Entrepreneurship in Black and White

Barton H. Hamilton^{*} Andrés Hincapié[†]

Prasanthi Ramakrishnan[‡] Siddhartha Sanghi[§]

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Abstract

White males are two-and-a-half times more likely to be entrepreneurs than black males. Already present at the start of their careers, this gap continues to widen as individuals age. Using a life cycle model of occupational choice we study various mechanisms explaining this gap. In the model individuals can choose whether to work and whether to be paid- or self-employed. Their choices are affected by their endowment of wealth and human capital as well as by the process through which they transform these resources into earnings, a process which includes borrowing constraints. Their decisions are also influenced by their risk preferences and their non-pecuniary preferences for being self-employed. We estimate the model separately by race using data from the PSID. The estimates show that the main sources explaining the gap in entrepreneurship between black and white males are the returns to capital and the idea profitability distribution.

^{*}Olin Business School

[†]Department of Economics, UNC Chapel Hill

[‡]Department of Economics, Washington University in St. Louis

[§]Federal Reserve Bank of St. Louis

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1. Introduction

Entrepreneurs are known to be job creators (Haltiwanger, 2012) and contribute to wealth accumulation and social mobility (Quadrini, 2000). However, there exists a large racial gap in entrepreneurship - white males are two-and-a-half times more likely to be entrepreneurs as compared to black males (Table 1). Not only are white males more likely to be self-employed at the start of their career, this gap only widens over the life-cycle. This racial gap in entrepreneurship can have far-reaching consequences on inequality, social mobility, job creation, and economic output (Hsieh et al., 2019). Fostering black entrepreneurship can bridge the racial gap and help reduce disparities in economic mobility by building personal wealth.

In this paper we aim to understand the economic causes of the large gap in entrepreneurship between blacks and whites. We explore five main mechanisms. First, there is a large wealth gap between blacks and whites. A typical white family has eight times the wealth of a typical black family (Bhutta et al., 2020). We find that 26.6 percent of black males have zero or negative wealth, nearly double the number for whites (Figure 2). Second, blacks face tougher restrictions in accessing financial capital, which coupled with low assets, leads to liquidity constraints.¹ Third, there are large differences in human capital endowment and accumulation, which can compromise the profitability of an enterprise and the returns to entrepreneurship (Hincapié, 2020). We find that 21.0 percent of blacks have less than high school education as compared to 10.2 percent of whites. Moreover, 18.4 percent of blacks are not working in the sample, more than double the percent of whites. Fourth, white males may have different non-pecuniary benefits from entrepreneurship, leading to racial differences in participation.² Lastly, differences in attitudes towards risk could also generate this trend as they might push black entrepreneurs away from entrepreneurship (Iyigun and Owen, 1998).³ To the best of our knowledge, this is the first paper to look at these mechanisms jointly to disentangle the racial gap in entrepreneurship.

To this end, we develop a life-cycle model which incorporates all of the mechanisms listed above. Each period during his working career, the risk-averse, forward-looking individual observes the profitability of his idea, his human capital, and his wealth, and

¹This is well-documented by many as a barrier to entrepreneurship (Fairlie, Robb and Robinson, 2020; Kerr and Nanda, 2009; Evans and Jovanovic, 1989; Buera, 2009; Cagetti and De Nardi, 2006).

²Hamilton (2000) showed that non-pecuniary benefits have an important role to play for entry into self-employment.

³See also Weems (2009) for a historic perspective.

makes three decisions: consumption and assets, employment status and rental of capital. Human capital evolves through the individual's labor market career, with sector-specific accumulation and a constant rate of depreciation. The profitability of his idea depends on both his human capital and luck. If he decides to become an entrepreneur, he faces borrowing constraints for capital.,which depend on his current wealth as in Evans and Jovanovic (1989).

We use data from the Panel Study of Income Dynamics (PSID) for the years 1968 to 2015 and restrict our sample to black and white males between the ages of 25 to 58. We focus on males to avoid modeling fertility and marriage decisions.⁴ The entire estimation is done separately for blacks and whites. The initial human capital and asset distributions, along with the unemployment benefits as well as the shock to self-employment income are taken from the data. We then use a two-step estimation strategy. In the first stage, we obtain estimates of the human capital accumulation process using a Heckman two-step estimator. The remaining parameters, including returns to capital, credit constraints, idea profitability distribution, fixed costs of working, non-pecuniary benefits to self-employment, and variance of income shocks, are estimated in a second stage using a minimum distance estimator.

