the relevant papers is provided by Decker et al. (2014).

a substantial fraction of productivity growth accounted for by growth within existing businesses (including within existing, mature businesses).

The article proceeds as follows. Section 2 provides a broad overview of the literature on firm dynamics that suggests there is an important role for entry and exit. Section 3 highlights the challenges of measuring the dynamics of young businesses. Section 4 presents basic facts about young businesses in the United States regarding survival, growth, and productivity dynamics and then briefly discusses what we know about these dynamics in the rest of the world. The focus here is on what we have learned about the role of young businesses given the recent improvements in data infrastructure. Section 5 provides concluding remarks with a focus on reconciling theory with evidence.

2. CONCEPTUAL UNDERPINNINGS

Empirical evidence shows wide dispersion in profitability and productivity within industries (Syverson 2004). The extent of this dispersion is surprising, raising the question of why low- and high-productivity/profitability firms coexist in the same industry. One view is that the observed dispersion reflects the frictions and perhaps distortions present that prevent resources from being immediately allocated to the most productive firms. Adjustment frictions to capital and labor as well as to entry and exit can play this role.[2] In addition, as discussed below, distortions can act as wedges preventing the equalization of marginal revenue products of factors. Alternatively, there may be sources of curvature in the profit function, so the most productive firms do not take over the market. Decreasing returns to scale or span of control interacting with heterogeneous entrepreneurial ability (e.g., Lucas 1978) yields an equilibrium size distribution of firms. Alternatively, the curvature in the profit function may come from firms facing downward-sloping demand curves. This approach has become increasingly popular in the past decade or so as empirical evidence suggests substantial price dispersion across producers within the same industry, consistent with models of product differentiation (see, e.g., Melitz 2003).[3]

There is a rich set of models that help us understand the observed industry and firm dynamics in this context. Jovanovic (1982) posits that at entry firms do not fully know their productivity (or other aspects of profitability), so an important part of firm dynamics, especially for new or growing industries, involves the selection and learning dynamics of young firms. Those firms that learn they have a good location, product, or process survive and grow. Those that learn they are not profitable contract and exit. Because the evidence on firm dynamics shows that reallocation and restructuring are not confined to young firms, additional theories need to be used to understand such dynamics. Ericson & Pakes (1995) develop a model in which every time a firm makes a major change in its way of doing business (either by adopting a new technology or by responding to a major change in economic conditions such as higher energy costs), the firm gets a new draw on its profitability and productivity with associated selection and learning dynamics. Syverson (2011) provides a recent survey of these and other related models.

The more general notion, as illustrated in models such as those by Hopenhayn (1992) and Hopenhayn & Rogerson (1993), is that firms are subject to new profitability shocks in any given period. Shocks are persistent, but technical efficiency, demand, and cost conditions are stochastic. Firms in this environment must adjust and adapt to changing economic circumstances to grow and

[2]For example, in Mortensen & Pissarides (1994), search and matching frictions yield dispersion in productivity in equilibrium.

[3]There have been many refinements to the incorporation of product differentiation and demand factors into heterogeneous firm models with entry and exit (see, e.g., Foster et al. 2008, Melitz & Ottaviano 2008).

survive. Although their past successes can help in forecasting their ability to adjust and adapt, firms are regularly required to reinvent themselves. Firms that reinvent themselves successfully survive and grow; firms that do not contract and exit.

In these canonical models, entry goes hand in hand with exit. Low-profitability businesses cannot cover their fixed costs and exit. Part of the pressure on these businesses to exit involves the mass of potential entrants always putting competitive stress on them. Potential entrants enter until the present discounted value of profits net of entry costs is equal to zero.

Characteristics of entrants are an important issue. Do entrants enter high or low in the profitability distribution? What is their role as innovators? Models in which entrants enter at the top of the distribution are related to models in which new innovations are tied to entry. If only entrants can generate new products and new processes (because of some type of vintage or putty-clay assumptions), then entry plays a vital role in innovation and growth. Alternatively, models in which entrants face a similar distribution to incumbents emphasize entrants as a source of replenishment and replacement in the economy—with poorly performing incumbents contracting, failing, and being replaced by entrants.

It is common to assume that there is considerable heterogeneity along with accompanying uncertainty among entrants about their prospects in terms of technical efficiency, demand, and costs. It may take time for this uncertainty to be resolved, so there may be a period of selection and learning dynamics, as in Jovanovic (1982). Moreover, there may be not just passive learning about idiosyncratic factors, but also active learning by doing. The latter may be endogenous as firms that engage in more activity may learn faster, and firms may be able to actively invest in such learning. Because empirical evidence suggests that productivity and profitability distributions are highly skewed, the post-entry dynamics may be rich and complex. Entrants presumably do not know whether they will be in the critical right tail of the profitability distribution. They may have to learn (passively and actively) to determine whether they have the new product or new process that will put them there. This learning may be about several different aspects of profitability. It may be learning about technical efficiency or about demand factors. Foster et al. (2013b) and Drozd & Nosal (2012) argue that new firms must build up a customer base, which takes time and resources.

This discussion highlights the importance of distinguishing between productivity and profitability. Profitability differences across firms will obviously reflect productivity differences but also demand and cost factors. Because firms likely have some market power, some part of the differences may reflect the degree of competition and markups. The frictions and learning dynamics might be quite different for these different components of profitability. For example, if the learning is on the demand side, then there are two sides to the learning process: The firm learns about its customers, and the customers learn about the products of the firm.

