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# Wealth, Tastes, and Entrepreneurial Choice

Erik Hurst and Benjamin W. Pugsley

## 3.1 Introduction

What drives small business entry? Why do most firms stay small while only a few grow fast? What explains the distribution of firm size within a country? There is a large and active literature trying to answer these questions. The canonical models of business formation segment the population into "entrepreneurs" and "workers" where entrepreneurs are often equated with either small business owners or the self-employed. Most of the existing research attributes differences across entrepreneurs with respect to ex post performance to either differences in financing constraints facing the firms (e.g., Evans and Jovanovic 1989; Clementi and Hopenhayn 2006),

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differences in ex post productivity draws across the firms (e.g., Simon and Bonini 1958; Jovanovic 1982; Pakes and Ericson 1998; Hopenhayn 1992), or differences in entrepreneurial ability of the firms' owners (e.g., Lucas Jr. 1978). These models, however, assume no heterogeneity in preferences for either small business ownership or small business growth.

Even though the canonical models of entrepreneurship assume away preference heterogeneity in the population, recent empirical work suggests that such heterogeneity is an important feature of the data. For example, Hurst and Pugsley (2011) document that roughly 50 percent of small business owners within the United States report that nonpecuniary benefits were one of the primary reasons that they started their business.[1] These self-reported nonpecuniary benefits included responses such as "wanting to be my own boss," "tired of working for others," "wanting flexibility to set my own hours," or "wanting to pursue my passion." Hurst and Pugsley (2011) also show that most small business owners report having no desire to grow their business. When asked about their ideal firm size, the median response of new business owners is that they desire their business to only have at most a few employees. Moreover, those reporting that they started their business for nonpecuniary reasons were much more likely than a group motivated by a new business idea to report that their ideal firm size was small. This is not surprising given that the overwhelming majority of small business owners in the United States are skilled craftsmen (e.g., plumbers, electricians, painters), skilled professions (e.g., lawyers, dentists, accountants, insurance agents), or small shopkeepers (e.g., dry cleaners, gas stations, restaurants).

Additionally, there is a large literature showing that the median small business owner earns less as a business owner than she would have earned had she remained a wage or salary worker. Using data from the Survey of Income and Program Participation, Hamilton (2000) documents that the median small business owner receives lower accumulated earnings over time than otherwise comparable wage and salary earnings. Pugsley (2011) expands on Hamilton's findings, showing that these patterns persist for both newly formed businesses as well as older small businesses (those in existence for at least a decade). Moskowitz and Vissing-Jørgensen (2002) document that the returns to investing in private equity (predominantly business ownership) are no higher than the returns to investing in public equity, despite the additional undiversifiable risk.[2] Collectively, these papers suggest that

1. Respondents in the Panel Study of Entrepreneurial Dynamics were asked to report the top two reasons they started their business. Hurst and Pugsley classified these responses into five broad categories: nonpecuniary benefits was one of the categories.

2. Measurement issues surrounding income reports by the self-employed complicate such analyzes. Hurst, Li, and Pugsley (2014), for example, show that the self-employed underreport their income by roughly 25 percent to household surveys. Moskowitz and Vissing-Jørgensen (2002) incorporate the fact that business owners underreport their income when computing the differential returns to private equity.

nonpecuniary benefits may explain why the total compensation for running a small business (risk-adjusted) is much lower for the median small business owner relative to remaining a wage/salary worker.

In this chapter, we craft a simple static model of small business entry with selection on the nonpecuniary benefits of small business ownership. The key element in the model is that individuals differ in their preference for owning a small business, and these preferences are the sole drivers of small business entry within the model. To highlight the mechanism, we assume away the standard forces that researchers usually use to model small business entry and growth. For example, individuals in the model do not differ in either their latent ability to create a new business nor do they differ in their ex post productivity. Furthermore, we assume that capital is not needed to start a new business. As a result, there is no role for liquidity constraints to affect small business entry. In that sense, our model should be viewed as being in a similar style to Evans and Jovanovic (1989), who also develop a deliberately stylized model to study an alternative mechanism for selection of entrants. The difference is that Evans and Jovanovic focused on differences in ability across entrepreneurs and the role of binding liquidity constraints. We, instead, focus solely on preference heterogeneity with respect to nonpecuniary benefits for small business ownership. As we show, many of the key predictions of these two stylized models are identical.

While wanting to highlight the economic effects of nonpecuniary benefits, we do feel there are benefits from adding two additional degrees of heterogeneity to our setup. First, like Evans and Jovanovic (1989), we allow households to differ with respect to their initial wealth. Second, we allow for different industries where each industry is defined by its natural scale. Some industries (e.g., car manufacturing) have large fixed costs and, as a result, a large natural scale. Other industries (e.g., plumbers) have relatively small fixed costs and, as a result, a smaller natural scale. The heterogeneity across sectors in their natural scale will yield predictions about what sectors will be dominated by small businesses within our model. When entrepreneurs form a business they are more likely to do so in sectors with a relatively low natural scale. This is because the key trade-off within the model stems from the benefits the individual gets (in utility terms) from starting her own business relative to the costs imposed from having a small business and losing the benefits of scale.

With these simple features, we show our model yields many key empirical facts without relying on differences in entrepreneurial ability, differences in entrepreneurial luck, or binding liquidity constraints. First, we show that the model predicts that people with large nonpecuniary benefits of small business formation will be concentrated in industries with low natural scale. This results from our assumption that nonpecuniary benefits do not depend on industry or the scale of the business. The intuition is that individuals will want to get their nonpecuniary benefits in the industry with the lowest costs. In these industries small businesses will also have a competitive advantage because of their implicit lower pecuniary marginal costs. This matches evidence showing a strong correlation between an industry's share of small businesses (out of all small businesses) and the fraction of employment within that industry that occurs within small businesses. For example, a large fraction of small businesses (out of all small businesses) are skilled craftsmen. Within the detailed skilled craftsmen industries, most employment occurs within small businesses. There are very few big firms in the plumber, electrician, and painter industries. However, there are many old firms in the plumber, electrician, and painter industries. Reconciling these two facts is the finding that very few firms in the skilled craftsmen industries ever grow beyond being small (conditional on survival).

Second, the model predicts that earnings will be lower for those who run a small business. Equilibrium forces imply that individuals must be indifferent between working for others or starting their own business. Since at the margin there is a utility flow from owning a business, pecuniary earnings must be lower for small business owners. Again, the fact that small business owners earn less than comparable wage/salary workers seems to be a feature of the data for the median small business owner.

We also show that our model predicts a positive correlation between small business ownership and wealth even though there are no binding liquidity constraints, differences in risk preferences, or ex ante correlation of tastes and initial wealth. The reason for this is that we are modeling the utility flow of owning a business as being separable from the rest of the individuals' consumption bundle. As wealth increases, the marginal utility of the rest of the consumption bundle falls. The cost of running a small business in our model is the foregone market wage less the business's pecuniary earnings. This cost must always be positive in an equilibrium with a small business sector. When wealth is higher, the marginal utility loss from the lower pecuniary earnings is lower. This makes the cost of running a business, in utility terms, lower. To put it another way, our model generates that owning a business is a relative luxury good. In a world with nonpecuniary benefits, there could be a strong correlation between wealth (or exogenous changes in wealth) and business ownership that have nothing to do with binding liquidity constraints. This complicates the inferences made in many empirical studies that look for exogenous changes in wealth and subsequent business entry as evidence of binding liquidity constraints.

Related to the above findings, we show that labor productivity within the economy is declining the greater the level of nonpecuniary benefits in the economy. If there are reasons people prefer the small business sector, there are pecuniary costs to a society in that individuals will forego the benefits of scale to enter the small business sector. This can offer one potential reason why measured labor productivity differs dramatically between countries with differing sizes of the small business sector.[3] However, in a world with nonpecuniary benefits of small business ownership, labor productivity differences need not imply utility differences.

Finally, and potentially most provocatively, the model predicts that small business subsidies in this model—funded by lump sum taxes—are regressive. There are no distortions in our model, so it is not surprising that small business subsidies strictly reduce welfare. However, because of the fact that wealthy people are more likely to buy the utility flow of small business ownership, the subsidies are regressive. More wealthy individuals are small business owners than poor individuals. The subsidy on small business ownership just transfers resources to the wealthy from the poor. The net gain to the wealthy relative to the poor is strictly positive if the taxes to fund the subsidy are lump sum. The regressivity could be undone if the taxes paid to fund the subsidy also increase in household wealth.

We are well aware that our model is highly stylized and abstracts from many features we believe to be relevant with respect to small business formation. However, our goal is to highlight how a simple model of nonpecuniary benefits of small business ownership has predictions that are similar to many canonical models used in the literature that rely on heterogeneity in ability, luck, or liquidity constraints to explain small business entry and dynamics. In the last section of the chapter, we set out a road map for researchers by offering some guidance on new moments that can be used to help discipline the various forces within our model. We then talk about how we can improve measurement to better create empirical counterparts to the moments needed to test among the importance of the various potential drivers of small business ownership and growth. For example, a key prediction that distinguishes nonpecuniary benefits from the other stories is the size of the wage difference between wage/salary workers and small business owners. Researchers can use these gaps as additional moments to help calibrate the average size of the nonpecuniary benefits from small business ownership. However, much additional work needs to be done to measure these gaps empirically. In particular, one needs to account for the potential that business owners may underreport their income, the fact that business income is more volatile, and the fact that employers often provide additional fringe benefits to workers.

In summary, we think researchers should take seriously the potential for nonpecuniary benefits of small business ownership when crafting models of small business entry and firm dynamics. There seems to be a belief by some that small businesses would only grow faster if they were not bound by liquidity constraints or government regulations. This is likely true for some small businesses. However, if people are starting small businesses for nonpecuniary reasons, subsidies to small business owners may actually be welfare reducing. We also show that under some conditions, the subsidies

3. See, for example, La Porta and Shleifer (2014).

will be regressive. The benefits of the subsidy will go to the wealthier households who were more likely to buy the utility flow of running a business. Understanding the relative importance of different drivers of small business formation and growth will allow researchers and policymakers to assess the potential costs and benefits of different policies.

## 3.2 Empirical Facts

In this section, we establish a set of facts that will help to guide our modeling choices below.

### 3.2.1 Heterogeneity in Small Business Propensity across Industries

To establish our first set of facts, we use data from the US Census Longitudinal Business Database (LBD). The LBD is a complete annual census of US business establishments with paid employees that spans the years 1976 to 2011. Establishments are linked to their parent firm through both survey and administrative records within a year. Then the data are longitudinally linked by both establishment and firm identifiers across years in order to measure entry, growth, and exit.[4] While the LBD files are available for each year at the establishment level, we transform the data so the unit of observation is at the year and firm level.

We follow the approach adopted in the US Census Business Dynamic Statistics (BDS) and assign the firm's age as the age of its oldest establishment. For industry information, we assign a four-digit North American Industry Classification System (NAICS) industry code to each firm. For multiunit firms, we assign the firm's "industry" as the modal industry classification across all of the firm's establishments.[5] Our sample pools annual firm-level employment measures from 1992 to 2011 for all firms with nonmissing employment data. Because firm age is left censored in 1976, 1992 is the first year where we can identify firm age through age fifteen.

For the work below, we classify each firm in year $t$ by its size, $s$, age, $a$, and four-digit industry, $j$. We define small firms as those employers with between one and nineteen employees.[6] This category accounts for roughly 20 percent of all US business employment. We then consider three mutually exclusive age groups: "young" firms ages zero to five, "middle" firms ages six to nine, "older" firms ages ten to fifteen, and an additional category for all remaining

4. See Jarmin and Miranda (2002) for details on the construction of the LBD.

5. We used the procedure in Fort and Klimek (2016) to map standard industrial classification (SIC) industry codes to NAICS industry codes. In Fort's procedure, some of the four-digit industries cannot be mapped between the NAICS and SIC categories. These industries are mapped at higher levels of aggregation (two digit or three digit). We collapse these unmatched categories into a single cell.

6. Our results are robust to defining small firms as having less than fifty or less than one hundred employees. We focus on firms with less than twenty employees for consistency with the results in Hurst and Pugsley (2011).

firms over age fifteen. Using the year/firm files, for each year we compute the total number of firms, $n_{jast}$, and employment, $e_{jast}$, within each four-digit industry, age, and size group.