Our first stage results reveal large racial differences in returns to human capital from self-employment; incorporating age leads to larger gaps during early career, which decline over life-cycle. We find two key results from our second stage estimates. First, the return for each dollar invested in their business is higher for whites. It follows that black businesses will have a smaller scale. Second, the distribution of idea profitability is significantly right-skewed for whites compared to blacks. We are skeptical about the interpretation of these distributional differences as they may well reflect discrimination either by lenders or by potential customers.

Using our model we run several counterfactual exercises in which we replace subsets of the parameters estimated from the black sample with the estimates from the white sample, and simulate the life-cycle patterns for black males, assuming that all other parameters estimated from the black sample and the black sample's initial conditions remain the same. We find that raising the returns to capital of black businesses to the level of white businesses increases black self-employment by 126 percent, bringing the black self-employment rate to 15.6 percent, just half a percentage point below that of whites. Second, and perhaps surprisingly at first glance, replacing the black human

⁴We explore these dynamics in ongoing work.

capital distribution at age 25 with that of whites leads to a fall in self-employment. This decline is accompanied by a rise in paid employment of 9 percentage points. The reason behind this result is that black individuals with high human capital endowments face better returns in paid-employment than in self-employment. We are currently exploring other mechanisms and checking for the robustness of our structural estimates to different parameterizations.

The paper is organized as follows. Section 2 presents the dataset and a collection of motivating stylized facts. Section 3 presents the dynamic life-cycle model of occupational choice. Section 4 presents the results from the structural model and counterfactual exercises. Section 5 concludes.

2. Data

Our sample is drawn from the Panel Study of Income Dynamics (PSID), a nationally representative household panel survey consisting of information including demographic characteristics, employment, income and wealth. We restrict our sample to contain black and white males between the ages of 18 to 65 years for period between 1968 and 2015. The sample consists of 160,738 individual-year observations and 14,169 unique individuals, 67 percent of which are white.

The PSID was conducted annually from 1968 to 1997 and biannually afterward till 2015. To compile the dataset, we used the Family files, Cross-Year Individual files, and the T-2 Income and Transfers files. The latter helps to complete the information regarding labor income and annual hours worked in the intervening years during the periods when the survey is conducted biannually. The main variables in our model are race, employment status, earnings and wealth.

The main variables in our model are race, employment status, earnings and wealth. Self-declared race is directly obtained from survey answers. Employment status is partitioned into self-employment (SE), paid-employment (PE) and not-working (NW). A man is categorized as SE if he is self-employed only or if he is both self-employed and works for someone else. He is paid-employed if he works for someone else only.⁵. In addition, a man is categorized as NW if he is not working or works less than 520 hours a year. Annual earnings are defined as the sum of labor income, farming income, and business

⁵Employment status is constructed based on the following question: *On your main job, are you (HEAD) self-employed, are you employed by someone else, or what?*

income. Assets are defined as the sum of farm wealth, money in cash or checking accounts, real estate, stocks, vehicles, and other assets, less of debt. For robustness we use two measures of wealth: with and without home equity. The questions relating to assets are asked every 5 years from the year 1984 and bi-annually from 1999. The intervening years when the question is not asked, the value of assets is assumed to be the same. All nominal values are deflated to 2015 US dollars using the Consumer Price Index (CPI) deflator.

2.1 Stylized Facts

The racial gap in entrepreneurship stems from many structural and individual barriers such as differences in wealth, educational disparities, borrowing constraints, and discrimination in many forms. We focus on economic mechanisms as those are the ones we can measure in our data and are often fixable with targeted policy responses.

Whites are more likely to be self-employed compared to Blacks Whites are two-anda-half times more likely to be self-employed (14.4 percent) than blacks (5.7 percent), as shown in Table 1. While there isn't much difference in paid employment by race, blacks are far more likely to be not working. The differences in proportion self-employed is quite stark; however, far fewer blacks have ever tried self-employment compared to whites - while half of the white population (52 percent) has tried to start a business, only a quarter of the black population (25 percent) has done so ⁶.

⁶While the overall sample is from 18 to 65 years, we restrict to those who we continuously observed from 25 years to atleast 40 years.

| | Whites | Blacks |
|--------------------|--------|--------|
| Paid-Employed (PE) | 74.4 | 73.1 |
| Self-Employed (SE) | 14.4 | 5.7 |
| Not Working (NW) | 11.2 | 21.2 |
| Observations | 136832 | 57747 |

Table 1: Differences in Employment Statusby Race

Source: Panel Study of Income Dynamics, 1968-2015 (PSID)

Note: A man is categorized as SE if he is selfemployed only or if he is both self-employed and works for someone else. He is characterized as PE or paid-employed if he works for someone else only. A man is categorized as NW if he is not working or works less than 520 hours a year. In this, the sample is restricted to 18 years to 65 years.

