What makes a successful entrepreneur? The effects of elite colleges and intergenerational transfers

Naijia Guo* Charles Ka Yui Leung†‡

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Abstract

This paper studies the effect of elite colleges and intergenerational transfers on entrepreneurial entrance and performance. The data from the Panel Study of Income Dynamics exhibits a positive relationship between elite college enrollment and successful entrepreneurship (owning an incorporated business). We then build a life-cycle model with different education choices and career paths, together with intergenerational ability and monetary transfers. Our estimation shows that entrepreneur premium is positive, and the premium of incorporated business owners is higher than that of unincorporated business owners. The elite college premium is negative, suggesting that the consumption value of elite college plays an important role. Compared with non-elite colleges, elite colleges have a comparative advantage in enhancing entrepreneur human capital, but not worker human capital. Our counterfactual experiments suggest that elite college leads to more successful entrepreneurs, and intergenerational transfer reduces the numbers of elite college students and successful entrepreneurs.

JEL Classification: D15, I20, J24

Keywords: entrepreneurship, elite college, intergenerational transfer.

*The Chinese University of Hong Kong. Email: guonaijia@cuhk.edu.hk.

†City University of Hong Kong. Email: kyc.leung@cityu.edu.hk.

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1 Introduction

Education and entrepreneurship are two major drivers of economic development, a fact that policy-makers are well aware of.[1] For instance, President Barack Obama has said that "the countries who out-educate us today will out-compete us tomorrow" (Obama, 2009). Regarding entrepreneurship, Janet Yellen, former Chair of the Board of Governors of the Federal Reserve System, has stated that "entrepreneurship is a fundamental strength of the American economy, and owning your own business or working for yourself can offer income, a means of building wealth, and, sometimes, greater flexibility for balancing job and family commitments" (Yellen, 2017). At the same time, two empirical "puzzles" in economics, the "elite college premium puzzle" (ECPP) and the "entrepreneurship premium puzzle" (EPP), seem to contradict the conventional wisdom on education and entrepreneurship. The discussion on ECPP goes back to Dale and Krueger (2002), who argue that elite college graduates, who paid higher tuition, earn roughly the same as those who graduated from ordinary colleges,[2] after controlling for the selection effect (people with higher abilities have higher chances of attending elite colleges), suggesting that the "elite college premium" is non-positive. The findings of Dale and Krueger (2002) inspires a lot of discussion in the literature (see, for example, Black and Smith, 2004, 2006, Dale and Krueger, 2014, and Hoxby, 2009).[3] The discussion on the EPP goes back to Hamilton (2000) and Moskowitz and Vissing-Jørgensen (2002), who argue that the average return to equity in privately held companies is not higher than the market return of publicly traded equity. In other words, many entrepreneurs who invest in a single private company bear more risk but do not earn higher returns, indicating that the "entrepreneurial premium" is not positive. Many subsequent studies discuss the entrepreneurial premium and find different results (see, for example, Hall and Woodward, 2010 and Kartashova, 2014).[4]

This paper studies the effect of elite college and intergenerational transfers on entrepreneurial entrance and performance and contributes to the ECPP and EPP literatures in two ways. First, we analyze whether elite colleges are more capable than ordinary colleges at equipping economic agents to be successful entrepreneurs, in addition to any effect attending such colleges

[1] The literature on how education and entrepreneurship impact the economy is too large to be reviewed here. See, for instance, Buera et al. (2015), Hanushek and Woessmann (2015, 2016), Quadrini (2009), and the references therein.

[2] Throughout this paper, the term "ordinary college" and "non-elite college" are used interchangeably.

[3] Black and Smith (2004) adopt the method of matching and find that the often-used linear specification may lead to biased results. Black and Smith (2006) compare four different econometric methods and find that the effect of college quality is likely to be under-estimated by the literature. Hoxby (2009) shows that elite colleges have become even more selective. At the same time, with their resources, these colleges enable their students to make massive human capital investments and to be more competitive. Dale and Krueger (2014) extend their earlier work by examining returns to college for a more recent cohort and over a longer time horizon for the older cohort. They argue that college effects on wage mainly concentrate in some sub-groups, such as African American and Hispanic students.

[4] Hall and Woodward (2010) find that almost three-quarters of venture-backed entrepreneurs receive nothing at firm exit, while few receive more than a billion dollars, suggesting that the distribution of entrepreneur return is very skewed. See also Greenwood et al. (2018) on the return of venture-backed entrepreneurs. Kartashova (2014) finds that the private entrepreneurial premium is positive when data from more recent years are included.

has on employee earnings. Because many empirical studies of ECPP focus on employees only, the effect of elite college on entrepreneurial entrance and performance is overlooked. By modeling intergenerational ability and monetary transfers together with education choice, our model captures the selection effect and identifies the value-added of elite colleges on the selection into entrepreneurs and entrepreneurial performance. Second, based on the observation that entrepreneurs are diverse, we distinguish between incorporated and unincorporated business owners. Levine and Rubinstein (2016) observe that incorporated entrepreneurs and unincorporated entrepreneurs are very different in the amount of education they receive and the level of income they receive before becoming entrepreneurs. Their findings help to explain the EPP; incorporated entrepreneurs earn more than salaried employees while unincorporated entrepreneurs earn less and there are more unincorporated than incorporated entrepreneurs. In this paper, successful entrepreneurs are defined as incorporated business owners. By modeling individuals career choice over the life cycle, we re-evaluate the EPP and compare it between incorporated and unincorporated entrepreneurs.

In the empirical analysis, we first use data from the Panel Study of Income Dynamics (PSID) to establish some stylized facts related to educational choice, career choice, income dynamics, and intergenerational transmission. We show that elite college graduates are more likely to be incorporated entrepreneurs and receive higher entrepreneur income compared with non-elite college graduates and high school graduates. However, this reduced form correlation does not imply that going to an elite college increases the likelihood of being a successful entrepreneur, as youth with more ability or from richer families are more likely to enroll in elite colleges and to be successful entrepreneurs. Therefore, we need a model with intergenerational transfers to disentangle different effects. We develop an overlapping generations model in which economic agents self-select into different possible education and career paths. Individuals receive an ability transfer (worker ability and entrepreneur ability) and a monetary transfer at age 20 from their parents and choose between three levels of schooling: high school, non-elite college, and elite college. Different types of schools have different effects on worker and entrepreneur human capital. They also have different tuition fees, financial aid, and consumption values. After school, individuals choose between three types of careers: employee, unincorporated business owner, and incorporated business owner. Not only are agents allowed to select the entrepreneur career path at any time after school, they can also switch back to being an employee after being an entrepreneur. Career choice is affected by an individual's worker and entrepreneur ability endowments, education, wealth, and consumption values. The two types of entrepreneurship require different levels of human capital, have different technologies, investment risks, entry costs, and consumption values, and are both subject to borrowing constraints. We use the simulated method of moments (SMM) to structurally estimate our model. Using the estimated parameter values, we conduct a series of counterfactual experiments to quantify the relative importance of different channels and provide insight into the implications of different policies to encourage more incorporated entrepreneurs.

Our simple life-cycle model is capable of matching education choices, career choices, income dynamics, career transitions, and intergenerational transfers. Our estimated elite college premium, defined as the difference between the discounted present value (DPV) of income (including tuition) at age 20 for an individual attending an elite college versus the DPV of income if the individual attended an ordinary college, is negative. Thus, the "consumption value" of elite college is needed to explain the fact that elite colleges recruit a significant number of students while charging much higher tuitions. The entrepreneur premium, defined as the difference between the DPV of income for an entrepreneur versus the DPV of income if the individual became an employee, is positive and the entrepreneur premium for incorporated business owners is much higher than for unincorporated business owners. In addition, we find that elite colleges have a comparative advantage in enhancing entrepreneur human capital but no comparative advantage in increasing worker human capital compared with non-elite colleges. Hence, with significantly positive entrepreneur premiums, part of the expensive tuitions elite colleges charge can be justified as a form of "return to entrepreneurship." Even if elite colleges do not provide an earning premium for employees, they still attract those with high entrepreneur ability because the education elite colleges provide increases the likelihood of becoming a successful entrepreneur.