We are interested in, at a detailed level, an industry's link with small businesses, and we propose two alternative measures of an industry's small business orientation. First we measure a four-digit industry's firm or employment share of all small businesses or small business employment. To do this, for each industry $j$ we define the following:

$$x_j^m = \frac{1}{T}\sum_{t=1}^{T}\frac{\sum_a m_{j,a,\text{small},t}}{\sum_j \sum_a m_{j,a,\text{small},t}},$$

where $m$ is either a measure of employment, $e$, or a measure of the number of firms, $n$. For example, $x_j^n$ is the number of small firms (of any age) in four-digit industry $j$ as a share of the total number of small businesses regardless of age or industry, averaged over the sample period of 1992 to 2011. Analogously, $x_j^e$ is the total number of employees in small firms (of any age) in four-digit industry $j$ as a share of all employment in small businesses regardless of age or industry. Generically, $x_j^m$ provides a measure to identify the most important industries among small businesses. We also define two additional measures computed for only young or older small businesses:

$$x_{j,a=\text{young}}^m = \frac{1}{T}\sum_{t=1}^{T}\frac{m_{j,a=\text{young},s=\text{small},t}}{\sum_j m_{j,a=\text{young},s=\text{small},t}}$$

$$x_{j,a=\text{older}}^m = \frac{1}{T}\sum_{t=1}^{T}\frac{m_{j,a=\text{older},s=\text{small},t}}{\sum_j m_{j,a=\text{older},s=\text{small},t}}$$

For example, $x_{j,a=\text{young}}^e$ is industry $j$'s share of total young small firm employment.

Whereas our first measure captures the concentration of an industry among small businesses, our second type of measure captures the concentration of small businesses within an industry. We define as $y$ the fraction of employment (firms) in small businesses in industry $j$ out of all employment (firms) in industry $j$ regardless of size. Formally,

$$y_j^m = \frac{\sum_a m_{j,a,s=\text{small}}}{\sum_s \sum_a m_{j,a,s}},$$

where the denominator is total employment, $m = e$, or total number of firms, $m = n$, in industry $j$ across firms of all sizes and ages. As above, we can further define $y_{j,a=\text{young}}^e$ and $y_{j,a=\text{older}}^e$ as the share of employment among small firms ages zero to five and ages ten to fifteen in industry $j$ out of all industry $j$ firms within each respective age group.

These industry measures need not be the same. The first measure identifies the most important industries for the small business sector. The second measure identifies the industries with a high concentration of small businesses. It is possible that large industries, even with a relatively small share of small businesses, may still be important for the small business sector if they are sufficiently large.

Figure 3.1 analyzes the first measure and plots the cumulative distribution of $x_j^n$ (on the y-axis) against the industry rank of $x_j^n$. For example, the four-digit industry with the largest share of small firms out of all small firms is residential building construction. This industry would get a rank of 1. This four-digit industry comprises roughly 3.5 percent of all firms with less than twenty employees. As seen in figure 3.1, roughly twenty-five four-digit industries in the United States comprise one-half of all firms with less than twenty employees. Hurst and Pugsley (2011) list the top forty four-digit industries that represent over 60 percent of all firms with less than twenty employees. Essentially all of these firms are skilled craftsmen (builder, plumbers, painters, electricians), skill professionals (doctors, dentists, accountants, lawyers, real estate agents, insurance agents) and small shopkeepers (dry cleaners, restaurants, grocery stores, bars, gas stations).

The patterns in figure 3.1 persist with firm age. Figure 3.2, panel A,

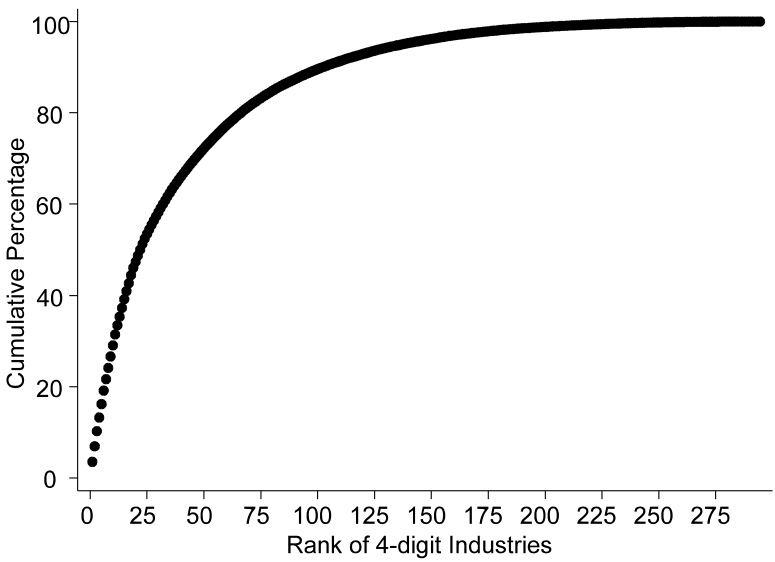
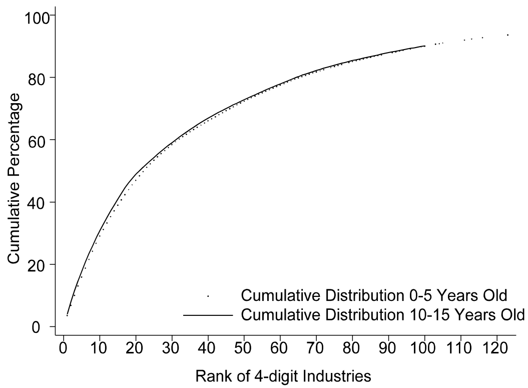



**Fig. 3.1 Cumulative distribution of $x_j^n$ (on the y-axis) against the industry rank of $x_n^j$**

*Notes:* We select all firms with up to twenty employees. These firms are grouped by their four-digit NAICS industry code. There are 295 such industries. Industries are then ranked by the average fraction of small businesses (out of all small businesses) that are in each industry. A rank of 1 means that industry had the largest fraction of small businesses (out of all small businesses). The rank is then plotted against the cumulative percentage of small businesses (out of all small businesses) in an industry of a given rank.

A. Cumulative distribution by age group




B. Industry ranks of young versus old firms

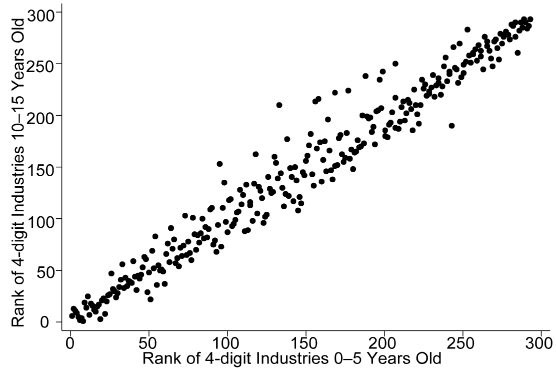



**Fig. 3.2 Comparing cumulative distribution and rank of $x_j^n$ by age group**

*Notes:* We select all firms with up to twenty employees. These firms are grouped by their four-digit NAICS industry code and age group (zero to five years old and ten to fifteen years old). For each age group, industries are then ranked by the average fraction of small businesses (out of all small businesses) that are in each industry. A rank of 1 means that industry has the largest fraction of small businesses (out of all small businesses). The rank is then plotted against the cumulative percentage of small businesses (out of all small businesses) in an industry of a given rank. The figure plots the 100 industries with the highest fraction of small businesses ages ten to fifteen years (out of all small businesses ages ten to fifteen years).

replicates figure 3.1 for young firms and older firms separately. The cumulative distributions are nearly on top of each other. Of course in this plot, the industry rank is not held fixed across firm age groups, and one may worry that industry's ranks are shifting as firms age. Figure 3.2, panel B, shows that this is not the case. The figure plots the rank of $x^n_{j,a=\text{young}}$ against the rank of $x^m_{j,a=\text{older}}$. Industries that dominate the distribution of small young businesses also dominate the distribution of small older businesses.

Figure 3.3 plots the rank of $x^n_{j,a=\text{young}}$ (x-axis) against the level of $y^n_j$ (y-axis), that is, it plots industries that dominate the share of small businesses (out of all small businesses) are also the same industries for which small firms dominate employment within the industry. The relationship is essentially monotonic. Most small businesses are skilled craftsmen, skilled professionals, and small shopkeepers. These industries are also ones where most employment is in small firms. For example, figure 3.3 says that in the ten

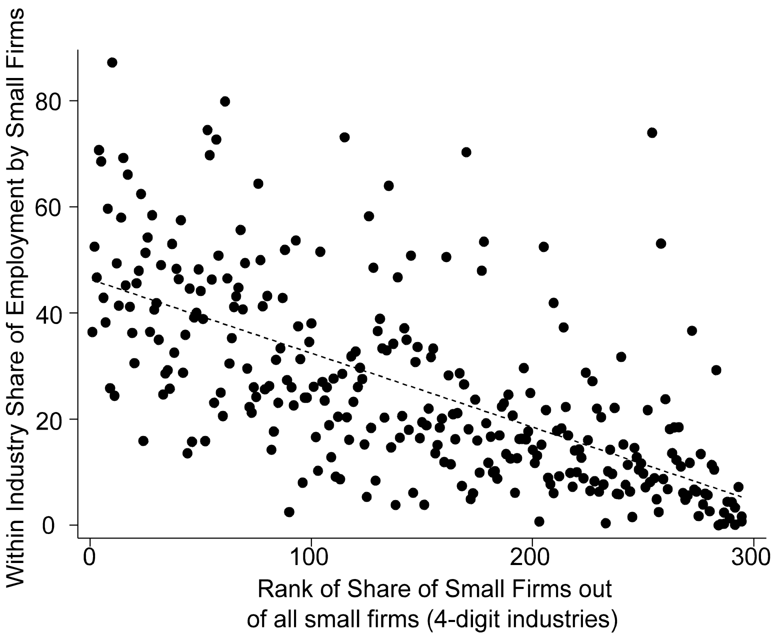



**Fig. 3.3 Rank of young firms versus level of $y^e_j$**

*Notes:* Firms are grouped by their four-digit NAICS industry code, age group, and size. For each age group (ages zero to five and ages ten to fifteen) we computed the percentage of small firms (up to twenty employees) in a given industry out of all firms in that industry $y^e_h$ and the percentage of each industry's small firms out of all small firms $x^e_j$. For concerns regarding the disclosure rules of the Census Bureau, we trimmed the sample of industries to those with fractions between percentile 2.5 and 97.5. For the sample industries, the figure plots the percentage of small firms (up to twenty employees) in a given industry out of all firms in that industry, for firms ages zero to five years and ages ten to fifteen years. The line represents the 45-degree line.

most prevalent industries among small businesses, small firms account for anywhere from roughly 40 to 90 percent of each industry's employment.

Figure 3.4 compares $y^e_{j,a=\text{young}}$ (x-axis) against $y^e_{j,a=\text{older}}$ (y-axis). In words, the x-axis measures the share of employment in industry $j$ that is in small young firms out of all young firms, while the y-axis measures the share of employment in industry $j$ (this is in small older firms out of all older firms). Again, there is a strong amount of persistence within industries as firms age. For example, the skilled craftsmen have essentially between 60 and 80 percent of employment in small firms when they are young. Those same industries have between roughly 60 and 80 percent of employment in small firms when they are older. These results add to the results in Hurst and Pugsley (2011), showing that most small firms never grow. Put another way, even among older firms, there are still many small firms. In some industries, small firms employ most of the workers in the industry regardless of firm age.