This is even more apparent when we compare life-cycle profiles of proportion selfemployed for whites and blacks (Figure 1 (a)). While white males are consistently more likely to be self-employed at all ages, the racial gap widens with age. At age 25 white men are about 3.3 percentage points more likely to be self-employed than black men; by age 58, this gap has widened to 12.1 percent points, with 6.8 percent and 18.9 percent of white and black men, respectively, being self-employed.

Blacks are less likely to enter and more likely to exit The first question that arises with this striking racial difference in self-employment is: how do entry and exit rates differ? While 3.2 percent of white males between the ages of 25 to 58 years enter, only 2.1 percent of blacks do - nearly a third less. However, of those in self-employment, 15.3 percent of whites exit while nearly double that exit for blacks (28.7 percent). Figure 1 (b)-(c) shows this disturbing trend over the life-cycle, with whites are more likely to enter and less likely to exit at all ages, as compared to blacks.



Figure 1: Racial Differences in Life-Cycle Profiles of Self-Employed

Source: Panel Study of Income Dynamics, 1968-2015 (PSID). *Note:* A man is categorized as SE if he is self-employed only or if he is both self-employed and works for someone else.

However, to make the claim that black business are less likely to survive, we run a Kaplan-Meier survival analysis. After 1 year of running a business, 70 percent of white businesses survive compared to 63 percent of black businesses. This gap widens to 38 percent for white versus 26 percent for blacks, after 5 years of business.

College educated individuals are more likely to be self-employed We divide the population by 4 education categories: less than high school education, high school education, some college education, and college graduates and above. Table 2 presents the racial differences by education level. Interestingly, there is not much differences in self-employment rates for those without a college degree. For both blacks and whites, a significant bump is seen in self-employment rates - 16.2 percent of college-educated whites are self-employed while 8.2 percent of college-educated blacks are. This is a ratio of 2, as compared to 2.5 for the overall rate. However, while 35 percent of whites are college-educated, only 12 percent of blacks are. Lastly, along with the rise in self-employment rates for those with a college degree, unemployment rates are only 8 percent for blacks.

| | Whites | | | Blacks | | | | |
|------------------|--------|------|------|--------|------|------|------|------|
| | LHS | HS | SC | Col | LHS | HS | SC | Col |
| PE | 69.0 | 76.2 | 78.6 | 78.7 | 69.3 | 74.9 | 78.1 | 83.9 |
| SE | 14.2 | 14.3 | 14.4 | 16.2 | 5.7 | 5.3 | 6.3 | 8.2 |
| NW | 16.8 | 9.5 | 7.0 | 5.1 | 25.1 | 19.8 | 15.6 | 7.9 |
| Percent in Group | 10.1 | 30.9 | 23.9 | 34.8 | 21.1 | 40.0 | 26.0 | 12.4 |

Table 2: Differences in Self-Employment by Education Level

Source: Panel Study of Income Dynamics, 1968-2015 (PSID)

Note: 1. A man is categorized as SE if he is self-employed only or if he is both self-employed and works for someone else. 3. The age group is restricted to 25 to 58 years.

Blacks have lower wealth accumulation compared to Whites Figure 2 plots the distribution of assets, with the percent of individuals with zero or negative assets as a bar on the left of the figure, both including and excluding home equity. It is clear that blacks are more likely to have zero or negative assets compared to whites. Using the measure including home equity, the number for blacks is 26.6 percent, nearly double of the number for whites (13.5 percent). This gap further worsens if home equity is excluded - 31 percent of blacks have zero or negative wealth, compared to 16.9 percent of whites.

Racial gap in self-employment widens at top decile of wealth Given the large differences in wealth, we analyse the difference in self-employment rates by deciles of wealth.





Source: Panel Study of Income Dynamics, 1968-2015 (PSID)

These deciles are calculated for the entire population, and therefore, are comparable for blacks and whites. Figure 3 (a) presents this analysis. There is a small but constant difference between self-employment rates till the 7th decile of wealth. After that, there is a widening racial gap with wealth. At the top decile of wealth, more than a third of whites are in self-employment, while only a fifth of the blacks are. However, this gap is even more larger as while 13 percent of whites are in this top decile, only 2.4 percent of blacks are a part of this group.

Self-employment income gap persists at all deciles of wealth Using the wealth deciles, Figure 3 (b) analyses the differences in self-employment incomes by race. We use log income so that the analysis is not influenced by tail numbers. There is a persistent gap in income at all deciles. While there appears to be a narrowing in the gap at the top 4 deciles, the proportion of blacks in these deciles is very low.