Our counterfactual experiments generate some interesting findings. We find that the abolishment of elite colleges leads to a reduction in the number of incorporated business owners by 6%, suggesting that elite colleges significantly impact successful entrepreneurship. We consider two methods of removing intergenerational transfers. In the first case, inter vivos gifts from parents are re-shuffled in a random manner among young agents. In the second case, gifts are pooled together and redistributed equally among young agents. Attendance at elite colleges increases by 10% and 3% and the number of incorporated entrepreneurs increases by 3% and 11% in the first and second scenarios, respectively. Both regimes suggest that removing the correlation between ability and wealth leads to more elite college graduates and successful entrepreneurs. We also consider an increase in the leverage ratio of entrepreneurs and find that it not only encourages more people to become entrepreneurs but also motivates more people to enroll in elite colleges. These results suggest that entrepreneurship borrowing constraints are an important reason preventing individuals from going to elite colleges. Potential entrepreneurs may not want to pay high tuitions to go to elite college because they cannot borrow to finance their businesses before they pay back their student loans. Last, policy experiments suggest that providing a direct subsidy to incorporated entrepreneurs can successfully attract more incorporated entrepreneurs, increase social welfare, and reduce the income Gini coefficient (i.e., reduce income inequality). Subsidizing elite college students can also indirectly increase the number of incorporated entrepreneurs and social welfare, though its effect on the income Gini coefficient is not monotonic.

This paper proceeds as follows. The next section connects our work to the literature. The formal model is presented in Section 3, followed by an introduction to the data used for es-

timation in Section 4. We explain the identification and estimation strategies in Section 5. Estimation results and counterfactual experiment results are presented in Sections 6 and 7, respectively. Section 8 concludes.

2 Literature Review

This paper builds on the insights of many authors. Because the literatures on entrepreneurs and education have been surveyed by a number of authors (Astebro et al., 2014, Kerr et al., 2018, Oreopoulos and Salvanes, 2011, Oreopoulos and Petronijevic, 2013, Van der Sluis et al., 2008, etc), we will highlight only a few contributions. The earlier literature on entrepreneurship focuses on which characteristics of an individual, including income and education, affect the probability the individual becomes an entrepreneur (Blanchflower and Oswald, 1998, Dunn and Holtz-Eakin, 2000, Evans and Jovanovic, 1989, Evans and Leighton, 1989, etc). Using tax return data, Holtz-Eakin et al. (1994) argue that receiving a larger inheritance increases the chance of survival as an entrepreneur. However, Hurst and Lusardi (2004) find the relationship between wealth and entrepreneurship is almost flat except for the top 5% of the wealth distribution, for whom wealth and entrepreneurship are positively correlated. Our model incorporates a saving decision together with borrowing constraints and allows wealth to affect the entrepreneurial decision. We assume agents initial wealth at age 20 comes from a parental altruistic monetary transfer.

There are mixed findings on the effect of education on entrepreneurship. Some studies do not find a significant effect (e.g., Dunn and Holtz-Eakin, 2000, Evans and Jovanovic, 1989), while others do find a significant impact (e.g., Parker and Van Praag, 2006, Samaniego and Sun, 2016). Blanchflower (2000) examines the OECD data and finds "evidence that self-employment is more prevalent among groups at the two ends of the education distribution and especially so for the least educated." This is consistent with the idea that several competing factors, such as the opportunity cost and financial constraints, affect the entrepreneurship decision. We embed these factors in our structural model and distinguish the effect of elite colleges from other factors.

Another strand of the literature tries to understand how young agents inherit their entrepreneurship skills from parents. Nicolaou and Shane (2010) use data on identical (MZ) and fraternal (DZ) twins in the United States to confirm the existence of a genetic component to the intergenerational transfer of entrepreneurship. Lindquist et al. (2015) also confirm the existence of an intergenerational entrepreneurship linkage using Swedish adoption data. In addition, they find that post-birth factors account for more than the pre-birth factors by comparing individuals living with adopted parents to those living with their biological parents. Using Norwegian data, Hvide and Oyer (2018) find that most male entrepreneurs start a business in the same or a closely related industry as their fathers. We allow for the intergenerational transfer of entrepreneur ability and wealth to capture these facts.

Recent studies also find that "psychological gains" or "consumption value" can explain

the decision to become an entrepreneur (e.g., Benz and Frey, 2008, Coad and Binder, 2014, Hetschko, 2016, Hyytinen et al., 2013, Sevä et al., 2016). We account for this by including a consumption value of self-employment in the model and then estimate that value for both incorporated and non-incorporated entrepreneurs.

This paper contributes to an emerging literature studying entrepreneurship in a dynamic equilibrium setting. Bassetto et al. (2015) and Cagetti and De Nardi (2006, 2009) build a two-stage economy and find that introducing entrepreneurs into the model significantly helps the model to match macro stylized facts such as the capital-output ratio, the percentage of entrepreneurs in the labor force, and the income distribution of the U.S. In the life-cycle model built by De Nardi and Yang (2014), economic agents choose whether to be entrepreneurs and whether to leave a bequest. Their model can produce the skewed income distribution and the bequest distribution observed in the data. Samaniego and Sun (2016) introduce endogenous education choice into the Cagetti and De Nardi framework. They find that the higher labor earnings of college graduates allow them to mitigate credit constraints and become entrepreneurs. They compare the welfare implications of different counterfactuals, such as an education subsidy and a relaxation of the credit constraints of entrepreneurs.

There are also models which do not have a life-cycle structure. Kwark and Ma (2018) build a dynamic general equilibrium with both aggregate and idiosyncratic shocks and a discrete choice of entrepreneurship versus employment in each period. Their model can explain the differential cyclicality of the income shares of different income groups. Choi (2017) develops a dynamic occupation choice model as in Vereshchagina and Hopenhayn (2009) that allows agents to choose between being a paid worker or an entrepreneur every period.[5] He shows that entrepreneurs with higher outside options as paid workers tend to take more business risks and thus exhibit higher firm exit rates, more growth dispersion, and faster growth conditional on survival.

This paper differs from the literature in the following ways. First, we distinguish between incorporated and unincorporated businesses. These two types of businesses have different technologies and risks and require different levels of human capital and entry costs. Differentiating these two types of entrepreneurs helps us better understand agents career decision. Second, we allow agents to choose from three education choices (high school, ordinary college, and elite college), subject to the abilities and wealth they inherited from their parents. The model helps to disentangle the effect of college education on human capital accumulation from the selection effect. Thus, our model endogenizes the distribution of human capital and naturally generates the intergenerational persistence observed in practice. Last, we structurally estimate the model to gain a quantitative sense of how unobserved variables, including worker ability, entrepreneur ability, and consumption value, affect education and career decisions. Our counterfactual experiments provide better estimates of ECPP and EPP by allowing for selection in

[5]Vereshchagina and Hopenhayn (2009) develop a theory of endogenous entrepreneurial risk-taking that explains why self-financed entrepreneurs may find it optimal to invest in risky projects offering no risk premium.

unobservables, and we are the first study to jointly analyze these two puzzles.

3 Model

3.1 Model Setup

Economic environment: The economy is populated by single-individual dynasties, where each individual lives for at least 65 years and at most 100 years. Each period is 5 years. For the first four periods, or 20 years, of his life, an individual is part of his parent's household and does not make any economic decisions. At age 20, a young individual moves out of his parent's house and forms his own household. At age 30, he has a child.

At age 20, a young adult decides whether to enroll in college and if so, what type of college to attend. There are three levels of education attainment, high school, non-elite college, and elite college, which are denoted $e \in \{hs, nc, ec\}$, respectively.[6]

Individuals not in school choose between being an employee, owning a unincorporated business, or owning an incorporated business, which are denoted $j \in \{em, ub, ib\}$, respectively. All individuals decide how much to consume (c) and save (k). In addition, entrepreneurs (anyone who owns a business) also choose an investment level k_j. Workers must retire at 65, but entrepreneurs can work after 65 if they owned a business in the previous period.