Finally, figure 3.5 plots the log of the average size in the industry when the firm was young (x-axis) against the log difference in industry size between when the industry was older (ten to fifteen years) and young (zero to five

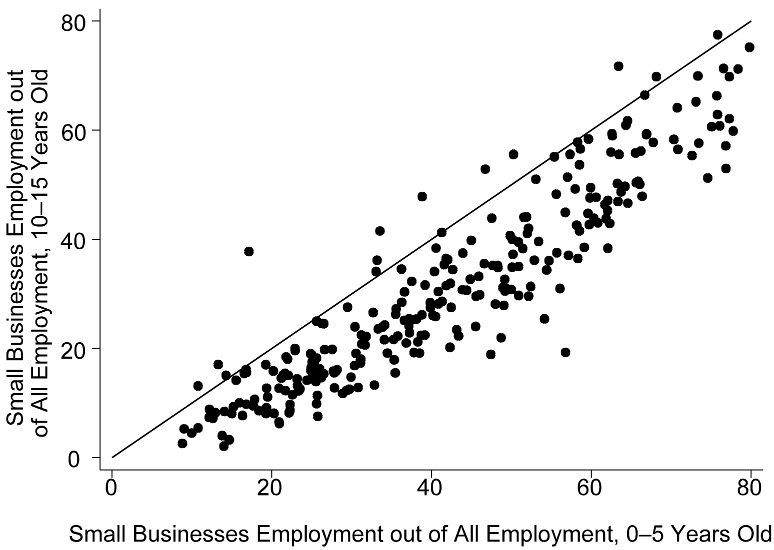



**Fig. 3.4 Small business share of total industry employment for young versus old firms**

*Notes:* Firms are grouped by their four-digit NAICS industry code, age group, and size. For each age group (ages zero to five years and ages ten to fifteen years) we computed the percentage of employment by small firms (up to twenty employees) in a given industry out of the employment of all firms in that industry. For concerns regarding the disclosure rules of the Census Bureau, we trimmed the sample of industries to those with fractions between percentile 2.5 and 97.5. For those industries, the figure plots the percentage of employment by small firms (up to twenty employees) in a given industry out of all employment in that industry, for firms ages zero to five years and ages ten to fifteen years. The line represents the 45-degree line.

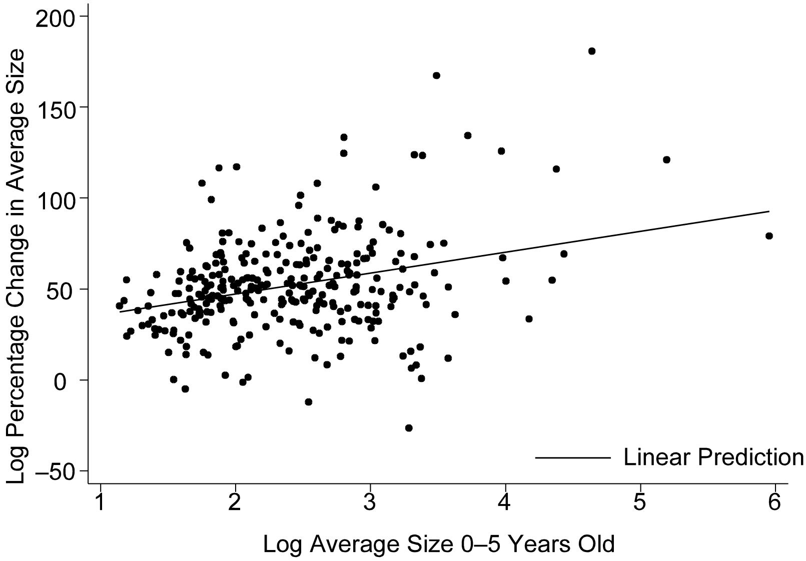



**Fig. 3.5 Industry average size and conditional growth rate**

*Notes:* Firms are grouped by their four-digit NAICS industry code, age group, and size. For each age group (ages zero to five years and ages ten to fifteen years) and industry, we computed the average size as total employment divided by total number of firms. The y-axis is the difference in logs between firms ages ten to fifteen years and firms ages zero to five years, multiplied by 100. The x-axis is the average size (logs) of young firms. Each dot represents that relation for each four-digit NAICS industry code. The line represents the linear fit of the log percentage change of size and the average size of young firms (ages zero to five).

years). The relationship shows a slight increasing relationship between initial size and subsequent growth. If the industry had relatively large firms when young it was much more likely to grow than industries with smaller firms when young. This figure is in growth rates. What this also implies is that most industries that are small when young never grow by any meaningful measure. For example, if the industry had roughly seven employees when young (such that log employment was roughly 2), ten years later average employment in that industry was roughly eleven employees (a 50 percent increase in employment). Again, this is consistent with the fact that most small firms do not grow and that these nongrowing small firms are concentrated in a narrow industries.

The results in figures 3.1–3.5 will motivate some of our modeling choices in the next section. In particular, the model will incorporate different industries. Industries will be defined by their natural scale. As a result, some industries will have small natural scale (e.g., plumbers) while other industries will have larger natural scale (e.g., manufacturers). Even though our model is static, the results in figures 3.1–3.5 also suggest that firms in small-scale industries are less likely to grow as they age.

### 3.2.2 The Importance of Nonpecuniary Benefits in Small Business Formation

For our second set of facts, we review the work in Hurst and Pugsley (2011). Using data from the Panel Study of Entrepreneurial Dynamics II (PSED), Hurst and Pugsley show that the median small business reports starting their business for nonpecuniary reasons. The PSED started with a nationally representative sample of 31,845 individuals. An initial screening survey in the fall of 2005 identified 1,214 "nascent entrepreneurs." To be considered a nascent entrepreneur, individuals had to meet the following four criteria. First, the individual had to currently consider himself or herself as involved in the firm creation process. Second, he or she had to have engaged in some business start-up activity in the past twelve months. Third, the individual had to expect to own all or part of the new firm being created. Finally, the initiative, at the time of the initial screening survey, could not have progressed to the point that it could have been considered an operating business. The goal was to sample individuals who were in the process of establishing a new business.

In the winter of 2006, after the initial screening interview, these 1,214 respondents were surveyed about a wide variety of activities associated with their business start-up. They were asked detailed questions about their motivations for starting the business, the activities they were currently undertaking as part of the start-up process, the competitive environment in which the business would operate, and their expectations about the desired future size and activities of the business. Follow-up interviews occurred annually for four years, so that the data also have a panel dimension.

As part of the initial survey of the PSED, the business owners were asked, "Why do (or did) you want to start this new business?" Respondents could report up to two motives. The respondents provided unstructured answers, which the PSED staff coded into forty-four specific categories. We took the raw responses to the question and created five broad categories of our own: nonpecuniary reasons, reasons related to the generation of income, reasons related to the desire to develop a new product or implement a good business idea, reasons related to a lack of better job options, and all other reasons. The main responses in the nonpecuniary category include "want to be my own boss," "flexibility/set own hours," "work from home," and "enjoy work, have passion for it/hobby." The main responses in the generating income category include "to make money" or "need to supplement income." The main responses in the new product or business idea category include "satisfy need," "there is high demand for this product/business," "untapped market," and "lots of experience at work."

Hurst and Pugsley (2011) document that roughly 50 percent of all respondents reported nonpecuniary benefits as being one of the primary reasons they started their business. The second most common response (38 percent) was the respondent had a good business idea. The fraction who reported nonpecuniary benefits as the primary reason to start the business was consistent across different subsamples of PSED respondents. For example, for those firms that remained in business through 2010 (four years after the first interview), 52 percent reported that nonpecuniary benefits was a primary reason for starting their business. Hurst and Pugsley show that those that report nonpecuniary benefits as the primary reason for starting a business were less likely to actually grow, were less likely to report ex ante wanting to grow, were less likely to actually innovate along observable mentions, and were less likely to report ex ante wanting to innovate. There was variation in the extent to which nonpecuniary benefits were important across industries. For example, those entering retail trade industries were much more likely to report nonpecuniary benefits as a driver of their entry decision. Conversely, very few individuals who entered the manufacturing sector reported nonpecuniary benefits as a driver of their entry decision.

## 3.3 A Model of the Small Business Sector

We propose a highly stylized model of the small business sector that matches key features of the data described in section 3.2 with few additional free parameters. In particular, we introduce nonpecuniary benefits from small business ownership into a static equilibrium model of occupational choice. As shown above, most business owners report nonpecuniary benefits as an important reason as to why they started their business, and in the model as an equilibrium outcome the small business sector will only be populated by people who start their business for nonpecuniary reasons.

To focus on the allocative role of nonpecuniary benefits, we make a number of additional abstractions. First, we ignore the dynamics of small business formation and growth. As discussed in section 3.2 and further in Hurst and Pugsley (2011), most small businesses just do not grow or have any intention to grow.[7] Second, we ignore financial market frictions. Hurst and Lusardi (2004) find that liquidity constraints do not appear to bind and that initial capital requirements for most businesses are quite low. Even without financial frictions, it will become clear that the consumption value of business ownership will imply a strong correlation between wealth and probability of business ownership. Finally, we abstract from differences in skill or comparative advantage. We treat all workers as equally capable employees or proprietors of their own businesses. Rather than as a realistic description of the labor market, we view these simplifications as a stepping off point to see how far we can go before needing to confront the more complex issues of skill sorting in a dynamic frictional labor market.

7. Eliminating dynamics and risk excludes pursuing a number of interesting questions, some of which Pugsley (2011) takes up in a dynamic model of entrepreneurship.

In the model, households differ only in their endowed wealth and their preference (if any) for running a business. They decide whether to use their labor to own and operate a business or instead to work as an employee in the corporate firm sector. If they decide to run a business, they also must decide what goods to sell among the many types of goods sold. Each good is produced using a technology with u-shaped average costs and goods differ by their efficient scale of production. Corporate firms can produce anything small businesses can produce using the same technology, but they are unconstrained in their ability to hire additional labor and may reach their efficient scale. We study an equilibrium where corporate firms and small businesses compete to sell each good and where in equilibrium each good is supplied by the firm offering the lowest price.

### 3.3.1 Intermediates and the Small Business and Corporate Sectors

There is a continuum of intermediate goods represented by the set $B = [\underline{b}, \bar{b}]$ with $\underline{b} > 0$. Each type of good $b$ is characterized by the technology used to produce it, where $b$ serves both as the good's name and as a parameter governing its minimum efficient scale of production, which increases with $b$.

Good $b$ may be produced by either a corporate-owned firm or a household-owned small business using the technology

$$f_b(n) = An^{\theta} - b. \tag{1}$$

where $n$ represents the employment. With span of control parameter $\theta < 1$, the fixed cost $b$ implies hump-shaped returns to scale, and because labor is the only factor of production, the scale of production may also be expressed in terms of its required employment $n$.[8] We label the natural scale (expressed in terms of employment) as $n_b^*$. In an equilibrium with a competitive market for good $b$, free entry will impose that $n_b = n_b^*$. We can locate this value by solving for the value of $n$ that makes the elasticity of scale $[nf_b'(n) \,/\, f_b(n)]$ exactly equal to 1, so for $b > 0$

$$n_b^* = \left(\frac{b}{A}\frac{1}{1-\theta}\right)^{1/\theta}. \tag{2}$$

If a plant were to operate at its natural scale $n_b^*$, then its marginal cost of production (and thus its market price) given wage $w$ would be would be $w(b^{1-\theta} \,/\, A_{\chi})^{1/\theta}$ where $\chi \equiv \theta^{\theta}(1-\theta)^{1-\theta}$.

The technology described by equation (1) for each $b$ is available to both corporate and small business sectors. They differ only in their flexibility over choosing $n$.

**Small Businesses Sector.** If a household produces $b$ as a small business, it

8. Here the fixed cost is paid in units of the intermediate good. Results are very similar using an alternative formulation with a fixed cost in terms of labor input $(An - b)^{\theta}$.

must set $n = 1$. This prevents household-owned and operated small businesses from reaching the minimum efficient scale for any $b > A(1 - \theta)$. Depending on the range of $B$, households producing goods where $b < A(1 - \theta)$ would be allocating too much time to the business. Although we later rule out this possibility by our choice of $A$, this situation may be more common than one initially thinks. Sole proprietors who do not pay themselves a market wage may allocate more of their own or family labor to their business than they would have hired at market rates. Regardless, given the requirement that $n = 1$ and facing a price schedule $p_b$, an entrepreneurial household who produces good $b$ earns $p_b(A - b)$ as proprietor's income. For goods where $b > A$, the required fixed cost exceeds the small business owner's capacity to produce.

**Corporate Sector.** Corporate-owned plants are distinguished by being unconstrained in their choice of $n \geq 0$. For convenience, we refer to each corporate-owned plant as a corporate firm.[9]

### 3.3.2 Individual Good Demand

Demand for individual goods $b$ comes from a competitive final good sector that combines intermediate inputs $x_b$ to produce a final good

$$C = \left(\int_B x_b^{(\sigma-1)/\sigma} db\right)^{\sigma/(\sigma-1)}, \tag{3}$$

of the type described by Spence (1976) and Dixit and Stiglitz (1977) where $\sigma$ represents the elasticity of substitution between inputs. A cost-minimizing final good sector implies conditional input demand functions for each intermediate good $b$ such that:

$$x_b(p_b) = Cp_b^{-\sigma}, \tag{4}$$

where $p_b$ represents the price of good $b$. We use the final good as numeraire to normalize its price (and marginal cost) as 1.