Whether they are at the top or enter as a new draw in the profitability distribution, start-ups play an important role in job and productivity growth in these models of firm dynamics. In these models, the reallocation associated with the entry and exit and the expansion and contraction of existing businesses moves resources from less to more profitable businesses. If an important component of the dispersion in profitability across firms is associated with differences in productivity across firms, this implies that reallocation will be productivity enhancing. Factors potentially interfering with these dynamics include high barriers to entry or exit; regulations that deter job destruction; poorly functioning markets (product, capital, and/or labor); weak rule of law; poor public infrastructure for communication and transportation; and graft, corruption, or otherwise arbitrary government behavior. Much ongoing research has attempted to specify such distortions and to quantify the influence on firm dynamics and in turn productivity and employment (see, e.g., Hopenhayn & Rogerson 1993, Restuccia & Rogerson 2008, Hsieh & Klenow 2009, Buera et al. 2011, Bartelsman et al. 2013). Such distortions may adversely impact start-ups

and young businesses disproportionately. Section 4 briefly discusses the empirical evidence on the role of entrepreneurship and its relationship to these models with distortions to firm dynamics.

One potentially important issue in this context is how distortions to firm dynamics impact the level versus the growth rate of productivity. Distortions to entry and exit in this class of heterogeneous firm models inherently have an adverse impact on the level of productivity because entry and exit result in less productive exiting businesses being replaced with more productive entering businesses. These level effects yield predictions for growth (at least in terms of transition dynamics). A country (e.g., China) that reduces misallocation distortions over a period of time will exhibit productivity gains over at least that period of time (and longer if it takes time for the impact of the reduction in distortions to work itself out). But similar arguments have been used to discuss the impact of distortions to entry and exit (and other aspects of firm dynamics) on steady-state growth. For example, Aghion & Howitt (2006) nicely summarize the literature on Schumpeterian growth. In their framework, entrants are closely tied to innovation both in terms of engaging in innovation and in terms of inducing incumbents to innovate. More generally, the class of models in which only entrants have access to the latest technology inherently implies that a slower pace of entry will yield a slower pace of technological progress.

3. CHALLENGES OF MEASURING THE DYNAMICS OF YOUNG BUSINESSES

One reason for the differing views of the role of entrepreneurs in job and productivity growth involves the variations in defining and measuring entrepreneurship. Section 1 notes that many observers claim that the innovations of small businesses and entrepreneurs yield economic growth. Observers often conflate small businesses with entrepreneurs and thus ascribe the majority of economic growth to small business entrepreneurs. However, what we think of as entrepreneurial activity is better represented by new businesses.[4] Moreover, even with regard to this notion of new businesses as the manifestation of entrepreneurial activity, there are important distinctions to be made. These distinctions depend on an understanding of differences between firms and establishments, so a quick discussion of these terms follows.

A firm represents all economic activity operating under common operational control. In practice, we typically measure the economic activity within the United States (this is true for the analysis reported below). An establishment represents a fixed single location of business activity (e.g., in retail trade, an individual store). This distinction is important as many of the largest firms in the United States operate many establishments and as such may be opening up new establishments relatively frequently. In this article, the term start-up refers to a new firm with all new establishments. Other types of new firms, those that come into existence because of ownership changes, mergers and acquisitions (M&A), or some other change in the legal form of organization, are not included in this definition.

Both start-ups and new establishments of existing firms are important contributors to business dynamics. They represent a form of innovative and entrepreneurial activity in the sense that there is new activity in a specific physical location. However, a new establishment of an existing firm could take many forms. For example, an existing firm could itself be a relatively small and young firm. Alternatively, the existing firm could be a large, well-established firm with substantial experience in the industry and/or geographic region. Between these two extremes, the existing firm could be a large, well-established firm that is new to the industry or region. As such, the conditions

[4]The findings of Haltiwanger et al. (2013) show that most of the job-creating prowess of small businesses is a result of the contribution of start-ups and young businesses that are small. These findings are illustrated in a variety of ways below.

and challenges facing start-ups could be quite different from the new establishment of an existing firm. For these reasons, start-ups may be a cleaner indication of innovative activities. Thus, the discussion in Section 4 presents evidence on entrepreneurship drawing distinctions between young firms and young establishments because start-ups and young firms are more closely tied to our notions of entrepreneurship.

Moreover, even within these start-ups, we might expect to find very different types of entrepreneurs. For every well-known success story of a start-up that grows into a powerhouse source of job and productivity growth, there are many that never grow or in fact fail. Schoar (2010) argues that it is critical to distinguish between "subsistence" entrepreneurs and "transformational" entrepreneurs. Subsistence entrepreneurs create small businesses that provide an alternative source of employment for the entrepreneur and a few others (usually family members) and do not usually grow. Consistent with this type, Hurst & Pugsley (2012) find that many young and small business owners in the United States state that they do not have aspirations for high growth but rather often started businesses for nonpecuniary reasons. Transformational entrepreneurs, alternatively, create small businesses that grow into larger businesses, thus creating employment for other workers. "As such, they can be seen as the true engines of growth in an economy" (Schoar 2010, p. 59). It is beyond the scope of this article to further parse out the motivation of entrepreneurs, but indirect evidence is cited in terms of the growth and exit of start-ups.[5]

4. EMPIRICAL EVIDENCE ON THE CONTRIBUTION OF YOUNG BUSINESSES

The discussion of the conceptual underpinnings in Section 2 highlights the importance of entry, exit, and reallocation in productivity dynamics. The discussion in Section 3 on measuring entrepreneurship leads to a focus on new businesses, especially start-ups. In this section, these pieces are brought together in a review of start-ups and young businesses and their relationship to job growth and productivity growth. It begins by examining the evidence from the United States on start-ups and young businesses and their relationship to job growth (Section 4.1) and to productivity growth (Section 4.2). Section 4.3 briefly discusses results from the rest of the world as a point of comparison.