With this descriptive analysis, it is clear that there exists a large difference in selfemployment rates, which is exacerbated by human capital and wealth accumulation. We present a dynamic model of occupational choice with wealth and human capital accumulation in the next section.



Figure 3: Racial Differences in Self-Employment by Wealth

Source: Panel Study of Income Dynamics, 1968-2015 (PSID) *Note:* A man is categorized as SE if he is self-employed only or if he is both self-employed and works for someone else. In subplot (b), log income of self-employed individuals is considered.

3. Dynamic Life-cycle Model with Entrepreneurship

The model considers forward-looking, risk-averse individuals who can save and decide how to smooth their consumption over time. During their labor market careers individuals decide whether to work, and if they work they can participate in two sectors: self-employment or paid-employment. If they are self-employed they also choose how much capital to borrow for their business, which may be constrained based on their assets. Paid employment income depends on human capital which individuals accumulate as they participate in the working sectors but that depreciates continuously. The profits from the business of self-employed individuals depend on idiosyncratic shocks (luck) and on the profitability of their ideas. Beyond the role of human capital on the profitability of ideas, we remain agnostic as to the fundamentals underpinning idea profitability. Since most parameters of the model will be estimated separately by race we do not include a race subindex as we describe the model.

3.1 Sectors, Income, and Individual Characteristics

An individual in the model, denoted *i*, enters the labor market at age \underline{t} with an endowment of human capital $h_{i\underline{t}} \in \mathbb{R}_{++}$ and assets $a_{i\underline{t}} \in \mathbb{R}$ jointly distributed $G(h_{\underline{t}}, a_{\underline{t}})$.⁷ He lives until age \tilde{t} and his life cycle is split in two periods: a working period $[\underline{t}, \overline{t}]$ and a retirement period $(\overline{t}, \widetilde{t}]$.⁸ In the remaining exposition of the model we drop the individual indicator *i*.

During the working period the individual can choose among three alternatives. Let $d_t^k \in \{0, 1\}$ be an indicator for whether or not he chooses alternative k at age t and let $d_t \in \{0, 1\}^3$ be the vector that collects all choice indicators. He can decide not to work $(d_t^n = 1)$ or he can decide to work in one of two sectors: paid-employment $(d_t^p = 1)$ or self-employment $(d_t^s = 1)$. Alternatives are mutually exclusive and one must be chosen with indicators satisfying $\sum_{k \in \{p,s,n\}} d_t^k = 1$ for all $t \in [\underline{t}, \overline{t}]$. Individuals do not have working alternatives in their retirement period.

Income during the working period, denoted $y_t \in \mathbb{R}_{++}$, depends on the individual's choice. The individual's income is given by:

$$y_t = \begin{cases} b & \text{if } d_t^n = 1\\ wh_t \exp(\sigma^p \epsilon_t^p) & \text{if } d_t^p = 1\\ p^s(z_t k_t^\theta - rk_t) & \text{if } d_t^s = 1 \end{cases}$$
(1)

If he does not work he receives a fixed unemployment transfer determined by the amount *b*. If he is hired as a paid employee his human capital h_t is remunerated at a constant wage rate *w*. If he decides to be self-employed his income follows directly from the profits of his entrepreneurial endeavor, which depend on the profitability of his idea z_t and on the capital invested in the business k_t . The returns to capital are given by θ and the rental rate of capital is constant at *r*. However, there is a realization of an income shock p^s after the occupation choice due to which an individual can get the entrepreneurial income as described above with probability p^s or receive zero income with probability $1 - p^s$.

While not working removes all income uncertainty, income in the working sectors is uncertain. Paid-employment contain idiosyncratic components denoted ϵ_t^p , and dis-

⁷The distribution of the endowment of human capital and assets $G(h_{\underline{t}}, a_{\underline{t}})$ allows for zero initial assets and for correlation between the amount of initial human capital and initial assets.

⁸Individuals start their careers at age $\underline{t} = 25$ and retire at age $\overline{t} = 65$. All individuals exit the model at age $\tilde{t} = 75$.

tributed iid Normal(0,1). The parameters σ_t^p capture the degree of idiosyncratic variation in each sector. For self-employment, the idiosyncratic variation comes from the variation in the idea profitability as detailed below, as well as the income shock.