### 3.3.3 Households and Nonpecuniary Benefits

There is a unit measure of households who differ in their endowed wealth, $y$, and in their "taste" for small business ownership $\gamma$. We label the joint distribution characterizing household heterogeneity as $F(\gamma,y)$. For simplicity, we assume that $\gamma \geq 0$, $y \geq 0$, and that both variables are independently distributed so that:

$$F(\gamma, y) = F(\gamma)F(y),$$

where $F(\gamma)$ and $F(y)$ represent the marginal distributions of taste and wealth heterogeneity. The independence assumption assures there is no relationship between wealth and entrepreneurial taste ex ante.

9. While the boundaries of the firm for a household-owned small business are clear, the boundaries in the corporate sector are not well defined. In practice, a corporate-owned firm could operate multiple plants in one or more individual good markets. We only require that there are a sufficient number of corporate firms to ensure individual good markets are competitive.

Households have preferences over consumption of a final good and whether or not they allocate their labor to running a business ordered by:

$$u = \log c + \gamma \mathbf{1}_e,$$

where $c$ represents consumption of the Spence-Dixit-Stiglitz final good and $\mathbf{1}_e$ is an indicator that is 1 if the household runs a business and 0 otherwise.[10] Here $\gamma$ has the interpretation of a taste for small business ownership or equivalently, in this context, a preference for not having a boss. For simplicity, we have assumed $\gamma \geq 0$, but this is clearly an innocuous assumption.

If a household chooses employment, it earns the market wage $w$. If instead it chooses to operate a small business and produce a particular good $b$ it earns proprietor's income $p_b(A - b)$. Although households must choose a particular $b$, in an equilibrium, each entrepreneurial household will be indifferent among the set of goods produced by small businesses, and in anticipation this outcome we label the proprietor's income:

$$z \equiv p_b(A - b),$$

which does not depend on $b$.

**Propensity to Choose Entrepreneurship.** An individual household's labor supply is indivisible and equal to 1. Rogerson (1988) shows how the nonconvexity associated with indivisible labor supply produces equilibrium allocations that are not Pareto optimal. To restore optimality, he introduces lotteries over the labor supply decision that may be perfectly insured so that households may equalize consumption over either idiosyncratic outcome. We complete markets using the same procedure so that households of type $\gamma$ choose a probability of business ownership $e$. The choice of $e$ will represent both the probability of starting a business and the state-contingent price of consumption should the business start. Then $1 - e$ will represent the probability of the business not starting and the price of consumption for that contingency.[11] As in Rogerson (1988), optimizing households will equalize consumption across idiosyncratic outcomes and the problem is iso-morphic to choosing $c$ and $e \in [0,1]$ to maximize

$$\log c + \gamma e \quad (5)$$

subject to

10. Individuals only get the nonpecuniary benefit from running the business themselves. This is consistent with the fact from section 3.2 that the overwhelming majority of small businesses have very few employees, if any. The extreme form of the nonpecuniary benefits–that they accrue only if the firm has only one employee and that they are diversified completely away among corporately owned firms—is made for simplicity. We could write down a more flexible specification that let the nonpecuniary benefits decay as the number of employees increase without altering the main implications of the model.

11. This setup does not require there be a sufficient number of each type $\gamma$ households. So long as markets are complete, each type $\gamma$ household can insure against the idiosyncratic outcome of $E$.

$$c + (w - z)e = w + y. \tag{6}$$

We write the budget constraint so $w$ on the right-hand side has the interpretation of the full value of the household's time, and $w - z$ represents the pecuniary opportunity cost (if any) of running a small business. We will later show that $w - z$ is strictly positive in any equilibrium with a small business sector.

### 3.3.4 A Competitive Two-Sector Equilibrium

We define an equilibrium where entrepreneurial households compete with firms to supply each good $b$, and the remaining worker households provide the labor required by the firms. The equilibrium features a cutoff $b^* \in [\underline{b}, \overline{b}]$, dividing $B$ into goods produced by entrepreneur households and goods produced by firms.[12]

*Definition 1.* Given a distribution $F(\gamma)F(y)$ of heterogeneous households who differ in taste $\gamma$ and endowed wealth $y$, and production technologies described by equations (1) and (3), a two-sector competitive equilibrium consists of the following:

1. Wage $w$ and intermediate good prices $p_b$ for $b \in B$;
2. allocations $c(\gamma,y)$ and $e(\gamma,y)$ that given prices $w$ and $p_b$ for $b \in B$ maximize equation (5) subject to equation (6) for each type $\gamma,y$;
3. wealth cutoffs $y_{1\gamma}$ and $y_{2\gamma}$ that depend on $\gamma$ such that

$$e(\gamma, y) \in \begin{cases} \{0\} & \text{if } y \le y_{1\gamma} \\ [0,1] & \text{if } y_{1\gamma} < y \le y_{2\gamma} \\ \{1\} & \text{otherwise;} \end{cases}$$

4. allocations $n_b$ that maximize profits given $w$ and $p_b$ for corporate firms producing good $b$;
5. a density $q_b$ of operating corporate firms over each good $b$ consistent with free entry;
6. a cutoff $b^* \ge \underline{b}$ where if $b \ge b^*$ then $q_b > 0$ and $q_b = 0$ otherwise;
7. and market clearing;
   (a) final good market

$$\int\int (c(\gamma, y) - y) dF(y) dF(\gamma) = \left(\int_B x_b^{(\sigma-1)/\sigma} db\right)^{\sigma/(\sigma-1)};$$

   (b) intermediate good markets

$$x_b = q_b(An_b^\theta - b) \text{ when } b \ge b^*$$

12. In general, the choice of technology implies two cutoffs, $b_1$ and $b_2$, that is, there are goods $b < b_1$ where firms are the lowest cost producer. For these goods, entrepreneur households would be operating well beyond the good's natural scale of production. To eliminate this possibility, we restrict $\underline{b} > A(1 - \theta)$ so that the smallest possible natural scale is at least $n = 1$. This ensures that $b_1 < \underline{b}$.

and

$$\int_{\underline{b}}^{b^*} x_b db = \int\int\left(AE(\gamma, y) - \int_{\underline{b}}^{b^*} b db\right) dF(y) dF(\gamma);$$

(c) labor market

(7) $$\int_B q_b n_b db = 1 - \int\int e(\gamma, y) dF(y) dF(\gamma).$$

The following lemma establishes that intermediate prices for any $b < b^*$ must adjust to make the household indifferent over its choice of $b$.

*Lemma 1.* In an equilibrium where $b^* > \underline{b}$, proprietor's income $z = p_b(A - b)$ does not depend on $b$.

Proof. This follows almost immediately from the assumption of access to the same technology. Suppose to the contrary that there exists $b'$ such that $p_{b'}(1 - b') > p_b(1 - b)$ for all other $b < b^*$, then this cannot be an equilibrium since all households that run a business would prefer to produce $b'$.

To solve for this equilibrium, we first address the marginal households, that is, suppose $y \in (y_{1\gamma}, y_{2\gamma})$ for some household $y,\gamma$. From the first order condition for $E$, an optimal choice of $E(\gamma,y)$ requires

(8) $$\lambda = \frac{\gamma}{w - z},$$

where $\lambda$ is the marginal utility of income. For these marginal entrepreneurial households $w - z$ represents the opportunity cost of increasing the probability of running a business. With log preferences over consumption, then

$$c(\gamma, y) = \frac{w - z}{\gamma},$$

and the probability of running a business is

$$e(\gamma, y) = \frac{w + y}{w - z} - \frac{1}{\gamma}.$$

The solution of $e(\gamma,y)$ for the marginal households determines the wealth thresholds as the values of $y$ that make $e(\gamma,y)$ exactly equal to 0 or 1

$$y_{1\gamma} = \frac{w - z}{\gamma} - w \text{ and } y_{2\gamma} = y_{2\gamma} = \frac{w - z}{\gamma} - z.$$

Consumption for households outside of these thresholds will be equal to their endowment $y$ and any earned income, $w$ or $z$.

It is useful to define two aggregate quantities. We let $E$ represent the total supply of labor allocated to operating small businesses

$$E \equiv \int\int e(\gamma, y) dF(y) dF(\gamma).$$

Likewise, we let $C$ represent aggregate demand for the final good

$$C \equiv \int\int (c(y,\gamma) - y)dF(y)dF(\gamma).$$

In the firm sector (when $b \geq b^*$) free entry ensures that firms operate at their minimum efficient scale $n_b = n_b^*$. This is the only value of $n_b$ at which profits are exactly to zero. With price equal to marginal cost then:

$$p_b = w\left(\frac{b^{1-\theta}}{A\chi}\right)^{1/\theta}. \tag{9}$$

Given intermediate demand $x_b$ from equation (4) and the required price of $b$ from equation (9), intermediate good market clearing pins down the quantity of firms $q$

$$q_b = Cw^{-\sigma}\frac{1-\theta}{\theta}(A\chi)^{\sigma/\theta}b^{[(\theta-1)\sigma-\theta]/\theta}. \tag{10}$$

Recall that we have normalized $P = 1$ so all prices are in units of the final good.

Next we determine the small business sector and firm sector partitions. In a competitive market with free entry, each good $b$ will be supplied by the producer offering the lowest price. We locate the cutoff good $b^*$ that equates the marginal cost of firms with the price charged by small businesses.

*Proposition 1. With* $\underline{b} > A(1-\theta)$, $\overline{b} > A$ *and* $\underline{b}$ *sufficiently below* $\overline{b}$, *then there is a unique cutoff* $b^*$ *that defines the corporate sector* $B^c = [b^*, b] \cap B \neq \emptyset$ *and the small business sector* $B^e = B \setminus B^c \neq \emptyset$ *where* $b^*$ *is the larger real root on the interval* $[0, A)$ *of the following equation*

$$w\left(\frac{b^{*1-\theta}}{A\chi}\right)^{1/\theta} = \frac{z}{A - b^*}, \tag{11}$$

Proof. See appendix.

With all equilibrium objects expressed in terms of the market wage $w$ and equilibrium proprietor's income $z$, it only remains to identify these prices by clearing the labor and intermediates markets. Since the intermediates markets for $b \in B^c$ has already been cleared to determine $q_b$, we focus on $b \in B^e$. Market clearing requires that $(A - b)E_{\gamma y b} = Cp_b^{-\sigma}$, and since we have established that entrepreneur households are indifferent over $b \in B^e$ we need only check that this holds for aggregate small business production. By multiplying market clearing through by $(A - b)^{-\sigma}$, since $p_b = [z / (A - b)]$ we can write the equation as $(A - b)^{1-\sigma}E_{\gamma y b} = Cz^{-\sigma}$ for each $b$. Integrated over all $B^e$ requires

$$Cz^{-\sigma}\int_{\underline{b}}^{b^*}(A - b)^{\sigma-1}db = E, \tag{12}$$

where $b^*$ is the root defined by Proposition 1. Likewise, after substituting in $n_b^*$ and $q_b$ using equations (2) and (10), labor market clearing may be simplified as

$$(13) \qquad 1 - E = \int_{b^*}^{\bar{b}} C(b^{1-\theta} / A\chi)^{(1-\sigma)/\theta} db.$$

Unfortunately it is not possible to obtain algebraic solutions for $w$, $z$, and $b^*$, even when making simplified assumptions for both the distributions of $y$ and $\gamma$. However, given parameter values, we can numerically solve for the roots of the three simultaneous equations (11)–(13) where the first equation must be solved for the appropriate root.

## 3.4 The Importance of Nonpecuniary Benefits

In this section, we show that the introduction of nonpecuniary motives into our simple equilibrium model generates sharp implications for the relationships between earnings, productivity, wealth, and firm size that are consistent with the evidence we present in section 3.2 as well as additional established empirical regularities highlighted in the broader literature. As we highlight throughout this chapter, the inferences drawn from these empirical regularities can be altered significantly if one fails to account for the potential of nonpecuniary benefits to small business formation.