4.1. US Evidence on Job Growth

What role do start-ups and young businesses play in job creation in the United States?[6] There are a few relevant data sources suitable for addressing this question. One particularly useful source is the recently developed firm- and establishment-level data collected by the US Census Bureau.[7] In the past decade, the Census Bureau has developed the Longitudinal Business Database (LBD), which covers the entire private sector in a nationally comprehensive and integrated manner. As argued above, being able to distinguish between firms and establishments is especially important

[5]Similarly, this article does not address the role of start-ups and young firms in direct measures of innovation such as patents or other indicators of innovative activity.

[6]In terms of broad themes, this section builds on Haltiwanger et al. (2013) and Decker et al. (2014), which are repeatedly cited in this section. However, this section also highlights findings that distinguish between establishment and firm dynamics and the associated distinction between young establishments and young firms.

[7]The data and research at the US Census Bureau are summarized on the Center for Economic Studies website (**http://www.census.gov/ces**), which also provides information about how to access these data at Census Bureau–NSF Research Data Centers.

when studying entrants because of possible differences in start-ups and new establishments of existing businesses. The LBD has great advantages relative to the Longitudinal Research Database (LRD), which was the focus of much early work on job creation and destruction (e.g., Davis et al. 1996). The LRD was confined to manufacturing establishments, and it was not possible to track firm and establishment dynamics in the comprehensive manner that the LBD permits. Additionally, there have been similar developments at the US Bureau of Labor Statistics with the Business Employment Dynamics (BED) statistics. The BED and its underlying microdata provide a rich and timely source of job creation and destruction measures at the establishment level on a quarterly basis. As such, the data are very valuable for business cycle analysis (see, e.g., Davis et al. 2012). The BED is less well suited to studying the contribution of young businesses, which is the focus of this article.

It is useful to begin by quantifying the contribution of start-ups and young businesses to job creation. The United States had robust net employment growth most recently in the 2003–2007 period. During this period, net job creation in the US private sector over the course of the year was approximately 2.5 million jobs per year.[8] In this same period, start-ups (new firms) in the private sector accounted for over 3 million jobs per year. From this perspective alone, start-ups are an important contributor to job creation (although, as will become immediately clear, appropriate caution is needed in interpreting this finding).

As noted in Section 3, many of the largest firms in the United States operate many establishments and as such are opening up new establishments. Tabulations from the Business Dynamic Statistics (BDS) show that job creation from start-ups is about the same as that from new establishments of existing firms: Both add approximately 3% of employment each year. The cumulative 6% of employment is about one-third of overall job creation in the United States (which averaged approximately 18% per year over 1980–2010 in the United States). Viewed from this perspective, job creation from start-ups and that from the new establishments of existing firms play a critical role but are hardly the only sources of job creation.

Distinguishing between the growth and survival dynamics of young firms and those of young establishments is important. Doing so requires tracking establishment age and firm age in a consistent but separate fashion. We rely here on the methodology developed by Davis et al. (2007) and Haltiwanger et al. (2013). In this literature, establishment age is measured as the number of years an establishment has existed (an entrant has an age of zero). Firm age is based on the age of the oldest establishment that is part of the firm when the organization starts. For start-ups, all the establishments of the new organization are entrants, so firm age is zero. For a firm that comes into existence from an ownership change, M&A activity, or a change in the legal form of organization, the firm will have an age consistent with its ongoing establishments. Furthermore, in this methodology, continuing firms age naturally (i.e., by one year at a time) as long as the organization stays in existence.

As part of this same methodology assigning firm age, Haltiwanger et al. (2013) develop a method for capturing firm growth that focuses on organic growth rather than growth from M&A activity and other related changes in organization. In their approach, the growth of the firm from $t-1$ to t is based on all the establishments the firm owns in period t (as well as any establishments that shut down from $t-1$ to t that the firm owned in period $t-1$). This approach

[8]The statistics reported on job creation in this section are drawn from tabulations from the BDS and the LBD. Many of the tabulations in this section are based on the methodology and results of Haltiwanger et al. (2013) and Decker et. al. (2014). The BDS (**http://www.census.gov/ces/dataproducts/bds/**) includes public domain statistics derived from the LBD. The BDS and LBD track employer firms (firms in the private, nonfarm sector with at least one employee). There are many firms without employees, which are discussed briefly in Section 5.

to measuring firm growth insures that only organic growth contributes to firm expansions and contractions because only the underlying establishment-level growth contributes to organic growth.[9] Consistent with this approach, firm exits represent legal entities that cease to exist, and all the establishments shut down. Exits do not reflect legal entities that exit through organizational change or buyout activity. The tabulations that follow use this methodology.

With these remarks as a background, **Figure 1** shows that young establishments exhibit dynamics that are different from those of young firms. **Figure 1*a*** shows the net growth rate (all statistics are employment weighted) of firms by firm age and establishments by establishment age (so the horizontal axis is capturing firm age for the firm growth rates and establishment age for the establishment growth rates). The statistics are based on tabulations of pooled data from 1992 to 2011 from the LBD following closely related analysis by Haltiwanger et al. (2013). There is inherently some overlap between these categories as young firms tend to have young establishments (but young establishments can be owned by older firms).

Conditional on survival, young firms have much higher growth rates than do more mature firms. Similarly, young establishments have higher growth rates than do more mature establishments. However, the differential is much less for establishments, and the effect of establishment age diminishes quickly compared to the effect of firm age. There is little difference in growth rates between a 10-year-old and a more than 16-year-old establishment. In contrast, a 10-year-old firm has net growth that is 1.4 percentage points higher than that of a more than 16-year-old firm.

The exit dynamics look quite different as well (**Figure 1*b***). Young firms have a substantially higher exit rate (job destruction from exit is an employment-weighted exit rate) than do young establishments. In both cases, exit declines monotonically with business age. The exit rates for both are quite high: On an employment-weighted basis, 50% of an entering cohort of firms will have exited by age five. The analogous measure for establishment exit is 43%.