Individuals are altruistic towards their offspring. A child's expected lifetime utility enters the parents value function with weight $\omega \in [0, 1]$. When a child leaves home and begins his own household, the parent has the option of giving him a one-time gift of liquid assets, denoted R. This can be motivated by the observation that many parents help their children pay for college or finance their businesses.[7]

Human capital: Each person is born with two types of ability ($A = \{A_w, A_r\}$). Worker ability (A_w) is the capacity to produce income out of labor. Entrepreneurial ability (A_r) is the capacity to invest capital productively. The initial ability of a child is broadly defined to include things like genetics, family culture, motivation, and knowledge acquired from parents. We allow the two abilities, A_r and A_w, to be correlated. Abilities are assumed to be log normally distributed and imperfectly transferred from parent to child according to an AR(1) process:[8]

$$\log A_w^c = \theta_w \log A_w^p + \psi_w \tag{1}$$

$$\log A_r^c = \theta_r \log A_r^p + \psi_r \tag{2}$$

[6]We focus on whether individuals graduate from college, instead of college enrollment and dropout decisions. College dropouts are treated as high school graduates in our model. We assume each period is 5 years because it takes four to five years to get a college degree.

[7]Empirical studies confirm the existence of inter vivos transfers for college and other investment. See Hurd et al. (2011) and Haider and McGarry (2012).

[8]There is increasing evidence that "worker ability" and "entrepreneurial ability" are indeed different and transferred between generations (see, for example, Kerr et al., 2018, Hartog et al., 2010, and Schoon and Duckworth, 2012).

where $\psi_w \sim N(0, (\sigma_w^a)^2)$ and $\psi_r \sim N(0, (\sigma_r^a)^2)$. The variance of worker ability is $\sigma_w^2 = \frac{(\sigma_w^a)^2}{1-\theta_w^2}$. The variance of entrepreneur ability is $\sigma_r^2 = \frac{(\sigma_r^a)^2}{1-\theta_r^2}$. The correlation between worker ability and entrepreneur ability is ρ.

The human capital of an employee, h_w, can be increased by attending college and through learning by doing. How much worker human capital a person has depends on his worker ability, A_w, education, e, and potential experience x:

$$\log h_w = \log A_w + \mu_e^w + \gamma_1 x + \gamma_2 x^2 \tag{3}$$

where μ_e^w is the worker human capital gain through education, with the human capital gain from high school μ_{hs}^w normalized to be zero. Potential experience x is determined by age and whether a person attended college.

The human capital of an entrepreneur, h_r, can also be increased by attending college. How much entrepreneur human capital a person has depends on his entrepreneur ability, A_r, and education, e:[9]

$$\log h_r = \log A_r + \mu_e^r \tag{4}$$

where μ_e^r is the entrepreneur human capital gain through education, with the human capital gain from high school μ_{hs}^r again normalized to be zero.

Elite and non-elite colleges have different effects on both types of human capital. Moreover, elite and non-elite colleges also charge different tuitions and provide different levels of financial aid. Net tuition is

$$T_e - f_e(k^p, A_w) \quad \text{for } e = nc, ec$$

where T_e is college tuition and f_e is financial aid, which is a function of education type e, family assets k^p, and worker ability A_w.[10] We consider both need-based and merit-based financial aid. As will be discussed in the Leverage section, we assume that there are no borrowing constraints for college students. In addition, we do not impose any ability requirement for elite college attendance; our estimation results show that high ability individuals self-select into elite colleges.

[9] We assume away learning by doing for entrepreneur human capital because we already have the diminishing return to investment ν that serves a similar role to capture the hump shape in the life-cycle income profile. The empirical evidence for the entrepreneur experience-performance correlation is controversial. Toft-Kehler et al. (2014) and others propose that such correlation depends on the type of entrepreneur. For more details, see Toft-Kehler et al. (2014) and the references therein.

[10] We assume that colleges have perfect information on students worker abilities but do not give financial aid based on entrepreneur abilities because most previous studies find that financial aid is a function of SAT scores or IQ test scores, which are empirical counterparts of worker ability.

Technology: There are two sectors of production, one populated by entrepreneurs and one by non-entrepreneurial firms. The production function of the non-entrepreneurial sector is

$$F_{em}(K, L) = P_{em} K_{em}^{\alpha} L_{em}^{1-\alpha} \tag{5}$$

where P_{em} is the production technology of the non-entrepreneurial sector and K_{em} and L_{em} are the total capital and labor inputs in the non-entrepreneurial sector.

Employees' earnings are defined as

$$I_{em} = w h_w e^{\epsilon_{em}} \tag{6}$$

where w is the wage rate, h_w is worker human capital, and $\epsilon_{em} \sim N(0, \sigma_{em}^2)$ is an idiosyncratic productivity shock unobserved by individuals before they make their career choice.

The same economic agent can also choose to work as an entrepreneur. The entrepreneurial sector is divided into unincorporated businesses and incorporated businesses.

An unincorporated business owner investing k_{ub} has income

$$I_{ub} = P_{ub} h_r e^{\epsilon_{ub}} k_{ub}^{v} \tag{7}$$

where P_{ub} is the unincorporated business technology, h_r is entrepreneur human capital, and $\epsilon_{ub} \sim N(0, \sigma_{ub})$ is an idiosyncratic productivity shock unobserved by individuals before they make their career choice. This allows us to capture the fact that business investment is risky. We assume that both types of businesses are one-person firms which only use the business owner's human capital and physical capital for investment.[11]

The income of an incorporated business owner who invests k_{ib} is

$$\begin{aligned} I_{ib} &= P_{ib} h_i e^{\epsilon_{ib}} k_{ib}^{v} - C_{ib} 1\{j_{t-1} \neq ib\} \\ \text{where } \log h_i &= r \log h_w + \log h_r \end{aligned} \tag{8}$$

where $\epsilon_{ib} \sim N(0, \sigma_{ib})$.

There are a few differences between unincorporated and incorporated businesses. First, incorporated businesses use a combination of worker human capital and entrepreneur human capital. This is to capture the fact that incorporated business owners engage in activities demanding a high degree of nonroutine cognitive skills while unincorporated business owners perform tasks demanding relatively strong manual skills, as shown in Levine and Rubinstein (2016). This functional form assumption on h_i allows us to generate the prediction that incorporated business owners tend to be successful salaried employees before becoming incorporated while unincorporated business owners tend to earn less as salaried employees, consistent with

[11] According to Kochhar et al. (2015), only 24% of self-employed individuals have at least one paid employee in 2014.

the findings of Levine and Rubinstein (2016).

The second difference between the two types of businesses is that there exists a fixed cost of opening an incorporated business, C_{ib}. An incorporated business owner needs to pay the fixed cost if his previous period career type (j_{t-1}) is not incorporated. This is to capture the fact that there are direct costs of incorporation, such as annual fees and the preparation of more elaborate financial statements, and indirect agency costs associated with the separation of ownership and control. In addition, we allow the two types of businesses to have different technologies P_j and productivity shocks ϵ_j, so incorporated businesses can generate higher return but are riskier. Given these assumptions, the model predicts that when worker human capital and savings are above a certain cutoff, incorporated businesses become more attractive than unincorporated ones.

Leverage: Entrepreneurs can borrow up to a λ proportion of their assets k:

$$(k_j - k) \leq \lambda k \quad \text{for} \quad j \in \{ub, ib\} \tag{9}$$

where λ is the leverage ratio, $\lambda \in [0, 1]$. This follows a simple collateral constraint as in Kiyotaki and Moore (1997). We assume that there is no borrowing constraint for college students because many studies have found that the borrowing constraint is not binding for college students (see, for example, Cameron and Taber, 2004). However, if an individual has outstanding loans at the beginning of the period (either student or entrepreneur loans), he is not allowed to borrow again before paying back all his loans. Therefore, those who take out a student loan to go to college cannot borrow again to finance their business before they pay back their student loan. This provides a disincentive for students to go to an elite college if they want to become an entrepreneur.