For the remainder of the chapter, we consider an example where $y$ and $\gamma$ are independently distributed as uniform random variables with supports $[\underline{y}, \bar{y}]$ and $[\underline{\gamma}, \bar{\gamma}]$. Independence imposes no ex ante relationship between wealth $y$ and tastes $\gamma$. If both $y$ and $\gamma$ have independent uniform distributions, then one can simplify the expressions for the aggregates $E$ and $C$ as

$$E = \frac{(1/2)(w + 2\bar{y} + z)(\bar{\gamma} - \underline{\gamma}) - (w - z)\log(\bar{\gamma} / \underline{\gamma})}{(\bar{y} - \underline{y})(\bar{\gamma} - \underline{\gamma})},$$

when $y_{1\gamma}$ and $y_{2\gamma}$ are inside the support of $y$ for all $\gamma$ and

$$C = \frac{(w - z)^2\log(\bar{\gamma} / \underline{\gamma}) - (1/2)[w^2 - z^2 + 2(w\underline{y} - z\bar{y})](\bar{\gamma} - \underline{\gamma})}{(\bar{y} - \underline{y})(\bar{\gamma} - \underline{\gamma})}.$$

### 3.4.1 Earnings Gaps and Aggregate Productivity

First, consistent with the empirical findings of Hamilton (2000), Moskowitz and Vissing-Jørgensen (2002), and Pugsley (2011) the model generates a gap in earnings between wage workers and business owners. The small business owners are willing to produce the good at a wage lower than they could have earned in the firm sector because they receive some of their compensation in the form of nonpecuniary benefits. The following proposition establishes that the pecuniary opportunity cost of running a small business is always positive in an equilibrium with a small business sector.

*Proposition 2.* *If* $B^c \neq \varnothing$ *and* $\underline{\gamma} > 0$ *then* $w - z > 0$.

Proof. Since $B^c$ is nonempty, at least some household type must be willing to work as an employee. That household is either marginal or an inframarginal employee. If the household is marginal then it satisfies equation (8) with equality. Since $\gamma > 0$ and $\lambda > 0$, then $w - z$ must also be positive. If the household is inframarginal and $E_{y\gamma} = 0$, then $\gamma < \lambda\ (w - z)$ and again $w - z$ must be positive.

Notice that this result does not rely on that labor is less effective when operating a business instead of employed at a firm.

The existence of nonpecuniary benefits also informs the well-documented relationship between wages and firm size. Many researchers have documented that workers in smaller firms earn less than workers in larger firms (see Brown and Medoff 1989). In figure 3.6, we plot the equilibrium wage gap, normalized by total value added $C$, over alternative parameterizations of the distribution of $\gamma$. We show how the wage gap increases with the average strength of the nonpecuniary benefit. Nonpecuniary compensating differentials for running a business are a key aspect of understanding the relationship between wages and firm size, at least on the low end of the firm-size distribution.

The wage gap is also tied to measured aggregate productivity. If there were no nonpecuniary motives and every household worked in the firm sector so $B^c = B$, average labor productivity $AP$ (total value added/total hours) would equal $w$. We will continue to refer to this case as the "zero gamma" economy. With a small business sector:

$$AP = w - (w - z)E.$$

To see this we just integrate over all the households' budget constraints. We can think of $AP$ as a weighted average of income from either sector, or as the wage $w$ adjusted for the wage gap $w - z$, as we have written here. Figure 3.7 plots how measured aggregate productivity also declines with the mean of the distribution of $\gamma$.[13] For reference we plot aggregate productivity of the zero gamma economy as the dot on the vertical axis.[14] As nonpecuniary motives become more important, the wage gap and the size of the small business sector $E$ both grow, lowering $AP$. It is true that $w$ also grows as wages adjust for a small firm labor supply, but this effect is always offset by the losses from $(w - z)E$, where both the opportunity cost $w - z$ and the small business sector $E$ growth with $E[\gamma]$, as we establish in the following proposition.

*Proposition 3.* *If* $B^e \neq \emptyset$, *and* $\underline{\gamma} > 0$, *then* $(\partial AP / \partial E[\gamma]) < 0$.

The proof relies on a careful application of the implicit function theorem on the system of equations defined by (11)–(13). The resulting algebra is

13. We omit the plot for small values of $E[\gamma]$ to avoid complications from corner solutions for the wealth thresholds.

14. With $\gamma = 0$, the equilibrium wage $w_0$ is easy to work out since $C = w$, you can show that

$$w_0 = [A(1-\theta)^{1-\theta}\theta^{\theta}]^{1/\theta} \left(\int b^{[(1-\theta)(1-\sigma)]/\theta} db\right)^{1/(\sigma-1)}.$$

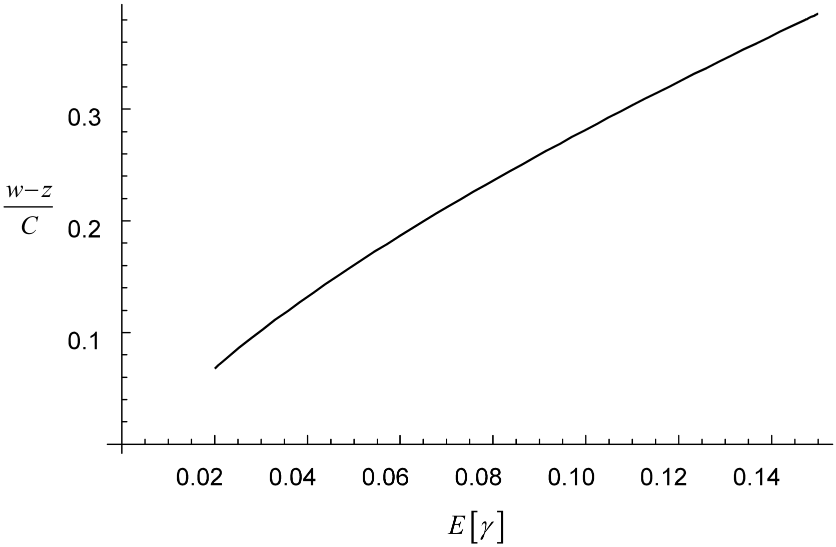



**Fig. 3.6** **Wage gap (as a fraction of aggregate output)**
*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\bar{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\bar{y} = 30$, and $\bar{\gamma} - \underline{\gamma} = 0.02$.

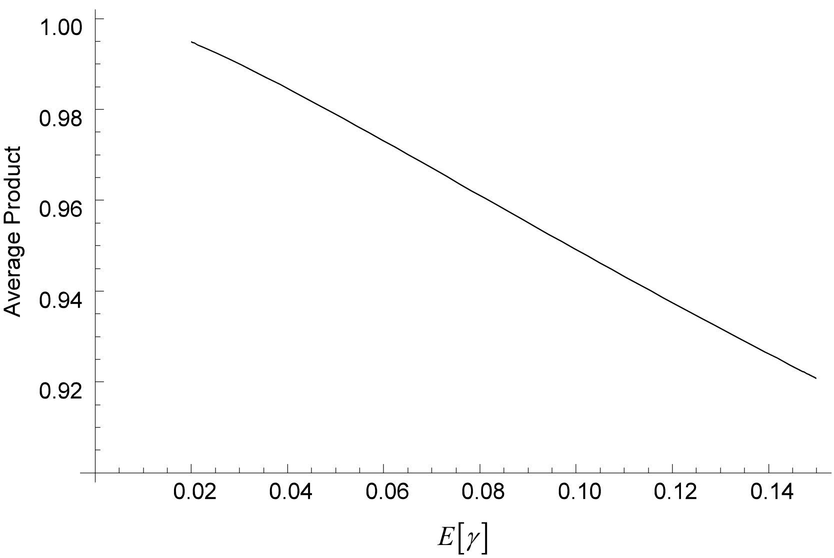



**Fig. 3.7** **Average product of labor (AP)**
*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\bar{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\bar{y} = 30$, and $\bar{\gamma} - \underline{\gamma} = 0.02$.

tedious, but can be verified with symbolic algebra software such as Mathematica.

In summary, the simple model shows that a model with nonpecuniary benefits will result in individuals in the firm sector earning higher pecuniary returns than workers in the self-employed sector. This results in a very discrete relationship that implies a positive firm size/wage relationship. Finally, the extent of nonpecuniary benefits will affect measured labor productivity within the economy. Even though no technology parameters will change, differences in the distribution of nonpecuniary benefits across locations or across time will result in differences in measured labor productivity.

### 3.4.2 Wealth and Business Ownership

The second important implication of our model is that, without any financial frictions, the model produces an increasing relationship between initial wealth $y$ and the probability of owning a business $E$.

*Proposition 4. If* $B^e \neq \emptyset$ *then* $(\partial E_{\gamma y} / \partial y) \geq 0$.

Proof. If the household is a worker, then $E_{\gamma y} = 0$ and $(\partial E_{\gamma y} / \partial y) = 0$. If the household is marginal, then $(\partial E_{\gamma y} / \partial y) = (1 / [w - z]) > 0$ by the previous proposition, and when the household is an inframarginal entrepreneur, then $E_{\gamma y} = 1$ and $(\partial E_{\gamma y} / \partial y) = 0$.

An increasing relationship between wealth and entry is often interpreted as evidence of binding liquidity constraints for small business owners. The presence of nonpecuniary benefits raises questions about relying on such an identification strategy. Figure 3.8 plots the probability of business ownership $E_{y\gamma}$ over the wealth distribution. For each $y$ we average over the conditional distribution $F(\gamma \mid y)$. For a particular value of $\gamma$ the wealth cutoffs are relatively close together and the probability of entry is increasing linearly in $y$. However, heterogeneity in $\gamma$ makes $E_y$ a smooth nonlinear function of $y$ as these thresholds evolve over the entire distribution of $\gamma$. The shape of this relationship is consistent with probit estimations of entry on wealth (see, for example, Hurst and Lusardi 2004). In our model, the probability is flat over a segment of the population that is not liquidity constrained. At low levels of initial income, the marginal utility of consumption is large relative to the marginal utility of the nonpecuniary benefits of business ownership. Likewise, the wealthy pay an opportunity cost to run the business in the form of lost wages because they enjoy running a business relative to other forms of consumption.

Again, this result undermines much of the empirical strategy performed by Evans and Leighton (1989), Evans and Jovanovic (1989), Quadrini (1999), Gentry and Hubbard (2004), Cagetti and De Nardi (2006), Fairlie and Woodruff (2005), and Fairlie and Krashinsky (2006). In these models, the relationship between wealth and the probability of starting a business (or

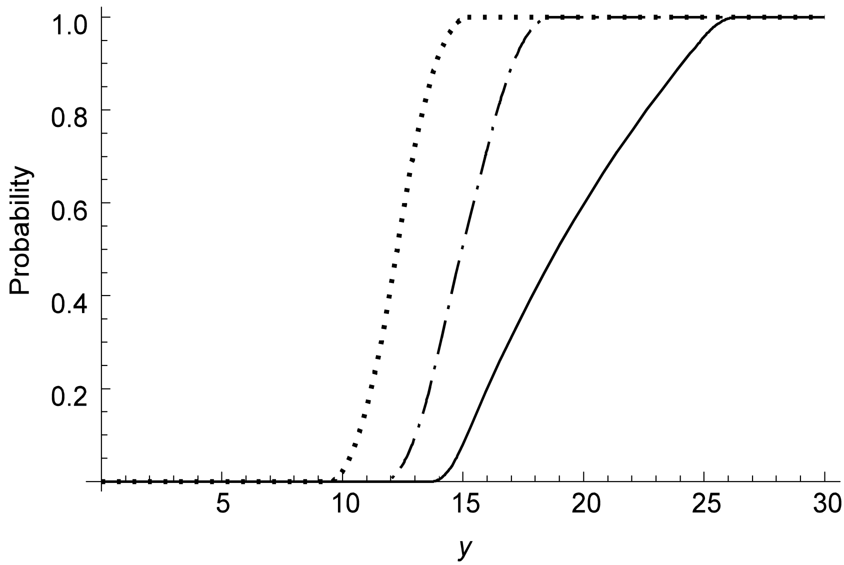



**Fig. 3.8 Probability of business ownership for *y* households**

*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\bar{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\bar{y} = 30$, $\bar{\gamma} - \underline{\gamma} = 0.02$, and with $E[\gamma] = 0.05$ (solid), 0.10 (dashed), and 0.15 (dotted).

even exogenous changes in wealth and the probability of starting a business) are evidence that liquidity constraints bind. Our model yields the same predictions in a world with no financial frictions. If one takes the nonpecuniary benefits of owning a small business seriously, using the relationship between exogenous changes and wealth and the probability of starting a business as being de facto evidence of liquidity constraints is invalid.