Although there are some nontrivial differences in the growth and survival dynamics of new firms relative to new establishments, both exhibit an up or out dynamic. Conditional on survival, young firms and, to a lesser extent, young establishments grow more rapidly than their more mature counterparts. However, both face a substantially higher failure rate. The very high failure rate of young firms is almost offset by the contribution of the surviving firms. Five years after the entry of a typical cohort, the employment is approximately 80% of the original contribution of the cohort. This is despite losing approximately 50% of employment to business exits.

Most of the remaining discussion focuses on young firms as opposed to young establishments because start-ups and young firms are more closely tied to our notions of entrepreneurship. The high mean net growth of surviving young firms masks enormous heterogeneity among young surviving firms. Evidence for this is reported by Decker et al. (2014), who show in their **figure 2a** that young firms have a very high dispersion of growth but also a very high skewness of growth. The skewness accounts for the very high mean growth rates of surviving young firms seen in their **figure 3a**. Decker et al. also show that young firms (and, for that matter, essentially all firms) exhibit median growth rates close to zero. The exception for the median is age-one firms, which is about 5%, but this is still much lower than the mean net growth rate of approximately 15% for young firms. Their findings highlight that the typical young firm (as captured by the median) exhibits little or no growth even conditional on survival. However, the skewed right tail of young firms shows that they disproportionately account for high-growth firms.

[9]This methodology attributes all the growth of establishments from $t-1$ to t to the acquiring firm (see Haltiwanger et al. 2013 for much more discussion of the data and measurement issues).

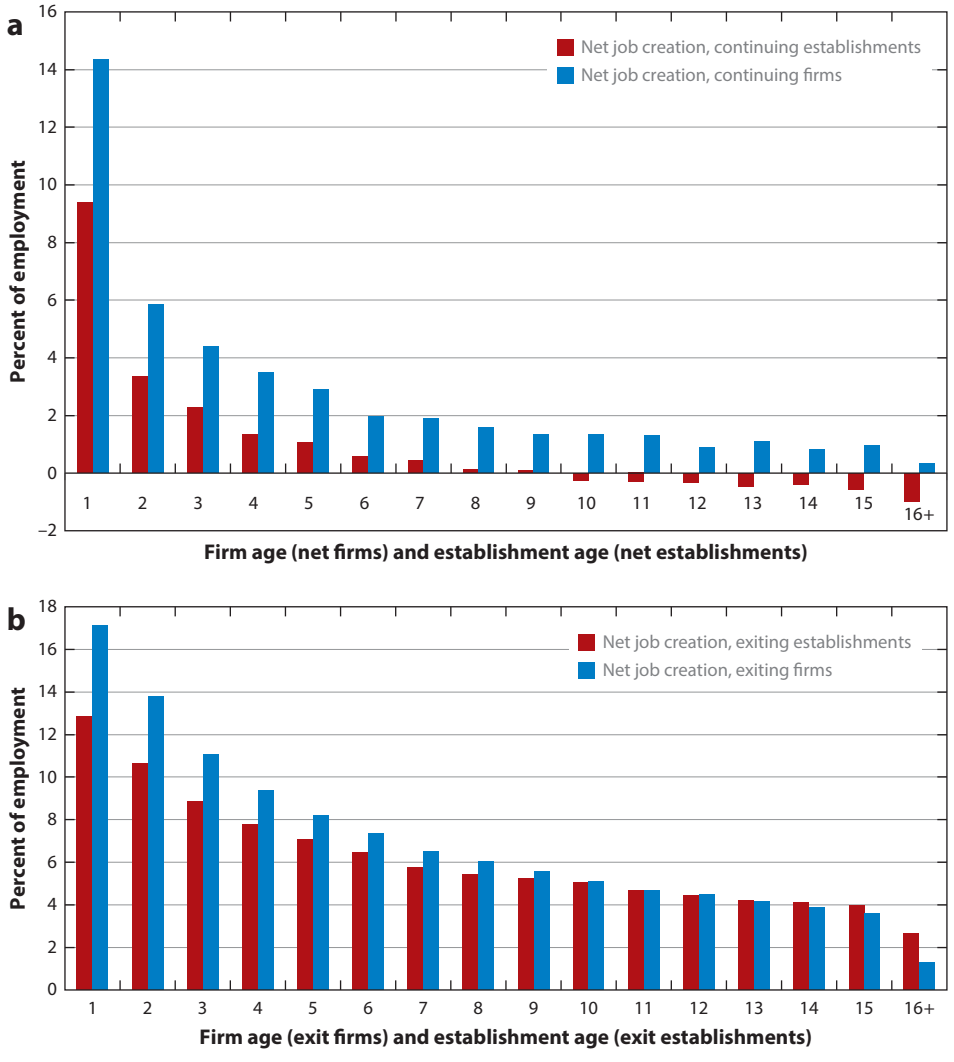

Figure 1

(*a*) Net growth for continuing firms and continuing establishments. (*b*) Job destruction from exiting firms versus exiting establishments. Annual averages of statistics are computed from the Longitudinal Business Database from 1992 to 2011 for the US private, nonfarm sector. All statistics are employment weighted and are rates (percent of employment).

Start-ups and the high-growth firms that yield the skewness in growth rates contribute disproportionately to job creation. **Figure 2** shows that start-ups account for less than 10% of firms and more than 20% of job creation. High-growth firms (defined here as firms growing more than 25% per year) account for approximately 15% of firms and 50% of job creation. High-growth firms are predominantly young firms, with 65% less than 10 years old.[10]

[10]High-growth young and mature firms are important contributors to job creation. High-growth young firms contribute 51% of the job creation from all high-growth firms. The important contribution of high-growth mature firms reminds us that there are rich dynamics even among mature firms in a manner consistent with the findings of Ericson & Pakes (1995).