Preferences: Each individual has utility function

$$u(c, d) = \frac{c^{1-\sigma}}{1-\sigma} + b_{ub}1\{d = ub\} + b_{ib}1\{d = ib\} \tag{10}$$

$$+ b_{nc}1\{d = nc\} + b_{ec}1\{d = ec\} \tag{11}$$

where $b_d \sim N(0, (\sigma_d^c)^2), d \in \{ub, ib, nc, ec\}$ are shocks on the consumption value of entrepreneurship and college, respectively.[12] Households discount the future at rate β.

A household's lifetime utility, U, is given by

$$U = \sum_{t=1}^{17} \beta^{t-1} \zeta(t) u(t) + \beta^6 \omega U^c \tag{12}$$

[12]There are empirical studies which support the view that there are consumption values to college and entrepreneurship (see, for example Benz and Frey, 2008, Astebro et al., 2014, Jacob et al., 2018, and Gong et al., 2018).

There are total 17 periods (age 20 to 100, one period is 5 years). The child's utility U^c enters parent's utility when parents are 50 years old (period 7) with weight ω. $\zeta(t)$ is the survival rate and we assume $\zeta_j = 1$ before age 65, and $\zeta_j < 1$ after 65.

3.2 The individual problem in recursive form

Before introducing the mathematical formulation of our model, it would be instructive to provide a descriptive overview. Agents go through different stages of life, starting at age 20. Age 20 is the schooling stage, when agents make their education choice, i.e. whether to attend an elite college, a non-elite college, or not attend any college at all. Given their educational achievement, agents are in their working stage between ages 25 and 65. On top of the standard consumption-saving decisions, they choose between different career paths: employee, unincorporated business owner, or incorporated business owner. At age 50, agents can make a one-time transfer to their offspring. Starting age 65, employees retire and face a chance of death. Conditional on surviving, business owners, whether incorporated or not, choose between operating their business and retirement after 65.

Retirement stage We now introduce some notation. W represents the expected life-time utility under different career choices: employee ($j = em$), unincorporated business owner ($j = ub$), and incorporated business owner ($j = ib$). Employees older than age 65 retire and solve how much to consume, c, and save (next period's capital) k'. State variables are age t, education type e, ability $A = \{A_w, A_r\}$, capital k, last period career type j_{-1}, and consumption shocks for unincorporated businesses b_{ub} and incorporated businesses b_{ib}.

The value of being a retired employee is

$$\begin{aligned} W_{em}(\Omega) &= \max_{c,k'} u(c, em) + \beta\zeta(t)EV(\Omega') \\ s.t. \quad & c + k' = k(1 + r) + p(e), \quad c > 0 \end{aligned} \tag{13}$$

where $p(e)$ is the pension received by retired employees, assumed to be a ϕ fraction of the employees average earnings before retirement. The capital rental rate is $r + \delta$, where r is the interest rate and δ is the capital depreciation rate. Therefore, the net capital rental rate is r. Next period state variables are $\Omega' = \{t + 1, e, A_w, A_r, k', em, b'_{ub}, b'_{ib}\}$. The expectation is over b'_{ub} and b'_{ib}.

The value function for an unincorporated business owner is

$$\begin{aligned} W_{ub}(\Omega, \epsilon_{ub}) &= \max_{c,k',k_{ub}} u(c, ub) + \beta\zeta(t)EV(\Omega') \\ s.t. \quad & c + k' = (1 - \delta)k_{ub} + P_{ub}h_r e^{\epsilon_{ub}} k_{ub}^{v} - (1 + r)(k_{ub} - k) \\ & c > 0, \quad (k_{ub} - k) \leq \lambda k \end{aligned} \tag{14}$$

where $\Omega' = \{t + 1, e, A_w, A_r, k', ub, b'_{ub}, b'_{ib}\}$.

The value function for an incorporated business owner is

$$
\begin{aligned}
W_{ib}(\Omega, \epsilon_{ib}) = & \max_{c,k',k_{ib}} u(c, ib) + \beta\zeta(t) EV(\Omega') \\
s.t. \quad & c + k' = (1-\delta)k_{ib} + P_{ib} h_i e^{\epsilon_{ib}} k_{ib}^{v} - C_{ib} 1\{j_{-1} \neq ib\} - (1+r)(k_{ib} - k) \\
& c > 0, \quad (k_{ib} - k) \leq \lambda k
\end{aligned} \tag{15}
$$

where $\Omega' = \{t+1, e, A_w, A_r, k', ib, b'_{ub}, b'_{ib}\}$.

When agents reach retirement age, they are only allowed to choose their career paths if they were entrepreneurs in the last period; otherwise, they must retire:

$$
V(\Omega) = \begin{cases} \max\{W_{em}(\Omega), EW_{ub}(\Omega, \epsilon_{ub}), EW_{ib}(\Omega, \epsilon_{ib})\} & \text{if } j_{-1} = ub, ib \\ W_{em}(\Omega) & \text{if } j_{-1} = em \end{cases}
$$

The expectations are over ϵ_{ub} and ϵ_{ib} because individuals do not observe productivity shocks when they make career choices.

Working stage without intergenerational transfers During the working stage with no intergenerational transfers, the maximization problem of entrepreneurs is the same as it is in the stage after age 65; for employees, the forward-looking maximization problem in the working stage is different from (13), as employees are paid a salary during these stages. In addition, the salary changes over time, as employees accumulate experience during these periods and receive different productivity shocks ϵ_{em} each period. Formally, it is

$$
\begin{aligned}
W_{em}(\Omega, \epsilon_{em}) = & \max_{c,k'} u(c, em) + \beta EV(\Omega') \\
\text{s.t.} \quad & c + k' = k(1+r) + w h_w e^{\epsilon_{em}}, \quad c > 0
\end{aligned} \tag{16}
$$

where $\Omega' = \{t+1, e, A_w, A_r, k', em, b'_{ub}, b'_{ib}\}$.

Agents can freely change their career paths at the beginning of each period, but they do not observe productivity shocks $\epsilon_{em}, \epsilon_{ub}$, and ϵ_{ib}:

$$
V(\Omega) = \max\{EW_{em}(\Omega, \epsilon_{em}), EW_{ub}(\Omega, \epsilon_{ub}), EW_{ib}(\Omega, \epsilon_{ib})\} \tag{17}
$$

Working stage with intergenerational transfer At age 50, parents can give a one-time transfer to their offspring. The value function of an "employee-parent" becomes

$$
\begin{aligned}
W_{em}(\Omega, \epsilon_{em}) = & \max_{c,k',R} u(c, em) + \beta EV(\Omega') + \omega EJ(\Phi | A_w, A_r) \\
s.t. \quad & c + k' + R = k(1+r) + w h_w e^{\epsilon_{em}}, \quad c > 0
\end{aligned} \tag{18}
$$

where $J(.)$ is the value function of the child and $\Phi = \{\tilde{A}_w, \tilde{A}_r, R, k', b_{nc}, b_{ec}\}$. The expectation is over the child's ability, $\tilde{A}_w$ and $\tilde{A}_r$, and shocks to the consumption value of college, b_{nc} and

b_{ec}. The child's abilities are correlated with the parent's abilities but are not observed by parents at the time of transfer.