3.2 Human Capital

Human capital $h_t \in \mathbb{R}_{++}$ evolves as the individual ages through his labor market career. While in his working period the individual's human capital depreciates at a rate determined by parameter δ . Counteracting depreciation, the individual contributes to his human capital at a rate Δh_t determined by his labor market participation. Concretely, his human capital evolves as follows:

$$h_{t+1} = h_t * \exp\left\{-\delta + \Delta h_t\right\} \tag{2}$$

where

$$\Delta h_t = \sum_{k \in \{p,s\}} d_t^k \left(\phi_0^k + \phi_1^k t \right) \tag{3}$$

The contribution to human capital is sector-specific and the parameter vector $\phi^k = [\phi_0^k, \phi_1^k]$ for $k \in \{p, s\}$ measures the contribution to human capital from participating in paid-employment or self-employment. The inclusion of *t* in (3) captures aging effects on the ability to accumulate of human capital.

3.3 Profitability of Entrepreneurial Ideas

The profitability of an individual's idea $z_t \in \mathbb{R}_{++}$ depends on both his human capital and luck. Each period, an individual draws a new idea profitability from a log normal distribution that depends on his human capital. Concretely, $z_t \sim LN(\mu_z(h_t), \sigma_z)$ where $\mu_z(h_t) = \mu_0 + \gamma_{hz}h_t$. γ_{hz} captures the dependence of idea profitability on human capital. While this may seem simple, it captures many of the core ideas. A draw every period captures the variability in idea profitability in one compact way and the investment in the idea is captured through the dependence on human capital.

3.4 Preferences

The individual is forward-looking and his discount factor for future utility is β . His flow utility $u(\cdot, \cdot) : \mathbb{R}_{++} \times \{0, 1\}^3 \to \mathbb{R}$ depends on consumption c_t and sector choices d_t . It is additively separable between utility from consumption $u^c(\cdot; \rho) : \mathbb{R}_{++} \to \mathbb{R}_{++}$ and utility from sector choices $u^d(d_t; \alpha) : \{0, 1\}^3 \to \mathbb{R}$ as follows:

$$u(c_t, d_t) = u^c(c_t; \rho) + u^d(d_t; \alpha)$$
(4)

where

$$u^{c}(c_{t};\rho) = \frac{c^{1-\rho}}{1-\rho}; \qquad \qquad u^{d}(d_{t};\alpha) = \alpha^{s}d_{t}^{s} + \alpha^{n}d_{t}^{n}$$
(5)

The utility from consumption displays constant relative risk aversion with risk parameter ρ . The utility from sectoral choices captures non-pecuniary benefits from being self-employed α^s and the leisure cost of working α^n which is forgone when individuals work in either sector paid- or self-employment.

3.5 **Optimal Choices**

Each period during his working career the individual observes his idea profitability z_t , his human capital h_t , and his wealth, a_t and makes three decisions: consumption and assets, employment status and rental capital choice. For convenience these choices are sequential in the model. The individual first chooses how much to consume c_t , which determines his available assets during the period, denoted \underline{a}_t , as the remaining current assets after consumption:

$$\underline{a}_t = a_t - c_t \tag{6}$$

Then, he decides whether to work or to be paid- or self-employed, and chooses his capital level k_t if he becomes self-employed. In his retirement years, after age \bar{t} , he only decides how to consume his remaining assets. The timeline of his optimization problem is presented in Figure 4.

Figure 4: Timeline of Model



3.5.1 Capital Choice

If the individual decides to be self-employed he decides how much capital to rent for his business. The amount of capital he can borrow is a function of his current level of available assets \underline{a}_t and a borrowing constraint λ . The individual solves the following problem to maximize the profits from his business:

$$\max_{k_t \le \lambda \underline{a}_t} z_t k_t^{\theta} - rk_t \tag{7}$$

Given the sequentiality of the problem, the optimal capital level only depends on available assets and can be solved separately. Hence, the optimal capital choice is given by:

$$k_t^* = \min\left\{\lambda\underline{a}_t, \left(\frac{r}{\theta z_t}\right)^{\frac{1}{\theta - 1}}\right\}$$
(8)

3.5.2 Consumption and Employment

During his working career, $t \in [\underline{t}, \overline{t}]$, the individual chooses consumption, employment status, and capital if self-employed. He obtains returns on his savings determined by the interest rate *r* and receives income at the end of the period. Hence, his budget constraint is given by:

$$a_{t+1} = y_t + (1+r)(a_t - c_t) \tag{9}$$

As detailed in the previous section, the capital choice can be solved separately. Hence, subject to the budget constraint in (9), the evolution of human capital in (3) and the draw

of idea profitability, the value function of the individual's problem is:

$$V_t(a_t, h_t, z_t) = \max_{c_t, d_t} \left\{ u(c_t, d_t) + \beta E_{\varepsilon} \left[V_{t+1}(a_{t+1}, h_{t+1}, z_{t+1}) \mid a_t, h_t, z_t \right] \right\}$$
(10)