### 3.4.3 What Do Small Businesses Produce?

Third, the model of nonpecuniary benefits informs the type of goods where we should observe a high concentration of small business owners. In our model, small business owner households only produce goods that would have been produced by small- to medium-scale firms. Recall that the interval $[\underline{b}, b^*]$ defines the small business sector $B^e$. Then any factor that enlarges the size of the small business sector does so by increasing the equilibrium cutoff $b^*$. This tells us that if any $b \in B^e$ were to be produced by a firm in a competitive market, the firm would have a smaller efficient scale than any other firm producing in the firm sector $b \in B^c$. This is consistent with the sorting we document in section 3.2, where most household-owned businesses start in a very narrow set of industries that operate at a small scale in the long run. These results suggest that using the concentration of small businesses within a sector can inform researchers about the average returns to scale in that sector. To our knowledge, this approach has never been pursued to estimate the returns to scale across various industries.

Additionally, the magnitude of the distribution of nonpecuniary benefits has a direct impact on the size of the small business sector.

*Proposition 5. The size of* $B^e$ *increases with* $E[\gamma]$.

This follows immediately from applying the implicit function theorem on the system of equations defined by equations (11)–(13) at the equilibrium allocation to determine $(db^* / dE[\gamma])$. To see how the small business sector $B^e$ depends on the distribution of $\gamma$, figure 3.9 plots the equilibrium cutoff $b^*$ for various $E[\gamma]$ holding all other moments and parameters fixed. As nonpecuniary motives become more important, the small business sector grows by successfully competing with higher $b$ firms. The firms' costs are higher because of the tighter labor market, and entrepreneur households are willing to bear the additional cost in lost wages in return for the nonpecuniary compensation.

### 3.4.4 Distribution of Firm Size

Finally, the distribution of $\gamma$ has important implications for the equilibrium cross-sectional distribution of firms. Entrepreneur households draw business away from the small- to medium-size firms. This is the flip side of the previous point about $b^*$. Here we use a change of variables to express

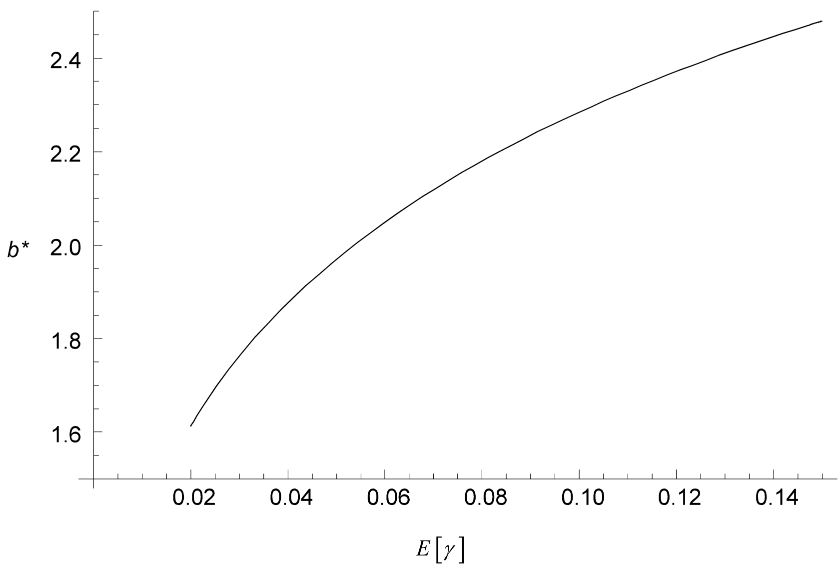



**Fig. 3.9 Small business cutoff** $b^*$

*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\overline{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\overline{y} = 30$, and $\overline{\gamma} - \underline{\gamma} = 0.02$.

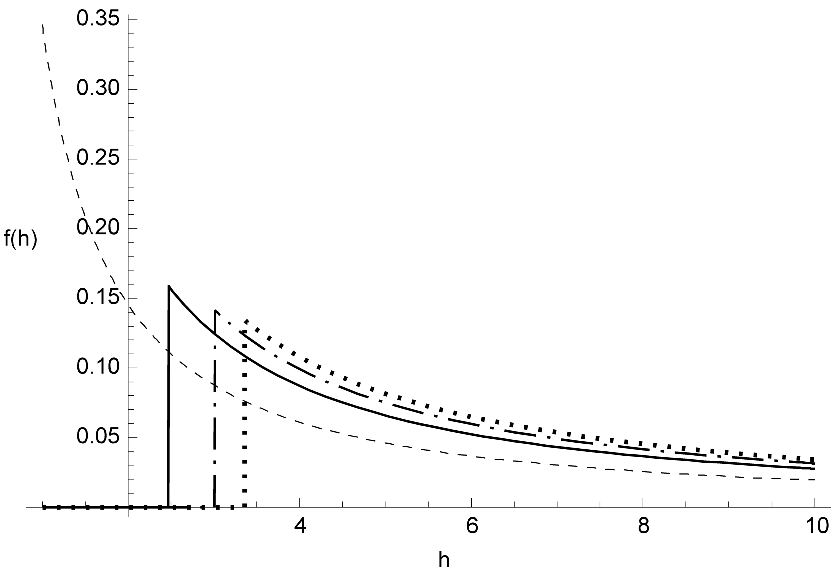



**Fig. 3.10 Distribution of firm sizes**

*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\bar{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\bar{y} = 30$, $\bar{\gamma} - \underline{\gamma} = 0.02$, and with $E[\gamma] = 0.05$ (solid), 0.10 (dashed-dotted), and 0.15 (dotted). The dashed line represents the distribution of firms in the zero gamma economy.

the density of firms as a function of size $n$. After a change of variables the density $q$ may be written in terms of employment $n$ as

$$q(n) \propto Cw^{-\sigma}n^{\sigma(\theta-1)-\theta}n > 1,$$

where the constant of proportionality is $(A^{\theta}\theta)^{\sigma-1}$ and with a mass point of $E$ at $n = 1$. Note that the firm-size distribution for $n > 1$ satisfies Zipf's law when $\sigma > 1$, that is, the density for $n$ is Pareto with paramter $\sigma(\theta - 1) - \theta$. This is a robust feature of the distribution of firms in the United States.[15] In figure 3.10 we plot this distribution of firm sizes measured by employment $n$. For reference, we also include a dashed line representing the distribution of firms in a zero gamma economy. In this picture it is especially clear that entrepreneur households specialize in the types of goods that would have been produced by smaller-scale firms.

## 3.5 A Regressive Small Business Subsidy

In this section, we consider how a model of nonpecuniary benefits could inform the costs and benefits of subsidizing small business ownership. Despite their political appeal, the welfare calculus of a small business sub-

15. See Axtell (2001).

sidy is not at all obvious. The importance of nonpecuniary benefits in the decision to become a small business owner makes this especially difficult. To make this point we introduce a very simple subsidy into our model funded by a lump sum tax levied equally across all households. We show that the redistributive role of this subsidy could actually benefit the wealthy at the expense of the poor. We want to stress that our model offers no reason for policymakers to want to subsidize small businesses. Our goal is to highlight (a) the potential costs of subsidies to small business owners and (b) the distributional effects of subsidizing small business owners. We realize that any costs must be weighed against potential benefits. Most of the literature focuses only on the benefit. We feel the model is well suited to highlight some of the costs.

To begin, we introduce a simple proportional subsidy to the model. An unsubsidized small business household producing $b$ earns $p_b$ per unit sold. We let $s$ represent a proportional subsidy to small business households so that small business owners will instead earn $p_b(1 + s)$ per unit sold.[16]

We augment the earlier equilibrium definition to include the subsidy and a new requirement that the government balance its budget through a lump sum tax levied across all households.

*Definition 2.* With $P = 1$ and small business subsidy $s > 0$, given a distribution of households $F(\gamma,y)$ characterized by preference parameter $\gamma$ and initial wealth $y$, and production technologies described by equations (3) and (1), a two-sector subsidized competitive equilibrium consists of the following:

1. A lump sum tax $T$, paid by all households;
2. wage $w$ and intermediate good prices $p_b$;
3. allocations $c(\gamma,y)$ and $e(\gamma,y)$ that given prices $w$ and $p_b$ maximize equation (5) subject to equation (6) for households of type $\gamma$,y;
4. wealth cutoffs $y_{1\gamma}$ and $y_{2\gamma}$ that depend on $\gamma$ such that

$$E_{y\gamma} \in \begin{cases} \{0\} & \text{if } y \leq y_{1\gamma} \\ [0,1] & \text{if } y_{1\gamma} < y \leq y_{2\gamma} \\ \{1\} & \text{otherwise;} \end{cases}$$

5. allocations $n_b$ that maximize firm profits given $w$ and $p_b$ for firms producing good $b$;
6. a density of firms $q_b$ producing $b$ that may freely enter or exit the market;
7. a cutoff $b^* \geq \underline{b}$ where if $b \geq b^*$ then $q_b > 0$ and $q_b = 0$ otherwise;
8. market clearing;
   (a) final good market

16. This subsidy may be interpreted as a $s(A - b)$ reduction in fixed operating costs $b$ for each small business of type $b$.

$$\int\int[c(\gamma,y) - y + T]dF(y)dF(\gamma) = \left(\int_B x_b^{(\sigma-1)/\sigma}db\right)^{\sigma/(\sigma-1)};$$

(b) intermediate good markets

$$x_b = q_b(An_b^{\theta} - b) \text{ when } b \geq b^*$$

and

$$\int_{\underline{b}}^{b^*} x_b db = \int\int\left(Ae(\gamma,y) - \int_{\underline{b}}^{b^*} bdb\right)dF(y)dF(\gamma); \text{ and}$$

(c) labor market

$$\int_B q_b n_b db = 1 - \int\int e(\gamma,y)dF(y)dF(\gamma).$$

9. and the government balances its budget

$$T = \int(A - b)p_b(1 + s)E_b db. \tag{14}$$

We repeat the steps from section 3.3.4 to compute the equilibrium with a subsidy. In this case we must replace proprietor's income $z$ with $(1 + s)z$ in equations (12) and (7), leaving equation (11) (where $[z / (A - b)]$ represents the selling price $p_b$) unchanged. Since $E$ is linear in $y$, the government budget balance equation may be solved analytically for $T$ as a function of $w$, $z(1 + s)$, and $b^*$. The threshold $b^*$ is now the larger real root on the interval $(0,A)$ of

$$w\left(\frac{b^{*1-\theta}}{A\chi}\right)^{1/\theta} = \frac{z(1 + s)}{A - b^*}, \tag{15}$$

with all endogenous quantities as a function of $w$, $z(1 + s)$, and $b^*$, then given parameter values, these may be recovered by solving the system of equations defined by (12), (13), and (15).

We take two approaches to quantity the welfare gains or losses from the subsidy. First, we consider aggregate welfare, as measured by a utilitarian planner. Second, because the aggregate measure obscures some interesting redistribution, we look at the households' individual burdens computing an equivalent variation measure of the subsidy's cost.