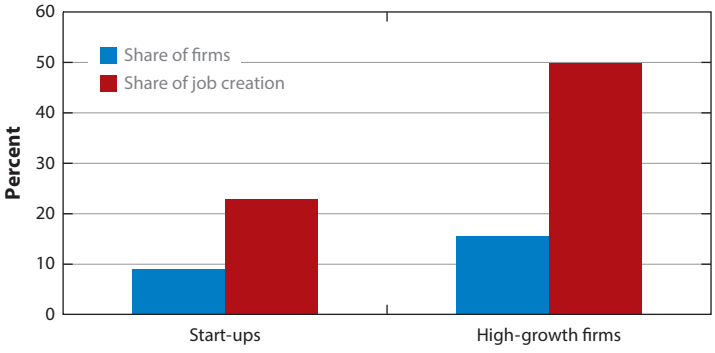

Figure 2

The contribution of start-ups and high-growth firms to job creation. Tabulations are from the Longitudinal Business Database from 1992 to 2011 for the US private, nonfarm sector.

Start-ups are small; more than 90% have less than 20 employees, and small start-ups account for about half of all start-up employment (see **Figure 3**). Approximately 90% of start-up employment is accounted for by firms with less than 250 employees. The size distribution of start-ups is quite different from that of the overall distribution of firms. For purposes of comparison, approximately 50% of employment in the US private sector is accounted for by firms with more than 500 employees. Large firms account for less than 1% of firms but a large share of activity. Large start-ups are almost nonexistent and account for a very small share of start-up activity.

Overall, the evidence shows that start-ups are small; most fail; and conditional on survival, most do not grow. But among the surviving start-ups are high-growth firms that contribute disproportionately to job growth. This image is enriched by examining the average net employment growth rate by firm age and firm size class, as found in Decker et al. (2014, table 1). That evidence shows that the average net growth falls monotonically with firm age for all firm size groups. However, the average net growth for young firms is substantially higher for firms with more than 20 employees. Such patterns highlight that rapid growth among young firms is especially present among larger (or at least not micro) young firms. In some respects, this additional evidence just highlights the rare nature of success among young firms. Only a small share of surviving entrants experience rapid postentry growth, and such growth is somewhat less likely for the very small young firms.

4.2. US Evidence on Productivity Growth

The implications of these job dynamics on productivity dynamics have also been closely studied. There is much evidence that these net entry dynamics and reallocation dynamics are closely related to productivity and other measures of profitability (see Bartelsman & Doms 2000, Foster et al. 2001, and Syverson 2011 for surveys and summaries). Common findings are that exiting businesses have much lower productivity than do incumbents and that, conditional on survival, growth is increasing in productivity (using measures of establishment-level productivity).[11] One challenge

[11]Much of the micro empirical literature focuses on establishment-level rather than firm-level measures of productivity. Part of this reflects the complex nature of large, mature firms operating in several sectors in which measuring firm-level productivity would be complex. Production technologies, as well as the deflators used to convert nominal expenditures to real values, are at the industry level. Note that young establishments are dominated by young firms, and young firms typically have only a single establishment. So the analysis of young establishments sheds considerable light on the patterns for young firms. Moreover, the studies discussed here break out results for establishments that are part of single-unit establishment firms so that the entering and young establishments are young firms. The findings discussed here carry over to single-unit establishment firms.

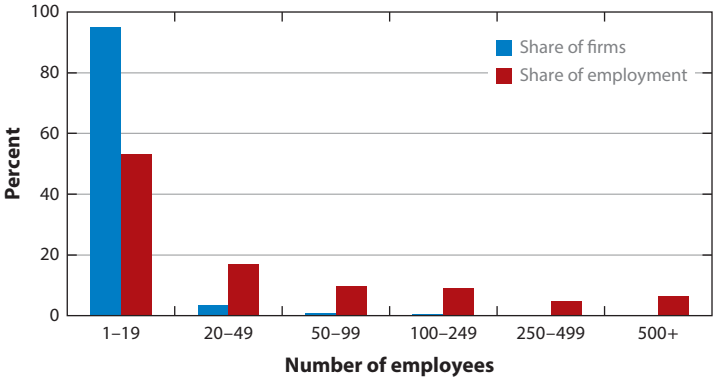

Figure 3

The size distribution of start-ups. Tabulations are from the Business Dynamic Statistics from 1980 to 2010 for the US private, nonfarm sector.

in the evidence for productivity is that much of the empirical literature uses a measure of productivity that reflects some combination of technical efficiency, demand, and cost effects. As discussed in detail by Foster et al. (2008), this primarily results from data limitations—most sources of firm- and establishment-level data used to measure productivity do not include microlevel measures of output and input prices. Instead, real output is measured as establishment- or firm-level revenue divided by an industry deflator. Similar remarks apply to measures of inputs. As such, high-revenue productivity businesses may simply be high–output price or low–input price businesses.

Given these issues, I focus on the evidence from Foster et al. (2008) based on data that permit distinguishing between what they call TFPR (revenue total factor productivity, which is the typical measure used in the literature) and TFPQ (a measure of physical productivity closer to a measure of technical efficiency). The findings of Foster et al. provide some reassurance that the vast literature using TFPR yields insights that are mostly not confounded by these conceptual and measurement issues. But there are some important differences between results by TFPR and TFPQ, so keeping this distinction and implications in mind is important in this context.