Similarly, the value function of an "unincorporated-entrepreneur-parent" at age 50 is

$$\begin{aligned} W_{ub}(\Omega, \epsilon_{ub}) &= \max_{c,k',k_{ub},R} u(c, ub) + \beta V(\Omega') + \omega EJ(\Phi|A_w, A_r) \\ s.t. \quad c + k' + R &= (1-\delta)k_{ub} + P_{ub}h_r e^{\epsilon_{ub}} k_{ub}^v - (1+r)(k_{ub} - k) \\ c &> 0, \quad (k_{ub} - k) \leq \lambda k \end{aligned} \tag{19}$$

The value function of an "incorporated-entrepreneur-parent" at age 50 is

$$\begin{aligned} W_{ib}(\Omega, \epsilon_{ib}) &= \max_{c,k',k_{ib},R} u(c, ib) + \beta V(\Omega') + \omega EJ(\Phi|A_w, A_r) \\ s.t. \quad c + k' + R &= (1-\delta)k_{ib} + P_{ib}h_i e^{\epsilon_{ib}} k_{ib}^v - C_{ib}1\{j_{-1} \neq ib\} - (1+r)(k_{ib} - k) \\ c &> 0, \quad (k_{ib} - k) \leq \lambda k \end{aligned} \tag{20}$$

Schooling stage Now we define the value function of the offspring, $J(.)$. At age 20 ($t = 1$), an agent decides whether to attend an elite college, a non-elite college, or work:

$$J(\Phi) = \max\{H_{hs}(\Phi), H_{nc}(\Phi), H_{ec}(\Phi)\} \tag{21}$$

The value function of high school graduates who do not attend college is

$$H_{hs}(\Phi) = EV(1, hs, A_w, A_r, k, em, b_{ub}, b_{ib}) \tag{22}$$

where the expectation is over b_{ub} and b_{ib} because we assume individuals do not observe consumption shocks to career choices when they make their schooling decision.

The value functions of attending a non-elite or elite college are of the form

$$\begin{aligned} H_e(\Phi) &= \max_{c,k'} u(c, e) + \beta EV(\Omega') \quad \text{where } e \in \{nc, ec\} \\ s.t. \quad c + k' &= (1+r)(R - T_e + f_e(k^p, A_w)), \quad c > 0, \end{aligned} \tag{23}$$

where T_e is college tuition and f_e is financial aid. $\Omega' = \{2, e, A_w, A_r, k', em, b'_{ub}, b'_{ib}\}$.

3.3 Equilibrium

In equilibrium, there exists a wage w and an interest rate r in the non-entrepreneurial sector such that

- each agent's consumption, investment, capital use, education choice, and occupation choice are optimal,
- the capital market is clear (the total capital from all agents' savings equals the capital

demand from both the entrepreneurial and nonentrepreneurial sectors):

$$\int_{h\in S_{em}} k dh = \int_{h\in S_{ub}} b_{ub} dh + \int_{h\in S_{ib}} b_{ib} dh + K \tag{24}$$

where h is the index of household, and S_{em}, S_{ub} and S_{ib} are the sets of households who choose to be employees, unincorporated, and incorporated entrepreneurs, respectively. $b_j = k_j - k$, $j \in \{ub, ib\}$ denotes the amount of borrowing from entrepreneurs, and

- the labor market is clear (the total labor supply (in efficient labor units) from employees equals the labor demand from the nonentrepreneurial sector):

$$L = \int_{h\in S^w} h_w e^{\epsilon_w} dh \tag{25}$$

4 Data

4.1 Data source

Our main data source is the Panel Study of Income Dynamics (PSID), which is a longitudinal project that began in 1968 with a nationally representative sample of over 18,000 individuals living in 5,000 families in the United States. The PSID tracks these individuals and their descendants, even after they form new families; therefore, we can track the education and life-cycle career choices of parents and children. We restrict our sample to white males aged 25-60 with a father identified in the PSID. This results in 8,058 individuals with 305,296 individual-year observations. We also obtain restricted access data on school identifiers, which can be linked to the Integrated Post-secondary Education Data System (IPEDS), providing rich information on the quality of the colleges that respondents attended.

We also use the National Longitudinal Survey of Youth 1997 (NLSY97) to obtain the initial conditions of the cohort born in the 1980s. The NLSY97 is a longitudinal project started in 1997 that follows around 9,000 American youth born between 1980 and 1984. The PSID does not have information on ability, while the NLSY97 has CAT-ASVAB scores as a measure of cognitive ability. CAT-ASVAB is an automated computerized test developed by the U.S. Military to measure overall aptitude. The test is composed of 12 sections, including sections that capture verbal reasoning, mathematical reasoning, and the ability to conceptualize scientific concepts. We use it to proxy for worker ability. In addition, the NLSY97 also asks about child's own wealth and family wealth at age 20. Therefore, the NLSY97 provides information on the joint distribution of worker ability, own wealth, and family wealth at age 20.

4.2 Summary Statistics

Entrepreneurs are defined as those who own a business.[13] As shown in Table 1, 18.2% of our sample are entrepreneurs. Among them, 21% own an incorporated business and 69% own an unincorporated business. Among incorporated business owners, 17% of them work in the construction industry, followed by the retail trade (13%) and financial services (11%).[14] The top 3 industries among unincorporated business owners are the same (19%, 14%, and 10%, respectively).

Table 1 shows that employees and entrepreneurs are quite different in their age, education, and income level.[15] Employees are younger, have fewer years of schooling, and are less likely to be college graduates. Furthermore, employees have lower mean, median, and variance in their income. The two types of entrepreneurs have very different socioeconomic status. The education level of those who own an unincorporated business is similar to the education level of employees and their mean and median income are even lower than employees' mean and median income. By contrast, an incorporated business owner has 0.9 more years of schooling on average, is 17% more likely to be a college graduate, and earns 74% more income than an unincorporated business owner.

From the summary statistics, we see significant differences in social economic status between employees and entrepreneurs, mainly driven by incorporated business owners, while unincorporated business owners are very similar to employees. These findings are consistent with Levine and Rubinstein (2016). This suggests that it is important to distinguish these two types of entrepreneurs and we define "successful" entrepreneurs as those who own an incorporated business.

To define elite colleges, we follow Black and Smith (2006) in using factor analysis to construct a college quality index:

$$\begin{aligned}\text{Index} = {} & 0.096 * \text{faculty-student ratio} + 0.137 * \text{rejection rate} + 0.257 * \text{retention rate} \\ & + 0.245 * \text{faculty salary (in millions)} + 0.385 * \text{mean of reading and math SAT (in 100s)}\end{aligned}$$

Colleges and universities ranked in the top 100 are defined as elite.[16] Elite colleges include 15 flagship public universities. Therefore, not every state has an elite flagship public university based on our definition. Students living in states without a flagship public university must pay out-of-state tuition (which is much higher than in-state tuition) to go to an elite flagship public university. 41% of students surveyed in the PSID attending an elite flagship public university pay out-of-state tuition. Table 2 shows the list of elite colleges. Table 3 provides summary

[13] In the PSID data, 86% of individuals who own a business spent some time on their business, suggesting that the majority of them still play a managing role in their business.

[14] Medical, dental, and health services only account for 6%.

[15] Income includes labor income and business income for employees and entrepreneurs.

[16] We also cross-check our ranking with other rankings, such as the U.S. News Top 100 Colleges. Our list is comparable to theirs.

statistics of elite and non-elite colleges. Elite colleges have higher faculty-student ratios, higher rejection rates, higher retention rates, higher faculty salaries, and higher SAT scores. They also charge higher in-state and out-of-state tuitions. We define an individual as having "elite college (ordinary college) education if he/she graduates from an elite college (ordinary college), rather than attending an elite college (ordinary college). Therefore, education is defined by whether the individual receives a college degree.[17]

Table 11 shows the intergenerational relationships in education and career choices. The upper panel shows that individuals whose father with an elite college degree are 14.4 ppt more likely to graduate from an elite college degree compared with those whose father with a non-elite college degree and 23.0 ppt more likely than those whose father with a high school degree. Clearly, there exists a strong intergenerational correlation in education choice. The bottom panel shows a similar intergenerational persistency in career choice. If a father owns an unincorporated business, his son has a higher chance of also owning an unincorporated business. Similarly, a son whose father owned an incorporated business has the highest probability of owning an incorporated business, 9.5 percentage points (ppt) higher than those whose father owned an unincorporated business and 12.1 ppt higher than those with an employee father.