Given that the flow utility in (4) is additively separable in the choice variables, using the sequentiality of the decisions, the individual problem can be split into a consumption part and an employment part. The choice of consumption follows from:

$$V_t(a_t, h_t, z_t) = \max_{c_t} u^c(c_t; \rho) + V_{t+\frac{1}{2}}(\underline{a}_t, h_t, z_t)$$
(11)

where available assets after consumption \underline{a}_t result from equation (6) and the subscript $t + \frac{1}{2}$ indicates the within period sequential split between the consumption and employment choices. Following the consumption choice, the employment choice is written as:

$$V_{t+\frac{1}{2}}(\underline{a}_{t}, h_{t}, z_{t}) = \max_{d_{t}} \left\{ u^{d}(d_{t}; \alpha) + \beta E_{\epsilon} \left[V_{t+1}(a_{t+1}, h_{t+1}, z_{t+1}) \mid \underline{a}_{t}, h_{t}, z_{t} \right] \right\}$$
(12)

subject to the budget constraint, and the evolution of human capital and idea profitability.

3.5.3 Consumption Choices in Retirement

Upon retirement, , $t \in [\bar{t}, \tilde{t}]$, the individual only chooses how to smooth consumption of his assets until he exits the model. Hence, his problem after retirement is given by:

$$V_t(a_t, h_t, z_t) = \max_{c_t} \left\{ u^c(c_t; \rho) + \left[V_{t+1}(a_{t+1}, h_{t+1}, z_{t+1}) \mid a_t, h_t, z_t \right] \right\}$$
(13)

subject to the budget constraint in (9) where earnings are zero. The terminal value $V_{\tilde{t}+1}(a_{\tilde{t}+1})$ is not set to zero, allowing for a bequest motive:

$$V_{\tilde{t}+1}(a_{\tilde{t}+1}) = \frac{a_{\tilde{t}+1}^{1-\rho}}{1-\rho}$$
(14)

3.6 Estimation Strategy

Denote by Λ_1 , Λ_2 the collection of parameters that need to be estimated.

$$\Lambda_1 = \{\delta, \phi^p, \phi^s\}$$
$$\Lambda_2 = \{\theta, \lambda, \alpha^s, \mu_0, \sigma_z, \sigma_p, \gamma_{hz}, \alpha^n\}$$

We follow a two-step estimation strategy:

- 1. First Stage: Estimate Λ_1 using a two-step Heckman estimator
- 2. Second Stage: Estimate Λ_2 using a minimum distance estimator

$$\hat{\Lambda}_2 = \arg\min\left[\frac{m_{sim}(\Lambda_2)}{m_{data}(\Lambda_2)} - 1\right]^T \left[\frac{m_{sim}(\Lambda_2)}{m_{data}(\Lambda_2)} - 1\right]$$
(15)

For this estimator, we target the following sets of moments: self-employment and paid-employment rates, entry and exit rates over the life cycle, self-employment income for those with assets above median and 90th percentile, median self-employment and paid-employment income and inter-quartile range of income for self-employment and paid-employment.

We set the following parameters from the data: initial human capital and asset distribution is set from the data G(h, a), as well as the shock to self-employment income p^s . The remaining parameters are set to be the following: the wage rate is normalized at 1, the rate of interest on assets *r* is 0.05 and the discount factor β is 0.96.

4. Results

We present estimates from the dynamic model as detailed in the previous section.

4.1 First Stage Estimates

We observe paid employment income in the data $y_{i,t}^p$. We consider spells which start and end with paid employment. Let us consider a spell: PE, SE, PE. Based on the model setup, this would imply:

$$\ln y_{i,t+2}^p - \ln y_{i,t}^p = -2\delta + \phi_0^p + 2\phi_1^p + \phi_0^s + \phi_1^s + \sigma^p(\epsilon_{t+1}^p - \epsilon_t^p)$$

Let us take another case where PE is repeated after *n* periods among which n_{SE} were SE periods. Then, the change in paid-employment income can be written more generally:

$$\ln(y_{it+n}^{p}) - \ln(y_{it}^{p}) = -n\delta + \phi_{0}^{p} + \phi_{1}^{p}(t+n) + n_{SE}\phi_{0}^{s} + \beta_{1}^{s}\sum age_{s} + \epsilon_{it+n} - \epsilon_{it}$$
(16)

With this equation, we run a two-step Heckman estimator, where the first stage is the selection into atleast two periods of paid-employment and the second stage is (16). The exclusion restriction is assets and the key assumption we are making here is that assets move participation but not labor income. Table 3 presents both OLS and estimates from the two-step Heckman.