Summary statistics from Foster et al. (2008, table 1) yield a within-industry dispersion in (log) TFPQ of 0.26 and in (log) TFPR of 0.22. These dispersion measures are roughly similar to the dispersion measures for TFPR in Syverson (2004), suggesting that the patterns for the small number of products studied by Foster et al. (2008) have wider relevance. There is a correlation of 0.75 between TFPQ and TFPR, −0.54 between TFPQ and plant-level (log) prices, 0.28 between TFPQ and plant-level physical output, and 0.56 between TFPQ and plant-level revenue labor productivity. These patterns suggest that the findings in the literature that use revenue productivity (either TFPR or revenue labor productivity) are using measures with reasonably high correlation with TFPQ. The inverse correlation between prices and TFPQ is consistent with models of product differentiation—higher-TFPQ plants have lower marginal costs and charge lower prices. Moreover, there is a positive covariance between size and productivity in the data.

Figure 4*a* shows the results of a commonly used accounting decomposition of industry-level productivity growth. Such accounting decompositions have limitations but are useful ways of summarizing the covariances between reallocation and productivity in the data.[12] This

[12]These statistics are taken from Foster et al. (2008, table 7). The limitations of these accounting decompositions are discussed by Foster et al. (2008) and Syverson (2011).

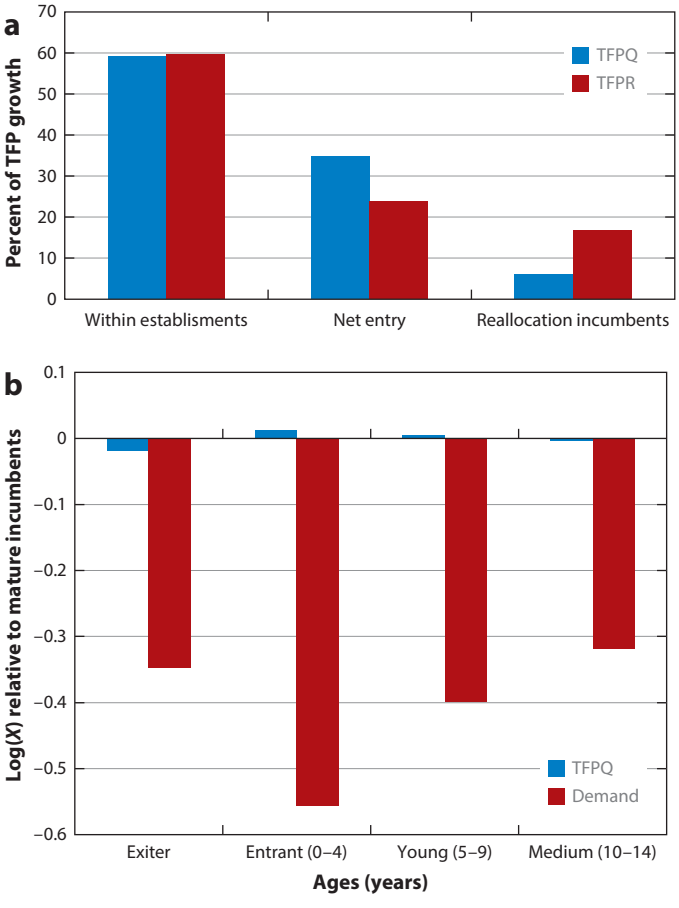

Figure 4

(*a*) Shares of total factor productivity (TFP) growth in selected manufacturing industries, five-year horizon, TFPR versus TFPQ. Tabulations are based on statistics from Foster et al. (2008, table 7). (*b*) Demand versus TFPQ evolution. Tabulations are based on statistics from Foster et al. (2008, table 5).

decomposition is based on establishment-level reallocation and therefore establishment-level entry and exit. The above analysis reminds us that there are nontrivial distinctions between establishment and firm dynamics, so appropriate caution is needed in relating this analysis to that discussed above.

The decomposition of five-year industry-level productivity growth (for the products analyzed in Foster et al. 2008) shows that, whether using TFPR or TFPQ, approximately 60% of the industry-level productivity growth over a five-year horizon is within establishments. This finding is common in the literature for the manufacturing sector[13] and, as discussed below, is important in

[13]For some other sectors, the within-establishment component appears to be much smaller. Foster et al. (2006) find that virtually all of the labor productivity growth in retail trade is a result of the contribution of net entry. Existing firms improve productivity in retail trade primarily through adding new, more productive retail locations. Moreover, much of the exit of low-productivity retail establishments in the United States has been dominated by the exit of mom-and-pop single-unit establishment firms.

this context of the role of entrepreneurship and the role more generally of reallocation and productivity. But by construction this also implies that approximately 40% of five-year productivity growth is accounted for by reallocation effects. The role of net entry is substantially larger using TFPQ as opposed to TFPR. The net entry component accounts for 35% of productivity growth with TFPQ and 24% of productivity growth with TFPR. Because the within-establishment effects are similar, reallocation among incumbents accounts for a higher share with TFPR than with TFPQ.

Foster et al. (2008) show that what is driving this difference in findings between TFPR and TFPQ is the role of price and in turn demand factors that differ between entrants and incumbents and younger and more mature incumbents. They find that entrants and young establishments have substantially lower prices because of lower demand (**Figure 4*b***). They find that entrants and young establishments have slightly higher TFPQ than do more mature incumbents and have nontrivially higher TFPQ than do exiting establishments. It is this gap in TFPQ between entering and exiting establishments that generates the 35% of productivity growth in TFPQ accounted for by net entry.

Figure 4*b* also shows that demand differences exhibit much larger variation across entering and exiting establishments and across establishments of different ages. It is the low demand of entrants that yields low prices and in turn lower TFPR for entrants—and in turn reduces the contribution of net entry to productivity growth.

The enormous variation in demand-side factors in **Figure 4*b*** should not be interpreted as suggesting that the variation in TFPQ and the net entry reallocation across establishments are not important for industry-level productivity growth. The index of industry-level productivity growth over a five-year horizon is approximately 4% in Foster et al. (2008).[14] This magnitude is roughly consistent with the rate of total factor productivity growth in manufacturing obtained over the same relevant time periods from aggregate statistics. A contribution of 35% to this level of productivity growth over a five-year horizon is important to the industry-level aggregate growth. **Figure 4*b*** is not about such aggregate implications but shows cross-sectional variation at the microlevel—and it is clear that most of the cross-sectional variation is driven by demand-side factors rather than TFPQ. As discussed above, such demand-side factors are potentially important in accounting for the life-cycle dynamics of young establishments (see Foster et al. 2013b for further analysis of these issues).