We run regressions to understand the relationship between elite college degree, career choice, and income. Table 4 shows that graduating from an elite college is associated with a 2.0 ppt higher chance of owning an incorporated business compared with high school graduates after controlling for father's education and career, while graduating from a non-elite college increases the likelihood by 1.7 ppt and graduating from graduate school has no significant effect. However, a college degree (elite or non-elite) has no effect on the likelihood of owning an unincorporated business. Table 5 shows that an elite college degree is associated with a higher income for employees, unincorporated business owners, and incorporated business owners, while a non-elite college degree is only associated with higher incomes for employees and unincorporated business owners.

One other possible channel through which elite colleges could generate an entrepreneur premium is through better access to graduate schools. Using the PSID, we find that the marginal impact of graduate school on an entrepreneur's income is much smaller than that of elite colleges, as shown in Table 4. This may be related to the fact that professional jobs (such as dentist, physician, accountant, or lawyer) account for less than 10% of entrepreneurs. Although we find that going to graduate school increases an entrepreneur's income, its impact on income is much smaller than that of elite colleges, as shown in Table 5. Hence, this paper focuses on the choice between elite and non-elite college attendance and abstracts away from graduate school attendance.

One caveat is that those with more ability or from richer families are more likely both to go to an elite college and to be successful entrepreneurs (both in terms of their chance of owning

[17]From now on, "elite/non-elite college attendance (go to an elite/non-elite college)" and "elite/non-elite college completion (receive an elite/non-elite college degree)" are used interchangeably.

an incorporated business and their income as an incorporated business owner) even without going to an elite college. As a result, the positive correlation between elite college attendance and successful entrepreneurship is subject to a selection problem. Hence, we need a model with education choice to identify the real effect of elite college attendance on human capital accumulation.

5 Identification and Estimation

We fix a few parameters in our model and estimate the rest of the parameters using the simulated method of moments (SMM). Table 6 shows the fixed parameters, including the discount rate, survival rate, utility function parameter, pension, budget constraint, college tuition, and college financial aid. The discount rate is set to 0.821 because each period is five years, which is equivalent to a 0.95 annual discount rate. The capital depreciation rate is assumed to be 0.266 for five years, which is equivalent to a 6% annual depreciation rate. The survival rate is less than one after age 65 and calibrated using survival data from the Health and Retirement Study in 2011; the details are shown in Table 7. We assume that a pension is 40% of average earnings before retirement and the utility function parameter σ is set to be 1.5, both of which follow Cagetti and De Nardi (2006).

For the budget constraint parameter, we follow Robb and Robinson (2014), who use the Kauffman Firm Survey[18] to characterize the capital availability of start-up firms. They show that the total equity of start-up firms accounts for 45% of their total capital, so we set our collateral constraint parameter λ to be 1.22.[19]

We calculate the average tuitions of elite and non-elite colleges using the IPEDS data. On average, elite colleges charge \$33,046 (in 2011 dollars) and non-elite colleges charge \$12,761. Unfortunately, the PSID does not have information on the financial aid received by respondents. Instead, we use the estimates of Fu (2014) to calibrate financial aid. Fu (2014) uses NLSY97 data to estimate the financial aid received by students at elite and non-elite colleges using a student's test scores and family wealth.[20] Our financial aid formula is

$$\begin{aligned}\text{Financial aid of non-elite college} &= 13901 - 32.5 * \text{family wealth in thousands} \\ &\quad - 7432 * \text{worker ability below 1/3} + 6875 * \text{worker ability above 2/3} \\ \text{Financial aid of elite college} &= 20224 - 32.5 * \text{family wealth in thousands} \\ &\quad - 7432 * \text{worker ability below 1/3} + 6875 * \text{worker ability above 2/3}.\end{aligned}$$

[18]The Kauffman Firm Survey is a longitudinal survey of new businesses in the United States. This survey collects annual information on 4,928 firms that started in 2004.

[19]Total equity includes owner equity, insider equity, and outsider equity and total debt includes owner debt, insider debt, and outsider debt. Total capital is the sum of total equity and total debt.

[20]School identifier is restricted access data in the NLSY97 and is available only to researchers within the U.S., so we have to use estimates from Fu (2014). Fu (2014) uses a slightly different definition of elite colleges from us. She defines the top 30 private universities, top 20 liberal art colleges, and top 30 public universities as elite. Our selection of top 100 elite colleges is based on Black and Smith (2006), but the difference between our list and Fu (2014)'s list is very small.

On average, elite colleges provide more generous financial aid than non-elite colleges. Students from poorer families and with higher worker abilities receive more financial aid.

Table 8 shows the parameters that remain to be estimated and the moments used to identify these parameters. We first discuss the identification of the ability distribution, return to education, and consumption shocks for different types of colleges.

First, given that we have panel data, we can track the same individual over time and calculate changes in their income when they stay in the same occupation and when they switch between being an employee and being an entrepreneur. The standard deviations of worker and entrepreneur abilities (σ_w and σ_r) are identified from the income correlation between two periods for individuals who are employees or entrepreneurs in both periods. If the dispersion of worker/entrepreneur ability is large relative to the dispersion of productivity shocks, a larger part of employee/entrepreneur income variation is driven by worker/entrepreneur ability variation and we will observe high income correlation between two adjacent periods for employees/entrepreneurs. The correlation between two types of ability (ρ) is identified from the income correlation between two periods for individuals who switch between being an employee and entrepreneurship. If ρ is large, we will observe that individuals who have high earnings as employees also have high incomes as entrepreneurs.

Once we recover the ability distribution, we can identify the standard deviations ($\sigma^c_{nc}, \sigma^c_{ec}$) of consumption shocks to the value of non-elite and elite colleges (ϵ_{nc} and ϵ_{ec}), together with the human capital gains from non-elite and elite colleges ($\mu^w_{nc}, \mu^w_{ec}, \mu^r_{nc}, \mu^r_{ec}$) via the following equations. The first set of equations are education decision:

$$Pr(\{A_w, A_r, \epsilon_{nc}, \epsilon_{ec}\} \in \Phi) = Pr(e = ec)$$
$$Pr(\{A_w, A_r, \epsilon_{nc}, \epsilon_{ec}\} \in \Psi) = Pr(e = nc)$$

where Φ is the set of students with $\{A_w, A_r, \epsilon_{nc}, \epsilon_{ec}\}$ who choose to go to an elite college and Ψ is the set of students who choose to go to a non-elite college.

The second set of equations are the average human capital after college for employees and unincorporated business owners with elite and non-elite college degrees:

$$E(A_w|\{A_w, A_r, \epsilon_{nc}, \epsilon_{ec}\} \in \Phi) + \mu^w_{ec} = E(h^{em}_{ec})$$
$$E(A_r|\{A_w, A_r, \epsilon_{nc}, \epsilon_{ec}\} \in \Phi) + \mu^r_{ec} = E(h^{ub}_{ec})$$
$$E(A_w|\{A_w, A_r, \epsilon_{nc}, \epsilon_{ec}\} \in \Psi) + \mu^w_{nc} = E(h^{em}_{nc})$$
$$E(A_r|\{A_w, A_r, \epsilon_{nc}, \epsilon_{ec}\} \in \Psi) + \mu^r_{nc} = E(h^{ub}_{nc})$$

where h^j_e denotes the average human capital of individuals with $e \in \{nc, ec\}$ education and $j \in \{em, ub\}$ career type when they finish college. Using the panel data, we can run income regressions and get individual fixed effects, which are equivalent to h^j_e, because h^j_e does not vary after individuals finish their education. In sum, we have six equations and six unknowns:

$\sigma^c_{nc}, \sigma^c_{ec}, \mu^w_{ec}, \mu^r_{ec}, \mu^w_{nc}, \mu^r_{nc}$. Therefore, we can identify the effects of non-elite and elite colleges on worker and entrepreneur human capital (μ's).

