Older and Slower: The Startup Deficit's Lasting Effects on Aggregate Productivity Growth

Titan Alon	David Berger	Rob Dent	Benjamin Pugsley
Northwestern	Northwestern and NBER	New York Fed	New York Fed

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Since 2005, there has been a dramatic slowdown in aggregate productivity growth in the U.S. (Fernald (2014)). In this paper, we examine whether, and to what extent, this relatively recent decline in aggregate productivity is a consequence of more longstanding decline in the gross business entry rate since the 1980s. The tight link between innovation and entrepreneurship in many models of economic growth (Shumpeter (1942); Acemoglu et al. (2013)) suggests that frictions that impede entry may have long lasting effects on productivity growth. Recent work by Davis and Haltiwanger (2014) and Decker et al. (2014) documenting declines in measures of business dynamism, the gross entry rate among them, is consistent with this view. In this paper, we provide the first direct evidence on the link between changes in firm entry and aggregate productivity growth.

To establish this link, our research adopts a multi-faceted empirical strategy. First, we use a new decomposition method on US Census firm-level microdata to reveal a pattern of labor revenue productivity growth over the firm lifecycle common across all sectors. Remarkably, this lifecycle pattern has changed little since the beginning of the aggregate productivity slowdown in 2005. These results motivate a counterfactual to quantify the effects of a change in firm entry vis-à-vis shifts in the firm age distribution on average industry revenue productivity growth. This entry-related "aging" channel explains roughly one-third of the slowdown, with the remainder following from a decline in the gains from reallocation among mature (20+ years) incumbent firms. Second, since declines in business dynamism may be symptoms of a shift in the underlying process of innovation moderating productivity growth rather than its proximate cause, in ongoing research we use an instrumental variables strategy to assess whether declines in entry that follow from plausibly exogenous low frequency demographic shifts induce the same effects on productivity growth. Third and finally, we will use these reduced form estimates as cross-sectional restrictions for an equilibrium growth model with firm heterogeneity to provide a quantitative analysis.

Accounting for Aggregate Productivity

We extend the Dynamic Olley-Pakes (DOP) decomposition of Melitz and Polanec (2015) to allow log productivity growth to vary over the lifecycle of the firm. Using changes in the cross-sectional distribution of productivity, the DOP framework decomposes the change in average productivity into into (1) a contribution from entrants relative to surviving incumbents, (2) a contribution from exit of less productive firms, (3) a widespread shift in the average productivity of incumbents, and (4) the reallocation of market share to more productive incumbents, where the last two encompass the traditional Olley-Pakes decomposition. We extend the dynamic framework to allow for selection, and the Olley-Pakes terms to further depend on firm age. In this way, the extended framework

delivers contributions from entry, from the first 20 years of firms' lifecycles, and separately from very mature (ages 20+) firms.

We apply this decomposition using Census data on firm-level measures of labor revenue productivity on the total nonfarm business sector from the Haltiwanger et al. (2016) Revenue-Enhanced Longitudinal Business Database (RLBD) for the period from 1996-2012. The period we study spans periods of both high productivity growth (1996-2004) and low productivity growth (2005-2012). This database merges annual net receipts from business tax returns to the longitudinal business database with sampling weights to adjust for bias introduced in the matching process. Lacking reliable measures of prices or value added, our labor productivity measure is real net receipts per worker, deflated using an aggregate price index. To the extent that within a narrow industry, firms have similar technologies, we expect growth in average industry productivity to co-move with value added per worker. We apply the decomposition first within 4-digit NAICS industries and then estimate a common age profile across industries. Importantly, we allow this age profile to shift between the high and low productivity growth periods.

Main Results

Our estimation procedure yields several significant findings. First, we document that the lifecycle profile of labor productivity growth is indeed downward sloping and convex. Figure 1 below presents our estimates of our results and illustrates that young firms do indeed register productivity growth contributions substantially faster than older incumbents. Furthermore, the differentials in growth rates are substantial but converge quickly; while the youngest firms grow very quickly relative to older incumbents, nearly 2/3 of the effect is gone after five years and the effect is nearly gone after 10 years.