In interpreting the 35% of five-year productivity growth due to net entry, several observations are of importance. First, because they are over a five-year period, the effects do not simply reflect the contributions of entry exactly at the point of entry. That is, entrants will have entered over the five-year interval, so the effects can reflect the contribution of selection and learning dynamics over that interval. Hence, part of the gap between entering and exiting establishments in **Figure 4*a*** can be the result of relatively young plants that have exited with low productivity. Foster et al. (2001, 2006) provide evidence of such selection and learning dynamics. Moreover, they show that within-plant productivity growth is more rapid for surviving young establishments than for more mature establishments. Thus, some of the 60% within-plant contribution is consistent with young plants exhibiting the type of active learning described in Section 2.

Evidence suggests that within-establishment productivity growth is less important in sectors such as retail trade in which most of the labor productivity growth has been attributed to net entry (see Foster et al. 2006). Part of what is going on in retail trade is that existing firms grow by adding establishments rather than expanding existing establishments. Still the evidence shows that there

[14] As highlighted by Melitz (2003), the industry-level index of productivity growth of TFPR and TFPQ will be the same because the industry-level deflators used in the micro-analysis are appropriate at the industry level of aggregation.

is relatively little within-establishment productivity growth in retail trade except interestingly by young establishments (including young establishments of new firms).[15]

Before concluding this discussion, I find it worth highlighting that the evidence is less definitive for the contribution of entrepreneurs to productivity compared to jobs. Studies of productivity beyond the manufacturing and retail trade sector are scarce. Measuring TFPR is a challenge beyond manufacturing given the limitations on data on inputs other than labor in non-manufacturing. Another limitation is that most studies discussed here (and, more generally, in Syverson 2011) focus on establishment-level dynamics rather than firm-level dynamics. This is partly for conceptual reasons but is also related to measurement challenges. The studies discussed here do break out the productivity dynamics separately for establishments that are part of single-unit establishment firms and those that belong to multi-units. Single-unit establishments capture the entire firm. The findings regarding productivity differentials between entering and exiting establishments, as well as within-establishment productivity growth being more rapid for young establishments, carry over to these single-unit establishment firms.[16] In addition, recent studies have taken advantage of the new firm age data to distinguish between establishments belonging to young firms and those belonging to mature firms (see, e.g., Foster et al. 2013a). That evidence suggests that establishments of young firms exhibit the type of up or out dynamics discussed here. That is, entering establishments of young firms that have low productivity exit, whereas those with high production grow rapidly. Still, there are many gaps in our understanding of the dynamics of firms and establishments.

4.3. A Brief Comparison with Evidence from Emerging Economies

It is well beyond the scope of this article to summarize the burgeoning literature studying these dynamics around the world. Many researchers have obtained access to firm-level databases in national statistical agencies in developed and emerging economies. Moreover, alternative sources (e.g., the Amadeus data and/or the ICA data from the World Bank) have been developed. A recent excellent summary of the insights from this work is provided in the *World Development Report 2013* (World Bank 2013). In addition, recent papers, such as Schoar (2010), provide a superb discussion of the factors underlying international differences in entrepreneurship.

Instead of reviewing the rich insights from the numerous studies from around the world, I make a few observations that help put the evidence from the United States discussed above in context. I highlight the following key findings from the *World Development Report 2013* (along with some related work cited there and relevant for the current discussion). First, the pace of job creation and destruction is high in developed and emerging economies (see World Bank 2013, figure 3.2). An important component of this job creation and destruction involves entry and exit. As such, the evidence suggests that it is, for the most part, not a lack of entry that characterizes poorly performing economies (see Bartelsman et al. 2009, figure 1.2).

Second, poorly performing emerging economies are characterized as having (relative to industrialized economies) a large share of very small, informal firms (see World Bank 2013, figure 3.7). There is little evidence of postentry growth for young firms and establishments. It appears they are missing the skewed right tail of the growth rate distribution, as seen in **Figure 4** (see World Bank 2013, figure 3.13).

[15]Doms et al. (2004) find that investment in information technology is related to both differences in the level of productivity across establishments and differences in the within-establishment growth rates of productivity.

[16]Measured productivity is higher at establishments that are part of multiunit firms.

Third, there is evidence of distortions impacting the dispersion of productivity measures and the covariance of size with productivity within countries. Figure 3.9 of the *World Development Report 2013* shows that firm-level dispersion in within-industry productivity is greater in emerging economies than in the United States (World Bank 2013), consistent with the hypothesis of Hsieh & Klenow (2009) that distortions permit even greater dispersion in productivity to exist. Bartelsman et al. (2013) show that the covariance between size and productivity is much lower in Eastern European economies but grew substantially over the transition. Their results suggest that these patterns are consistent with greater distortions to allocation in these economies that were reduced during the transition.

Taken together, these patterns suggest that what is especially missing from poorly performing emerging economies are the fast growing young firms. There is plenty of entry—perhaps too much. Most are microenterprises with few if any paid employees. Most are informal. There is little or no evidence of postentry growth.