The identification of the other parameters is standard. The average incomes of employees, unincorporated business owners, and incorporated business owners are used to identify the technologies of the non-entrepreneurial sector, unincorporated business, and incorporated business (P_{em}, P_{ub}, P_{ib}). The life-cycle income profile of employees and entrepreneurs helps to identify the return to potential experience for employees (α_1, α_2) and the diminishing return to investment for entrepreneurs (ν). We use the income variation of employees and entrepreneurs to identify the standard deviation of productivity shocks for employees and entrepreneurs ($\sigma_{em}, \sigma_{ub}, \sigma_{ib}$). The standard deviations of consumption shock for unincorporated and incorporated business owners ($\sigma^c_{ub}, \sigma^c_{ib}$) are identified from the fraction of unincorporated and incorporated business owners. The cost of opening an incorporated business (C_{ib}) is pinned down by the transition rate between unincorporated and incorporated business owners. If the cost is high, fewer unincorporated businesses will incorporate. The income difference between unincorporated and incorporated business owners by education helps to identify the contribution of worker human capital to incorporated business human capital. The model predicts that college graduates have higher worker human capital compared with high school graduates. If worker human capital has a substantial contribution to incorporated business human capital, the model predicts that college graduates have a higher incorporated business income premium (measured by the income difference between incorporated business and unincorporated business) than high school graduates. Intergenerational correlations in education and career identify the intergenerational transfer in worker ability and entrepreneur ability (θ_w, θ_r). Parental monetary transfer as a proportion of parental wealth identifies a parent's weight on offspring's welfare. The output elasticity of capital in the non-entrepreneurial production function is identified from the interest rate.

Parameters are estimated using SMM. The initial joint distribution of family wealth, own wealth, and worker ability is obtained from the NLSY97. Unfortunately, the NLSY97 does not provide a direct measure of entrepreneur ability, so we simulate entrepreneur ability using the joint distribution of worker ability and entrepreneur ability (with correlation ρ). After obtaining the initial condition, we simulate consumption shocks and productivity shocks in each period and use the model to predict individuals' education and career decisions. We target the following moments:

- education choice,
- career choice by education and age,
- average income by education, career, and age,
- variance of income by career,
- correlation between incomes in period t and $t+1$ by career types,

- career transitions in period t and $t+1$,
- intergenerational mobility in education and career and parental monetary transfer as a fraction of parental wealth, and
- interest rate.

In total, we have 26 parameters and 135 moments.

6 Estimation Results

6.1 Parameter Estimates and Model Fit

Table 9 shows parameter estimates with standard errors in parentheses. Figures 1 to 4 and Tables 10 and 11 present the model fit. In general, the model fits education choice, career choice by education and age, and income by education, age, and career, as shown in Figures 1 to 4. In addition, Table 10 shows that our model fits career transitions between two adjacent periods well. For example, 87.0% of employees in our data are still employees in the next period, with the model predicting 89.5%. Our data show that 52.0% (53.0%) of unincorporated (incorporated) business owners stay in their business five years later, while the model predicts 45.1% (44.5%).

Our model also explains a large share of intergenerational persistency in education and career, as shown in Table 11. For example, the data show that 80% of individuals whose fathers are high school graduates also have a high school degree, while the model predicts 68%. Similarly, the persistency in receiving a non-elite college degree is 40% in the data and 35% in the model and the persistency in receiving an elite college degree is 27% in the data and 16% in the model. In terms of intergenerational persistency in career, 50% of individuals in our data whose fathers are employees throughout their lifetime are also employees; the model predicts 46%. Similarly, the persistency in unincorporated business ownership (those who ever own an unincorporated business over their lifetime but never own an incorporated business) is 33% in the data and 36% in the model and the persistency in incorporated business owners (those who ever own an incorporated business over their lifetime) is 34% in the data and 52% in the model.

We also provide the fit of some untargeted moments. Table 12 shows that we predict the persistence of income between father and son. Income correlation is 0.42 in the data and 0.49 in the model. In addition, the model predicts that the income persistence is highest for families in which both father and son are employees, followed by families in which either the father or the son is an employee; families in which both father and son are entrepreneurs have the lowest income persistence. This pattern is consistent with the PSID data. The model predicts this pattern because income variation is larger for entrepreneurs than employees. When both father and son are entrepreneurs, their income difference has a larger variation compared to the case when both father and son are employees.

6.2 Effect of Ability and Wealth on Education and Career Decisions

Figures 5 to 8 present the interactive effect of ability (worker ability and entrepreneur ability) and wealth endowments on education and career decisions. Figure 5 shows that individuals with low initial wealth and low worker ability do not go to college. For individuals with below median worker ability, the probability of going to a non-elite college increases as initial wealth increases. For individuals with above median worker ability, the probability of going to a non-elite college is around 30% – 40%, regardless of their initial wealth. Individuals with low worker ability ($= 0$ or 1) only go to an elite college if their initial wealth is above \$100,000, which belongs to top 4% of the initial wealth distribution. The chance of going to an elite college increases with initial wealth for individuals with median worker ability ($= 2$, 3, or 4). The chance of going to an elite college is around 20% for individuals with high worker ability ($= 5$ or 6), regardless of their initial wealth. These results suggest that students with high worker ability receive financial aid so that their college decision is less likely to be affected by their initial wealth. However, although students from poor families can also receive financial aid, their college enrollment decision, especially those with low or median worker ability, is still largely affected by their initial wealth.

Figure 6 plots education decision by entrepreneur ability and wealth endowments. We do not find a monotonic relationship between college enrollment and entrepreneur ability.[21] On the one hand, individuals with higher entrepreneur ability may want to go to college to enhance their entrepreneur human capital. On the other hand, they may want to enter the labor market as soon as possible to accumulate enough assets to start their business. These two forces cancel out and the probability of going to college can increase or decrease with increased entrepreneur ability. Another pattern in this figure is that individuals with more initial wealth are more likely to be enrolled in either a non-elite college or an elite college, consistent with the findings from the previous figure.

Figure 7 presents the relationship between career choice, worker ability, and initial wealth. We find that the probability of being an employee declines as initial wealth increases, but this correlation weakens as worker ability increases. This finding suggests that individuals with high worker ability earn enough to overcome the effect of initial wealth. We also find that as worker ability increases, the likelihood of being an unincorporated business owner declines but the likelihood of being an incorporated business owner increases. This is because unincorporated businesses only use entrepreneur ability, which has a very low correlation with worker ability (almost zero), and a higher worker ability implies better outside options for unincorporated business owners. However, incorporated businesses use both entrepreneur ability and worker ability and a higher worker ability implies both higher income as an incorporated business owner and higher income as an employee. Our results suggest that the increase in incorporated

[21] Note that financial aid does not depend on entrepreneur ability because we assume that colleges do not observe entrepreneur ability. Also note that our estimation finds that there is almost zero correlation between worker ability and entrepreneur ability.

business income dominates the increase in employee income; therefore, individuals with a higher worker ability are more likely to become an incorporated business owner.

Figure 8 demonstrates the relationship between career choice, entrepreneur ability, and initial wealth. The likelihood of being an unincorporated business owner increases significantly with entrepreneur ability, as does the likelihood of being an incorporated business owner. For individuals with below median entrepreneur ability, initial wealth has little impact on career choice, as most such individuals choose to be employees. With above median entrepreneur ability, initial wealth increases the likelihood of being either an unincorporated or incorporated business owner.

6.3 Elite-college Premium Puzzle

Our estimation results shed light on the elite-college premium puzzle. First, we find that elite college attendance does not improve worker human capital more than attending a non-elite college does. Table 8 shows that elite college attendance leads to an increase in employee human capital by 27%, while non-elite college attendance leads to a 26% increase, and the difference is not statistically significant. However, elite college attendance has a bigger impact on entrepreneur human capital accumulation compared to non-elite college attendance. Attending an elite college leads to a 40% increase in entrepreneur human capital, while attending a non-elite college only leads to a 32% increase, and this difference is statistically significant. Our findings suggest that what makes elite colleges "elite" is not extra returns to worker human capital, but a larger return to entrepreneur human capital.