Using the first approach, the model implies that small business subsidies reduce aggregate welfare. To see this, we define a utilitarian measure of aggregate welfare $W_s$ as the equally weighted sum of each household's utility in equilibrium under subsidy $s \geq 0$.

$$W_s = \int\int(\log c_{y\gamma} + \gamma e_{y\gamma})dF(y \mid \gamma)dF(\gamma).$$

Figure 3.11 plots $W_s$ as a function of $s$. The overall reduction in welfare is not surprising. In our example there are no market failures that would provide a beneficial role for a subsidy, and the unsubsidized competitive outcome is first best. With equal Pareto weights, the $s = 0$ allocation can be supported as a solution to a planning problem where increasing $s > 0$ simply distorts the allocation of labor across the two sectors. Holding Var[$\gamma$] fixed, varying $E[\gamma]$ does not change the rate at which the subsidy trades off aggregate

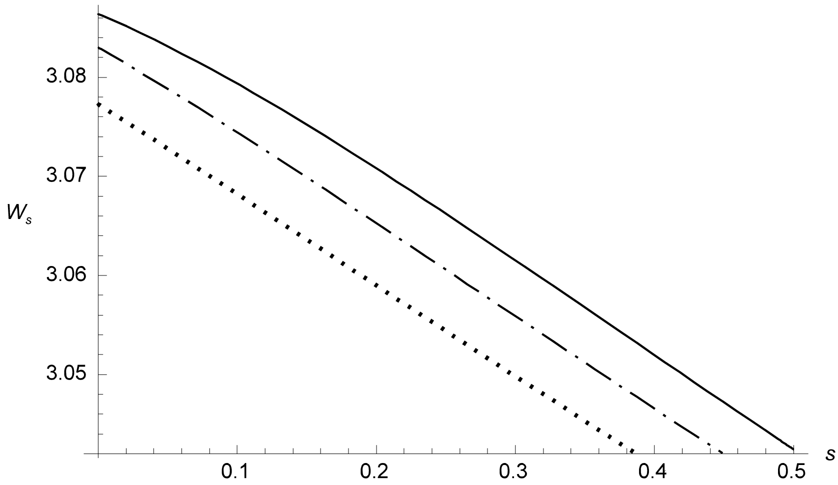



**Fig. 3.11 Aggregate welfare effect of small business subsidy $s \geq 0$**

*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\bar{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\bar{y} = 30$, $\bar{\gamma} - \underline{\gamma} = 0.02$, and with $E[\gamma] = 0.05$ (solid), 0.10 (dashed-dotted), and 0.15 (dotted).

welfare. The more interesting result is the redistribution hidden behind the aggregate measure.

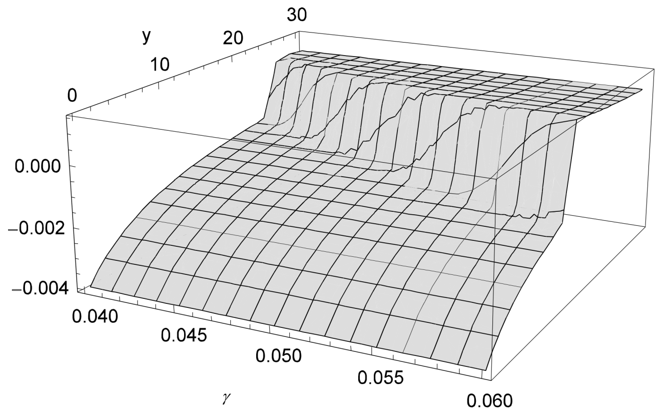
The existence of non-pecuniary motives makes the individual welfare effects of the subsidy highly nonlinear. To study the household level effects of the subsidy, we introduce a measure of equivalent variation. We compute $EV_{y\gamma}$ as

$$EV_{y\gamma}(s) = c(u_s; w, z) - (w + y),$$

where $u_s$ is household $y,\gamma$ equilibrium utility under subsidy $s$, and $c(u_s;w,z)$ is the minimum expenditures required at the unsubsidized equilibrium prices $w$ and $z$ in order to achieve $u_s$ and $(w + y)$ is the unsubsidized equilibrium expenditures (or total wealth). We normalize this measure by $w + y$ and express equivalent variation $EV_{y\gamma} / (w + y)$ as a fraction of the households' total wealth. Using the subsidized and unsubsidized equilibrium allocations, we can compute this measure over the entire joint distribution of households to study the household-level welfare costs of the subsidy.

Using this measure, we find this simple small business subsidy to be regressive, actually benefiting wealthy business owners at the expense of wage employees. Figure 3.12 plots this welfare measure for the baseline case. The left panel plots the normalized EV measure over the entire joint distribution $F(y,\gamma)$ for a small subsidy policy $s = 0.05$. It is a little difficult to read the surface plot, but it is evident that for some households (with $EV / (w + y) > 0$) the subsidy is a net benefit. In the right-hand plot we integrate over $\gamma$ to recover

a. $\frac{EV}{w+y}$ over $F(y,\gamma)$ for $s = 0.05$




b. $\frac{EV}{w+y}$ over $F(y)$ for $s = 0.05, 0.10, 0.15, 0.20$, and $0.25$

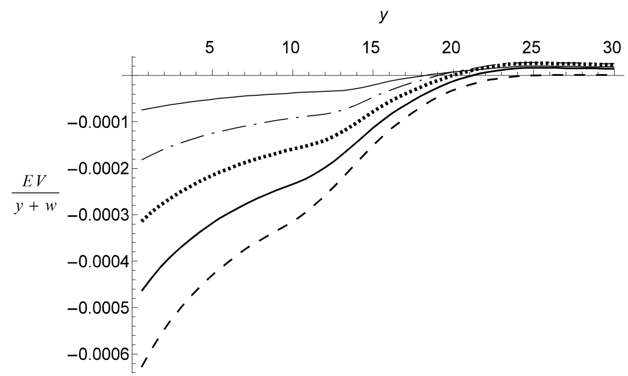



**Fig. 3.12 Equivalent variation as a fraction of full income ($w + y$) of subsidy $s$ policies**

*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\overline{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\overline{y} = 30$, $\overline{\gamma} - \underline{\gamma} = 0.02$, and with $E[\gamma] = 0.05$.

$$EV_y = \int EV_{y\gamma} dF(\gamma \mid y),$$

the total welfare gain or loss for all households with wealth $y$ and plot this measure over the wealth distribution $F(y)$. We plot several policies ranging from a small subsidy $s = 0.05$ to a large subsidy $s = 0.25$. From this graph it is evident that even when summing across high and low $\gamma$ households, wealthy households stand to benefit from a subsidy. Figure 3.13 makes this point more apparent by considering the three distributions of $\gamma$ we have studied under a low subsidy in the left-hand panel and a high subsidy in the right-hand panel.

Part of the large welfare cost to the poorer households is driven by the lump sum taxation assumption. This is an extreme example where all households equally share the tax burden regardless of their total wealth $w + y$. To see why, consider the effect of a subsidy. It makes entrepreneurship more lucrative to all households. Many would have run businesses anyway, but some will switch from wage employment to business ownership, constricting the labor supply. The downward-sloping aggregate labor demand curve implies a higher equilibrium wage. In the lump sum taxation example, the modest increase in wages for poorer-worker households is dominated by the additional tax burden needed to fund the subsidy. A more progressive policy where tax rates are based on wealth could reverse this policy, however a proportional income tax would not reverse the result. In fact, a proportional income tax would be even more regressive, since wage income constitutes the majority of consumption for the less wealthy households.

These mechanics also give some intuition for the result that wealthy entrepreneur households stand to benefit from the subsidy. While the subsidy entices some worker households into a higher probability of business ownership, the effect on this margin is relatively small. However, all business-owning households stand to benefit from the subsidy, and the wealthy business owners who would have started their businesses anyway, especially so. The best-case scenario for them is a subsidy with a small group of existing business owners, this way the individual benefit of the subsidy is not diluted by a larger tax needed to pay for a subsidy across a larger small-business sector.

## 3.6 Implications

The goals of this chapter were twofold. The first goal was empirical. In section 3.2, we expanded on the work in Hurst and Pugsley (2011) using restricted-access administrative data in the census LBD. We document the large amount of heterogeneity across narrow industries in the extent to which small businesses are important. For many narrow industries like dentists or florists, almost all employment within the industry is in small businesses. For other narrow industries like natural gas pipelines and scheduled air transport, essentially none of the employment within the industry

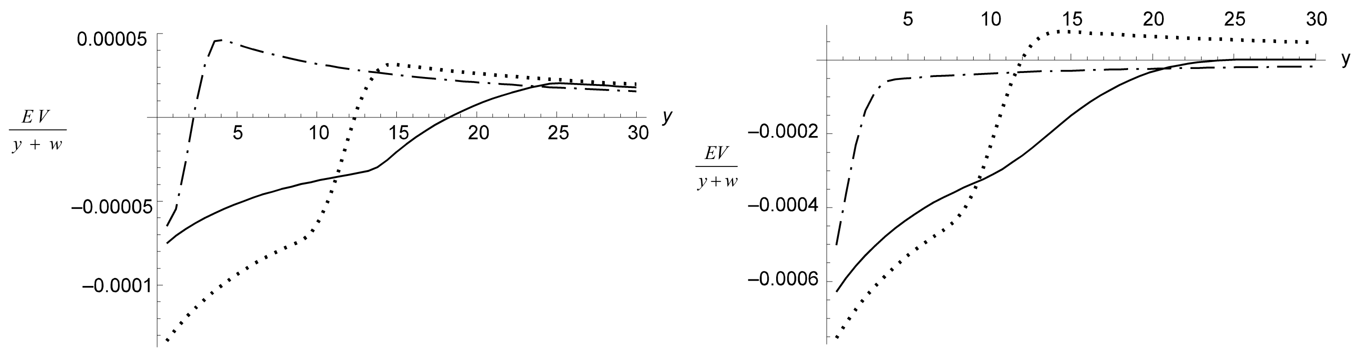



**Fig. 3.13 Equivalent variation as a fraction of full income ($w + y$) of high and low subsidy $s$ policies**

*Note:* $\theta = 0.75$, $\underline{b} = 1$, $\overline{b} = 5$, $\sigma = 2$, $\underline{y} = 0$, $\overline{y} = 30$, $\overline{\gamma} - \underline{\gamma} = 0.02$, and with $E[\gamma] = 0.05$ (solid), 0.10 (dashed-dotted), and 0.15 (dotted).

takes place within small businesses. Also, in section 3.2 we highlighted the fact that most young small businesses do not eventually grow, even conditional on survival for ten or more years. Put another way, while most new and young businesses are small, most old businesses also remain small. The facts in section 3.2 are consistent with the facts documented in Haltiwanger, Jarmin, and Miranda (2013) and Hurst and Pugsley (2011).

The second goal of the chapter was theoretical. We developed a highly stylized and static equilibrium model of an economy with a small business sector. The model included three key elements. First, we allow for different industries of the economy to differ in their natural scale of production. In any industry firms may be incorporated or run by small business owners (households), where the only difference is small business owners are limited in their capacity to grow. This modeling choice was motivated by the facts presented in section 3.2 showing that the size of the small business sector differs markedly across industries, and further, that the vast majority of young small businesses become old small businesses conditional on their survival. Second, we allow at least some individuals to have a preference for owning and working in a small business over employment within a corporate firm. The magnitude of the utility flow may vary across the population. With no differences in skill, nonpecuniary benefits generated from a taste for small business ownership are the only source of selection. This modeling choice was motivated by the work of Hurst and Pugsley (2011) documenting that nonpecuniary benefits were a key driver of small business formation. Nevertheless, the relative value of the nonpecuniary versus pecuniary benefits will vary with the marginal utility of consumption. So third and finally, we allow individuals to differ in their initial wealth, generating dispersion in the equilibrium marginal utility of consumption across the population. Collectively, these assumptions yielded a variety of predictions about the small business sector that are consistent with the data. In particular, the model predicts: (a) small businesses are concentrated in a few industries, (b) higher-wealth individuals are more likely to be small business owners, and (c) small business owners earn lower earnings on average relative to what they would have earned if they remained a wage/salary worker.

Our model abstracted from many of the common drivers of small business formation. For example, most of the existing research attributes differences across firms with respect to ex post performance to either differences in financing constraints facing the firms (e.g., Evans and Jovanovic 1989; Clementi and Hopenhayn 2006), differences in ex post productivity draws across the firms (e.g., Simon and Bonini 1958; Jovanovic 1982; Pakes and Ericson 1998; Hopenhayn 1992), or differences in entrepreneurial ability of the firms' owners (e.g., Lucas Jr. 1978). It is not that we do not believe these to be empirically important or that all of the model's predictions are reasonable. For example, the market structure generated adjustment in the quantity if individual goods sold entirely on the extensive margin of firm or small business entry. Instead, we offered a stark model to illustrate that preference heterogeneity alone yields many of the same predictions as models with heterogeneous entrepreneurial ability across individuals and liquidity constraints. It is straightforward to introduce differences in skill and liquidity constraints to the model, and Pugsley (2011) incorporates these features into a dynamic model of the small business sector. One question we think is important going forward, also considered in Pugsley (2011), is what is the relative importance of the different factors in explaining both the mass of small businesses we observe in the data and why some firms grow while others do not? To be concrete, we think it is important to assess the relative importance of (a) nonpecuniary benefits, (b) technological differences in scale across industries, (c) differences in ex ante entrepreneurial ability, (d) differences in ex post luck, and (e) binding liquidity constraints in explaining the distribution of firm size within the economy. It is challenging to robustly differentiate these factors, and as we show, the policy and growth implications of these different factors differ markedly.