| | Whites | | Blacks | | |
|---------------|-------------|-------------|-------------|-------------|--|
| | OLS | Heckman | OLS | Heckman | |
| Main | | | | | |
| δ | 0.02987*** | 0.02911*** | 0.02671*** | 0.02632*** | |
| | [0.0071] | [0.0034] | [0.0099] | [0.0050] | |
| ϕ_0^{SE} | 0.02677*** | 0.02686*** | 0.00636 | 0.00612 | |
| | [0.0082] | [0.0046] | [0.0283] | [0.0159] | |
| ϕ_1^{SE} | -0.00129** | -0.00123*** | -0.00036 | -0.00035 | |
| | [0.0005] | [0.0003] | [0.0016] | [0.0009] | |
| ϕ_0^{PE} | 0.07861*** | 0.11259*** | 0.06198*** | 0.08588* | |
| | [0.0075] | [0.0343] | [0.0111] | [0.0462] | |
| ϕ_1^{PE} | -0.00198*** | -0.00199*** | -0.00163*** | -0.00166*** | |
| | [0.0001] | [0.0001] | [0.0002] | [0.0002] | |
| Observations | 73224 | 85096 | 28800 | 35380 | |

Table 3: First Stage Estimates: Two-Step Heckman Estimator

Source: Panel Study of Income Dynamics (PSID), 1968-2015

Note: **1**. A man is categorized as SE if he is self-employed only or if he is both self-employed and works for someone else.

From this table, it is clear that whites have a much higher return to human capital from self-employment (0.02686) as compared to blacks (0.00612). Factoring in the age-

profile, this would imply that the return is positive for both whites and blacks in the young age group but declines as age increases. While whites also have much higher return to human capital from paid-employment (0.1125) as compared to blacks (0.08588), this remains positive throughout the life-cycle. Moreover, it is clear that there is selection in the paid-employment estimates, when the OLS and Heckman estimates are compared. Pinning down the human capital evolution parameters using a first-stage estimation provides a clean identification strategy to pin down the idea profitability parameters.

4.1.1 Initial Conditions

The initial conditions for the model are presented in Table 4. As presented in the Section 2.1, the mean of assets is higher for whites as compared to blacks, while the variance are comparable. The number of black males with zero assets is nearly double that of white males. For human capital, a similar trend to that of assets is seen.

| S. No. | Parameter | White | Black |
|--------|-----------------------------------|-------|-------|
| 1 | Mean A0 | 2.24 | 1.08 |
| 2 | Var. A0 | 3.27 | 3.30 |
| 3 | Frac. 0 - Assets | 0.14 | 0.27 |
| 4 | Mean H0 | 1.34 | 1.00 |
| 5 | Var. H0 | 0.31 | 0.58 |
| 6 | Income Shock <i>p^s</i> | 0.04 | 0.08 |
| 7 | UI b | 1.10 | 0.62 |

Table 4: Initial Conditions for Model

4.2 Second Stage Estimates - Ongoing

The parameter estimates are presented in Table 5. There are five key takeaways. First, the capital share θ is much higher for whites as compared to blacks i.e. for each dollar invested in the business, whites will get a much higher return on that dollar spent compared to blacks. Second, there do not seem to be binding collateral constraints for both whites and blacks. However, this still poses a problem as blacks have significantly lower wealth compared to that of whites. Third, the idea profitability distribution is

more right skewed for whites as compared to that of blacks and moreover, it is also a tighter distribution for blacks. This implies that on average, blacks are more likely to receive a lower idea profitability as compared to blacks. Fourth, the dependence of the idea profitability on human capital or γ_{hz} is higher for blacks as compared to whites; however, this may not be that helpful to blacks as their human capital is already low. Lastly, the non-pecuniary benefits of self-employment to whites is significantly higher than blacks and the fixed cost of working is much lower.

| S. No. | Parameter | White | Black |
|--------|--|-------|-------|
| 1 | Returns to Capital θ | 0.190 | 0.064 |
| 2 | Collateral Constraint λ | 2.953 | 2.858 |
| 3 | Non Pecuniary Benefit to SE α^s | 0.084 | 0.003 |
| 4 | Idea Profitability - Mean z | 0.964 | 0.785 |
| 5 | Idea Profitability - Var. z | 0.690 | 0.215 |
| 6 | Income Shock to PE σ_p | 0.069 | 0.012 |
| 7 | Dependence of <i>z</i> on <i>h</i> γ_{hz} | 0.000 | 0.031 |
| 8 | Fixed Cost α^n | 0.028 | 0.302 |

Table 5: Initial Conditions for Model

Figure 5 presents the selected model fit moments for both black and white individuals. Broadly, the model does a good job of fitting the data. In particular, we fit self-employment rates well. We overpredict the paid employment rates for both whites and blacks. Entry and exit rates have a good fit as well. In terms of log SE income, we marginally underfit for both blacks and whites.