Using Schoar's (2010) characterization, the evidence cited above suggests that poorly performing economies have too few transformational entrepreneurs. It is somewhat unclear if this results from inherent limitations in the nature of the entrepreneurs or from the challenges facing entrepreneurs. After all, even in the United States, most entrepreneurs either fail or do not grow. Schoar (2010) argues that the most important bottlenecks are regulation and access to capital. Hsieh & Klenow (2014) argue that the distortions are perhaps better characterized as "death by a thousand cuts" in that there are many different distortions that impact firms differentially. Their respective work has shed light on the nature of the distortions. The evidence presented for the United States highlights that in evaluating the distortions, it is especially important to assess how distortions will impact the right tail of the profitability/productivity distribution and in turn the right tail of the growth rate distribution. This point implies that studies focusing on how distortions impact the (unweighted) mean growth of firms may not be particularly insightful. It is the impact on the right tail of the weighted distribution of growth rates that matters for aggregate job creation and productivity.

5. CONCLUDING REMARKS: RECONCILING THEORY AND EVIDENCE

In the United States, start-ups and young firms are important contributors to job creation and productivity growth. But the process of that contribution is quite complex. Although start-ups contribute substantially to jobs immediately, most start-ups fail, but among surviving young firms is a relatively small share of very high-growth firms who contribute substantially to job growth. The evidence shows that the well-known skewness in the size distribution of employment is accompanied by a less well-known skewness in the distribution of growth rates, especially for young businesses. In other words, the typical young firm either exits or does not grow. Evidence for the manufacturing sector shows a tight relationship between these growth and survival dynamics and productivity, as well as with measures of profitability. For any cohort of recent entrants, those with low productivity and profitability are much more likely to exit than other firms. In contrast, young firms with high draws of productivity and profitability grow rapidly.

These patterns raise a variety of questions in terms of reconciling theory and evidence. To reconcile, the skewness in the growth rate distribution for young businesses must be matched with skewness in the profitability distribution for young businesses. In terms of the latter, it apparently takes many years for this heterogeneity in terms of both dispersion and skewness to work itself out. Accordingly, if selection and learning dynamics are being used to reconcile the patterns, it would appear that this is not simply passive learning about productivity or even profitability. In addition, it appears that much of the cross-sectional variation across businesses of different ages results

more from demand-side factors than differences in measures of technical efficiency (what we called TFPQ above). The implication is that models in which all the heterogeneity stems from differences in technical efficiency across firms are unlikely to match the data in terms of either dispersion of outcomes or dynamics. Much more theoretical work is needed to understand the demand heterogeneity across firms, especially with respect to the endogenous components of this variation.

It may take more than simply specifying that the underlying determinants of profitability exhibit skewed distributions for theory to match the facts. It has become common to assume such distributions (e.g., assuming that the distribution is Pareto) to help capture the size distribution of activity, but it is not clear this is sufficient. The insights of Hurst & Pugsley (2012) indicate that there are multiple motives for being an entrepreneur. Their results suggest that many entrepreneurs in the United States have little intention of establishing one of the high-growth firms emphasized in this discussion. Instead, circumstances or preferences make working for themselves their best current option. This perspective suggests that theory should have both ex ante and ex post heterogeneity in entrepreneurs.

Reallocation does appear to contribute substantially to productivity growth. Moving resources away from the less productive to more productive businesses is an important component of productivity growth. But there is a substantial fraction of industry-level productivity growth associated with within-firm (and within-establishment) productivity growth. Thus, focusing solely on allocational dynamics will miss many of the determinants of productivity growth. There is a vast empirical and theoretical literature on the determinants of within-firm productivity growth (see Syverson 2011 for further discussion and references). It is apparent that this should remain a core area of focus for those studying micro- and macroproductivity dynamics. Moreover, a complete model should have both within-firm and reallocation components to productivity growth.

The connection between within-firm/establishment productivity growth and allocational dynamics is not well understood. To begin, there is evidence that within-firm productivity growth is higher for young surviving businesses (see Foster et al. 2001, 2006). Moreover, the models summarized by Aghion & Howitt (2006) emphasize that the threat of entry can induce incumbents to innovate. Another possible connection is the role of entrepreneurs and young firms as being critical to experimentation—and then in turn those that are successful are acquired and implemented by the large, well-established firms that achieve their within-firm productivity growth in this fashion. Examples of these dynamics are apparent in the pharmaceutical industry and the software industry (in which success for an entrepreneur is often being bought up by the large, well-established firms). Such connections between entrepreneurial young firms and large, well-established firms are not well understood either empirically or theoretically.

The importance of how to distinguish across entrepreneurial types is an open question on both theoretical and empirical grounds. As noted, Hurst & Pugsley (2012) suggest that there are many entrepreneurs who are so engaged for nonpecuniary reasons. The vast number of nonemployer businesses in the United States provides some additional support for this hypothesis. There are approximately 26 million businesses in the United States, with approximately 20 million of those businesses having no employees. Nonemployer firms account for most businesses but relatively little business activity (they account for only 4% of economic activity as measured by gross revenue; see Davis et al. 2009 for analysis of nonemployer firms). Although most of those nonemployer firms never hire a worker, approximately 30% of employer start-ups (the focus of earlier discussion) actually had prehistory as a nonemployer firm. Although most new employers do not grow, a small share do grow, and they account for a very large share of job creation and contribute substantially to productivity growth. Given that, out of each of these groups, some emerge as the high-growth young firms that become the large successful firms of the future, do the

differences in outcomes reflect inherent differences in type, differences in draws from the productivity/profitability distribution, or differences in the barriers faced? In other words, should we view the large number of microentrepreneurs as a vast nursery out of which a small number of high-growth firms emerge?

Related questions arise from the characterization by Schoar (2010) between subsistence and transformation entrepreneurs. If barriers were reduced, would at least some of the subsistence entrepreneurs be able to become transformational entrepreneurs? These questions are vital not only for our understanding of entrepreneurship, but also for policy. A case can be made that policies should be targeting the market failures impacting the marginal high-growth firm. Given the rare nature of such high-growth firms, policies that target all young and small firms are likely to be unsuccessful.

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