### 3.6.1 Modeling Needs

To facilitate testing among these different drivers of small business growth, new models need be developed and new data brought to bear on the issue. Going forward we believe that traditional models of small business formation and growth should allow for heterogeneous nonpecuniary benefits of owning a small business across individuals in the population. Theoretically, the importance of nonpecuniary benefits can be distinguished from the other factors by examining earnings data. Individuals are willing to take lower pecuniary benefits (earnings) to run a small business if nonpecuniary benefits exist. However, the ability stories, the luck stories, and the liquidity constraints story all predict that earnings for those that remain business owners should be larger (in expectation) than they would be if the individual remained a wage/salary worker. By incorporating nonpecuniary benefits into standard models of firm dynamics, the models could then illustrate how wage data could be used to test among the various drivers of small business entry.

One attempt to do this was Pugsley (2011), which introduces preference heterogeneity to an otherwise standard model of entrepreneurship with credit frictions similar to Cagetti and De Nardi (2006). The preference heterogeneity, similar to the form in this chapter, generates nonpecuniary compensation from business ownership that effectively shifts the productivity and wealth thresholds for which business ownership is viable. He uses the model to determine to what extent the distribution of firm size is driven by selection on tastes, and finds using the structural model that roughly 40 percent of the distribution of firms (all very small firms) would not be viable without some further nonpecuniary compensation from running the business. This helps the model fit the existence of small firms with relatively low exit rates and no growth that are traditionally harder to understand with pure productivity or credit friction-driven distributions of firm size.

Additionally, it would be useful to amend our current models to allow for multiple sectors. As we illustrated in section 3.2, there is a large amount of heterogeneity in the firm-size distribution across industries. By developing models with multiple sectors, richer predictions can be developed. The detailed industry-level data can then be exploited to potentially test among some of the model ingredients.

### 3.6.2 Data Needs

With the advent of the restricted-use Longitudinal Business Database (LBD), researchers have had access to a wealth of information about firm dynamics. As seen from our work in section 3.2, researchers can track employment at the establishment level for businesses of differing ages across different sectors. Some measures of sales and total payroll can be merged into this data. However, these data do not contain much information about the owner(s) of the businesses. As seen above, one way to distinguish between the importance of nonpecuniary benefits and other factors in driving the firm-size distribution is to measure the wages of the owner as they transition into and out of self-employment. The LBD, in its current form, is not well suited to provide this information.

To examine the earnings movements of individuals as they transition in and out of business ownership, researchers have relied on household surveys. Because of the need to follow an individual as they move in and out of business ownership, panel data is necessary. Also, because business owners represent such a small fraction of the population, large samples are needed. Finally, the panel dimension of the data needs to be long enough to measure an individual's permanent income both before and after owning a business. Very few household surveys within the United States are constructed such that they are nationally representative, have large sample sizes, and have long panel dimensions. The Survey of Income and Program Participation (SIPP) is essentially the only household data set that meets this criteria. Even then, the panel component of the SIPP is relatively short (up to four years). As a result, essentially all work assessing whether individuals earn less as small business owners (or the self-employed) relative to what they would have earned as wage/salary workers is done using the SIPP. For example, both Hamilton (2000) and Pugsley (2011) document that the median small business owner earns about 20–30 percent less than they would have as a wage/salary worker.

Even with the SIPP data, however, there are limitations to what can be done with the SIPP with regard to this question. First, as discussed in Hurst and Pugsley (2011), the self-employed tend to underreport their income to household surveys (relative to wage/salary workers). Second, it is conceptually hard to measure the labor earnings of the self-employed. How much of the reported earnings are the return to labor and how much are the return to capital? Third, household surveys often do not measure fringe benefits provided by the firm. If there are differences in fringe benefits provided by large employers to wage/salary workers relative to what is provided to the small business owner, earnings differences will be further mismeasured. Finally, most of the existing research does not measure well the variability of earnings of small business owners. Ideally, one would want to measure risk-adjusted differences in earnings between the self-employed and wage/salary workers. The work by Hamilton (2000) and Pugsley (2011) abstract from the potential differences in measurement error in earnings between small business owners and wage/salary workers, as well as differences in the variability of the earnings between the two groups.

Going forward, it would be useful to think about ways to better measure the earnings differentials of the self-employed relative to wage/salary workers. Subjective survey questions, like those from the Panel Study of Entrepreneurial Dynamics, suggest that nonpecuniary benefits are an important driver of small business entry. However, it would be nice to quantify their importance. The only way we can see to do this is to measure the earnings differentials that occur as individuals transition into and out of small business ownership.

Finally, and perhaps the most useful, would be to leverage the existing survey and administrative records to create matched databases available for researcher access. It may be technologically feasible to merge covariates of business owners identified in the SIPP into the LBD. Similarly, other Census-run survey instruments, such as the Current Population Survey, which is joint with the Bureau of Labor Statistics, could be linked to existing administrative data. A similar effort is already underway to link the SIPP to Social Security Administration records on lifetime earnings histories. These sorts of projects are cost-effective because they make use of the already existing (and very expensive) fielding of surveys.

### 3.6.3 Policy Implications

Policymakers on both the Left and the Right often discuss the importance of subsidizing small business formation. For example, the recent health care reform within the United States exempts small business (those with less than fifty full-time equivalent employees) from a mandate to provide their employees with health insurance. The US Small Business Administration (SBA) in 2010 guaranteed over $20 billion in loans to small businesses (primarily those with less than 500 employees).[17] Looney (2011) outlines many other regulatory exemptions and preferential tax treatment provided to small businesses. For example, small businesses are also exempt from some provisions of the Americans with Disabilities Act (ADA) and some rules set forth by the Occupational Safety and Health Administration (OSHA).

Economic arguments for subsidizing small businesses hinge on small busi-

17. See Adam Looney's published comments to Hurst and Pugsley (2011).

nesses being important contributors to aggregate innovation and growth where market forces alone fail to allocate sufficient resources to the sector. For example, the social returns from technological spillovers or improving communities may far exceed the private returns to the small business owner. Even absent positive spillovers, financial constraints may limit the scale of small businesses or whether or not they even form. The subject of entrepreneurship and technological spillovers is well studied in the growth literature (e.g., Audretsch, Keilbach, and Lehmann 2006; Acs et al. 2009). If a substantial portion of R&D occurs in small firms, the social returns to entrepreneurship could far exceed the private returns. Jones and Williams (1998), for example, find the optimal level of investment in research and develoment (R&D) to be two to four times the observed level of investment. Additionally, subsidizing small businesses may be appropriate if liquidity constraints or other financial market imperfections prevent small businesses from securing the financing they need to bring their innovations to market (Evans and Jovanovic 1989; Evans and Leighton 1989). While it is hard to think that the government can better allocate funding to small businesses than private lenders, the argument for governments trying to relax small business liquidity constraints is more persuasive if the social return to small business ownership is higher than the private return. Thus, there is some interaction between the two common economic justifications for subsidizing small businesses.

Policymakers, however, also believe that small businesses are the engines of economic growth. Recent research by Haltiwanger, Jarmin, and Miranda (2013) suggest that it is the young firms not the small firms that are likely to grow. The work in Haltiwanger, Jarmin, and Miranda (2013) and our work above documents that most small firms do not grow. Additionally, our findings above, coupled with those in Hurst and Pugsley (2011), document that while it is young firms that contribute disproportionately to growth, most young firms also never grow.This fact remains true even conditional on the business surviving. So while young firms are more likely to grow than older firms, most firms conditional on survival never grow. Collectively, our work shows that in a world with nonpecuniary benefits of owning a small business, subsidies to small businesses may have little effect on business growth. Furthermore, as we document above, these subsidies may be regressive in that the wealthy may be more likely to purchase the consumption flow of small business ownership.

The fact that the nonpecuniary benefits of small business ownership are not taxed results in sectors where nonpecuniary benefits are a larger fraction of total compensation being tax preferred relative to other sectors. To the extent that small business ownership offers larger nonpecuniary benefits relative to owning a larger business or being a wage worker, the small business sector would be tax preferred even if there are no other direct subsidies offered by the government. Additionally, there is a large literature showing that small business owners are much more likely to underreport their income to tax authorities relative to wage and salary workers. Again, if it is easier to underreport income to tax authorities if one owns a small business, the small business sector again would be tax preferred relative to other sectors even if there are no additional direct small business subsidies.

The point we want to emphasize in this subsection is that while policymakers and researchers often invoke the potential benefits of direct small business subsidies, there is very little quantitative research documenting the actual benefits and costs of small business subsidies. The results in our chapter suggest that the potential costs may be nontrivial. To our knowledge, there is no empirical work that evaluates whether subsidizing small businesses is a positive net present value venture. Addressing this question seems like a very important area for future research. Our work in this chapter and the work in Hurst and Pugsley (2011) suggests that subsidies may be less distortionary if they were targeted at growth and innovation as opposed to being mostly linked to firm size. Such policies could address the concerns raised by our results in at least two ways. First, we show that most small businesses operate in industries with potentially smaller natural scales. Business owners with little intention to grow or innovate may select into these industries for that very reason. By focusing the subsidy on the intensive margin, the subsidy is more likely to be taken up by a business owner focused on growth or innovative activity. Subsidies could lower the cost of credit for existing firms, and by increasing their value entice productive entrepreneurs with high-wage employment opportunity costs. Second, if nonpecuniary compensation is independent of the scale of the firm, the incidence of an expansion subsidy would be undistorted by nonpecuniary benefits. If anything, nonpecuniary benefits may help separate businesses that want to grow from businesses that would prefer to remain small. Of course, there may be other social virtues to noninnovative small businesses, such as supporting communities and neighborhoods, which are aided by subsidizing the entry and exit margins. However, when targeting job creation or innovative risk taking, our findings suggest caution when supporting businesses purely by size.

In conclusion, our work suggests that more work is needed both empirically and theoretically to help policymakers assess the costs and benefits of subsidizing small business activity.

# Appendix

## *Omitted Proofs*

Proof of Proposition 1. Given wage $w$ and small business owner income $z$, the price $p^c(b)$ of good $b$ produced by the corporate sector is $wb^{(1-\theta)/\theta}[A\theta^{\theta}(1-\theta)^{1-\theta}]^{-1/\theta}$ and the price of the same good when $(b < A)p^e(b)$ produced by the small business sector is $z / (A - b)$. Good $b$ is provided by the lowest-priced sector.

We locate the lowest-price sectors using the solution to equation (11). With $\theta \in (0,1)$, equation (11) has exactly two real roots on the interval $[0,A)$. To see this, first note that $p^e(b)$ is continuous, strictly increasing and convex on this interval with $p^e(0) = (z / A) > 0$ and $\lim_{b \to A} p^e(b) = \infty$. Then, note that $p^c(b)$ is also continuous and strictly increasing on this interval with $p^c(0) = 0$ and $\lim_{b \to A} p^c(b) = p^c(A) < \infty$, and further that for good $b = (1 - \theta)A$ (this is the good with a minimum efficient scale exactly equal to the small business size of 1) that $p^c[(1 - \theta)A] > p^e[(1 - \theta)A]$. This last inequality follows from $z < w$, which is shown in Proposition 2. Since on the interval $[0,A)$, $p^c(b)$ is strictly convex when $\theta > 1 / 2$, strictly concave when $\theta < 1 / 2$ and linear when $\theta = 1 / 2$, it crosses $p^e(b)$ exactly twice: once below $b = (1 - \theta)A$ and once above. Label these roots $b_1$ and $b_2$, respectively. Small businesses are the lowest-cost provider when $b \in (b_1, b_2) \cap B$. Values of $b$ below the smaller root $b_1$ correspond to goods with an efficient scale sufficiently below 1 so that the small business is inefficiently large and not competitive. The restriction $\underline{b} > (1 - \theta)A$ rules out this possibility since $(1 - \theta)A > b_1$, ensuring that small businesses are the lowest-cost provider of all goods below $b_2$. So, $b^* = b_2$ is the unique cutoff defining the set of goods produced by the corporate sector $B^c = [b^*, b] \cap B$. The restriction $\bar{b} \geq A$ ensures some measure of goods is produced by the corporate sector. So long as $\underline{b} < b^*$ the small business sector $B^e = B / B^c$ is also not empty.

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