4.3 Counterfactuals

Using our estimates, we focus on the role of factors affecting self-employment and paidemployment. In each counterfactual presented, we replace the black value with that of white value and simulate the life-cycle profile for black individuals, assuming everything else is the same.



Figure 5: Model Fit for Whites and Blacks

Note: In subplots (a) and (c), 1, 2, and 3 refer to ages 26-35, 36-45 and 46-55. In subplots (b) and (d), Mean-1 refers to Mean SE Income for those individuals whose assets are above the median and Mean-2 refers to Mean SE Income for those individuals whose assets are above the 90th percentile.

Self-Employment Factors Figure 6 (a) presents the counterfactuals where we change parameters relating to self-employment. It is clear from the figure that changing θ and idea profitability distribution are two key factors in raising the self-employment rates of blacks. Raising θ from 0.064 (black) to 0.19 leads to a rise in self-employment from 6.9 percent to 15.6 percent. Similarly, improving the idea profitability distribution raises the black self-employment rate to 16.5 percent, 0.4 percentage points above that of whites. Both these factors play a role by increasing the self-employment income and thus, making self-employment more valuable.

Swapping the collateral constraints does not really play a major role as the constraints are already very relaxed and black wealth accumulation is significantly lower than that of whites. It only results in a 0.4 percentage point rise. On the other hand, factors which would help reduce the uncertainty in self-employment income leads to a rise in



Figure 6: Which Factors Help Bridge the Racial Gap in Self-Employment?

black self-employment rate to 9 percent - a 30 percent rise from the baseline. Similarly, changing the returns to self-employment through human capital helps in raising the black self-employment rate to 8.3 percent.

Movements such as #ShopBlack as well as National Black Business Month encourages demand for black-owned businesses. Mentoring has often shown to be a key factor in helping develop a business as well as in ensuring its profitability. In the last few years, accelerators have helped new entrepreneurs in providing mentoring from seasoned CEOs but also helped in securing funding. Initiatives like Black Business Accelerator by Amazon might help in providing these services to black entrepreneurs. Preventing discrimination in the loan market and building better relationships between the black community and banks could help with financing problems. While the wealth disparities between black and white men cannot be fixed quickly, any steps towards building wealth in the black community could improve the self-employment rate.

Paid-Employment Factors Figure 6 (b) presents the counterfactuals where we change parameters relating to paid-employment. It is clear that none of these changes are able

to push self-employment to the level of whites, and rather, some work contrary and lead to a further decline in self-employment rates. Reducing fixed cost works rather mechanically and helps in increasing self-employment to 9.4 percent - a 36 percent rise.

Contrary to what might have been expected, improving the distribution of human capital at age 25 leads to decline in self-employment from 6.9 percent to 0.8 percent. However, it leads to a large rise in paid employment - from a baseline of 85 percent to 94 percent. Changing the returns of paid employment to human capital also leads to a fall in self-employment and a rise in paid employment. These, too, can go a long way in bridging the racial wealth gap, and thus, self-employment gap.

5. Conclusion

White males are two-and-a-half times more likely to be entrepreneurs as compared to black males, and this gap begins at the start of their career and widens over their lifecycle. We write down a model of life cycle occupational choice in which individuals can opt for paid-employment, self-employment or not working. Starting from their initial levels of human capital and wealth, individuals make occupational choices to generate income, accumulating wealth and human capital along the way until retirement. Individuals are risk-averse, have non-pecuniary preferences for self-employment, and face a borrowing constraint.

From the estimates of the dynamic model, two key results stand out. First, raising the capital share of black businesses to the level of white businesses will bridge nearly all of the racial gap in self-employment. While this is easier said than done, it provides an area for policymakers to focus on. Second, raising human capital leads to a rise in paid-employment rather than self-employment in the short run. However, this could lead to accumulation of wealth and higher social mobility and the next black generation could have a higher number of entrepreneurs.

The exploration of the economic mechanisms behind the black-white entrepreneurship gap is a first step in providing a roadmap for policymakers to close this gap. There are many ways in which race impacts the decision and ability to start a business and changing some of them could increase the level of black entrepreneurship. Although these changes are hard to implement, any initiation in this direction will help encourage black entrepreneurs and can have far-reaching consequences on inequality, social mobility, job creation and economic output.

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