Moreover, we document that primarily selection and allocation effects operating on young firms, rather than within firm productivity improvements drive these lifecycle effects. In fact, if anything the mean productivity growth of young firms is negligibly different, and perhaps even smaller, than older firms. In contrast, the contributions by reallocation and selection are about equally important and constitute the bulk of the contribution of younger firms to aggregate productivity growth beyond that of older firms. We confirm that these lifecycle contributions for non-censored firms ages 1-19 are robust to several controls and remain stable over our estimation period and in the low-growth (1996-2004) and high-growth (2005-2012) sub-periods we study.

Together, these results suggest two main findings. First, the lasting effect of the start-up deficit has contributed a meaningful drag on aggregate productivity growth of around 0.50%. The drag has come primarily from decreases in the forces of selection and reallocation that act most strongly on younger firms who now account for a smaller share of economic activity. Furthermore, the fact that most of these lifecycle contributions come from between firm market forces (selection, allocation) rather than within firm innovations suggests also that the broader decline in dynamism observed in the aggregate economy may itself be a lasting consequence of the start-up deficit that began over three decades ago.

In addition to the contribution of start-up deficit discussed above, our estimates suggest one more
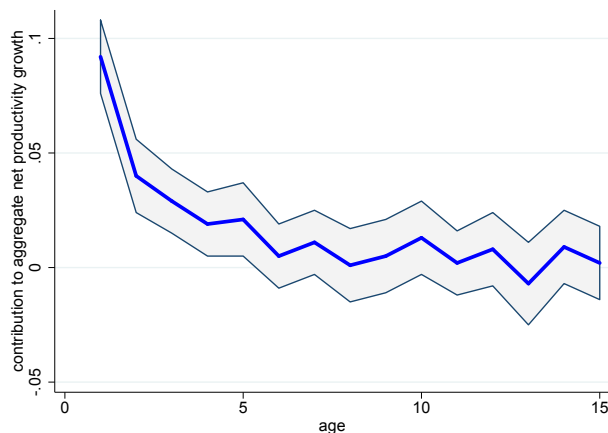
Figure 1: Net Labor Productivity Growth by Firm Age

major source of productivity drag: a declining rate of allocative efficiency amongst the economies largest and oldest (20+ firms). In comparing the high-growth and low-growth sub-periods the only part of the age profile contributions that changed was that made by the 20+ firms. Further breaking down the effect according our DOP decomposition shows that the decline was driven exclusively by a decline in the allocative efficiency of these older, larger firms and more than offset modest within firm productivity gains by this group. In other words, the most productive older firms have not gained market share at the expense of less productive firms. Given the increasing share of economic activity of this set of firms, we find that this in fact was the largest drag on productivity growth registered around the productivity slowdown.

Conclusions and ongoing work

Together, our findings fit with broader results in the literature. For both young and old firms, we find that the largest drags on productivity growth come from between firm market forces rather than falls in within firm innovation, which seem to have continued apace during our period. Similar results have been documented by other research in numerous areas, including most recently in the dispersion of wage gains that contributed to increasing inequality Song et al. (2015). In addition, we also document that the largest drag on growth has come from increasing misallocation among the largest, oldest incumbents. This is consistent with broader concerns among policy makers and economists about the increasing concentration of market activity across the United States and the extent to which this represent inefficient rent-seeking and uncompetitive market outcomes Furman (2016). Going forward, we aim to understand how the forces we've uncovered here and those that have been documented in the literature, fit together with the broader transformations in the U.S. business sector. In upcoming work, we will be examining what cross-sectional variation in U.S. detailed 4-digit industries and regional markets can tell us about the drivers of these trends and how the start-up deficit may be linked to increasing uncompetitive and inefficient concentration of economic activity amongst older and larger incumbent firms.

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