Next, we find that although we do not impose any ability restriction for entrance to elite colleges, high ability individuals self-select into elite colleges. Table 13 shows that elite college graduates have higher worker ability (0.630) and entrepreneur ability (0.048) compared to non-elite college graduates (0.208 and -0.027).[22] High school graduates have the lowest worker ability (-0.129) but their entrepreneur ability is higher than non-elite college graduates (-0.001). This is because individuals may need to borrow student loans to go to college, preventing them from borrowing for their business. Therefore, some individuals with high entrepreneur ability do not want to go to college; instead, they work after high school to accumulate assets to start a business.

Last, we calculate the elite-college premium, which is defined as the difference between the discounted present value (DPV) of income (including tuition) at age 20 for an individual who chooses to attend an elite college and the DPV of income if the individual went to a non-elite college. The calculation does not include the consumption value of college. We find that the elite college premium is negative, equivalent to -71,730 U.S. dollars at age 20. Although elite colleges provide larger returns for entrepreneurs, the return is not enough to cover the expensive tuition. Therefore, only those who receive high consumption shocks from elite colleges choose

[22] Worker ability and entrepreneur ability are normalized to have a mean of zero.

to enroll.[23]

6.4 Entrepreneur Premium Puzzle

Our model incorporates several mechanisms that help explain entrepreneur premium puzzle. First, our model assumes that running a business is risky because people do not observe productivity shocks before they make their career choice decision. Second, we allow for dynamic life-cycle decisions with options of entry and exit from entrepreneurship. Therefore, the value of entrepreneurship contains the option value of returning to the non-entrepreneurial sector. Third, entrepreneurs have the option of staying in business after retirement. Last, a major innovation of our paper is to distinguish between two types of businesses, incorporated and unincorporated.

The entrepreneur premium is defined as the difference between the DPV of income for an individual who chooses to be an entrepreneur in this period and the DPV of income if the individual chose to be an employee. The entrepreneur premium is estimated to be $21,555 on average; it is $10,262 for unincorporated business owners and $42,154 for incorporated business owners. Our findings that the entrepreneur premium is positive is consistent with Daly (2015). She compares the DPV of entrepreneurs and the DPV of employees by matching individuals with similar observable characteristics. Our approach improves her results by controlling for selection by the unobservable (worker ability and entrepreneur ability). In addition, we find that incorporated business has a larger entrepreneur premium than unincorporated business.

6.5 Incorporated vs. Unincorporated Businesses

Our results also help to understand the differences between incorporated and unincorporated businesses, which are listed as follows.

First, incorporated businesses use a combination of worker human capital and entrepreneur human capital, while unincorporated businesses only use entrepreneur human capital. The contribution of worker human capital to incorporated human capital is 0.2, as shown in Table 8. This allows us to generate a nice sorting in abilities by career. Table 13 shows that those with high worker ability but low entrepreneur ability choose to become employees, those with low worker ability but high entrepreneur ability become unincorporated business owners, and those with both high worker ability and high entrepreneur ability own incorporated businesses. This allows us to generate a prediction in line with Levine and Rubinstein (2016): incorporated business owners tend to be successful salaried employees before becoming entrepreneurs, while unincorporated business owners tend to earn less as salaried employees than comparable salaried employees that never become self-employed.

Second, the cost of opening an incorporated business is $60,000, while there is no cost for unincorporated business. Therefore, incorporated businesses require more wealth to start and

[23] Jacob et al. (2018) show that elite colleges provide more consumption amenities than non-elite colleges, but we abstract away from consumption amenities here. Instead, we assume that each individual randomly draws a consumption value for elite college attendance and another consumption value for non-elite college attendance.

older people are more likely to own an incorporated business than younger people. The first and the second differences allow us to predict that transitions between the two types of businesses are rare, as shown in Table 10, a result that is also consistent with Levine and Rubinstein (2016).

Last, our estimates show that incorporated businesses are more productive than unincorporated businesses ($P_{ib} = 5.6$ and $P_{ub} = 5.4$). However, incorporated businesses are riskier because of the larger standard deviation of the productivity shock ($\sigma_i = 0.53$ and $\sigma_n = 0.32$). Our finding is consistent with Choi (2017), who finds that entrepreneurs with higher outside options as paid employees (with higher worker human capital) tend to take larger business risks (choose to open an incorporated business).

7 Counterfactual Analysis

7.1 Effect of Elite-college Education, Intergenerational Transfer, and Borrowing Constraint

We consider a set of counterfactual experiments to quantify the effect of the following channels: elite-college education, intergenerational transfer (IGT), and borrowing constraints. We examine the effect on education choice, career choice, and the Gini coefficient (income Gini). Results are shown in Table 15.

The first experiment shuts down the option of going to an elite college. We find that the impact on non-elite college enrollment is very small, only increasing by 0.24 ppt. This suggests that the second-best education option for most elite college students is to directly enter the labor market after finishing high school. Without elite colleges, the number of unincorporated business owners slightly declines by 0.16 ppt (1.3%), while the number of incorporated business owners declines significantly by 0.33 ppt (5.8%). This suggests that elite colleges have a larger impact on the number of incorporated business owners than on the number of unincorporated business owners. Shutting down elite colleges reduces the income Gini because elite college students have higher income.

The second experiment shuts down IGT in money and ability. We consider two implementations. In the first approach, we maintain the distribution of initial ability and wealth, but we assume that there is no correlation between ability and wealth. With IGT, parents with higher ability are also wealthier, so they can transfer both more money and ability to their children. Without IGT, ability and wealth are no longer correlated; instead, they are drawn separately from their marginal distributions. We also assume that parents are no longer altruistic towards their children, but they are forced to make a mandatory transfer, equal to the average transfer, at age 50. We find that shutting down IGT increases the number of non-elite college graduates by 0.46 ppt (1.6%) and of elite college graduates by 0.60 ppt (10.4%). Without IGT, there are more students with relatively low ability from wealthy families and students with high ability from poor families who would like to go to an elite college, in addition to students with high

ability from wealthy families.[24] After they graduate from an elite college, the probability that they become incorporated business owners increases. However, removing IGT also reduces the wealth of individuals with high entrepreneur ability because these people receive a large monetary transfer from their entrepreneur parents when allowing for IGT. Without IGT, these people are less likely to be an entrepreneur due to a reduction in initial wealth. The net effect of shutting down IGT on the number of business owners is positive, suggesting that the first channel dominates the second channel. The numbers of unincorporated and incorporated business owners increase by 0.20 ppt (1.6%) and 0.19 ppt (3.3%), respectively. Overall, we find that the effect of removing IGT on elite college attendance is larger than on non-elite college attendance and the effect on incorporated business is larger than on unincorporated business. The income Gini remains constant because the two effects cancel each other out.

The second way of removing IGT is to assume that initial wealth is equalized for everyone while initial ability is still drawn from the original distribution. In this case, everyone is endowed with $20,000 at age 20. The effect on elite college attendance and incorporated business ownership is even larger. The numbers of elite college graduates and incorporated business owners increase by 0.34 ppt (5.9%) and 0.61 ppt (10.8%), respectively. The income Gini slightly increases by 0.002.

Finally, we relax the borrowing constraint. In the baseline model, we set λ to 1.22 following Robb and Robinson (2014). In this counterfactual, we assume $\lambda = 1.5$. Because it is now easier for entrepreneurs to finance their business, the numbers of unincorporated and incorporated business owners increase by 0.21 ppt (1.7%) and 0.12 ppt (2.1%), respectively. Interestingly, we also observe a large increase in the number of college graduates, especially from elite colleges. The number of elite college students increases by 1.06 ppt (18.3%). This suggests that wealth accumulation and the entrepreneurship incentive is an important reason preventing individuals from going to elite colleges. When the borrowing constraint is tight, some individuals do not want to go to an elite college because they want to save and work to accumulate enough asset to start a business. Previous studies find that many students do not want to attend a college due to consumption smoothing concerns, while our study provides the additional explanation that potential entrepreneurs (especially incorporated business owners) are dissuaded from attending by the high tuition. This finding is consistent with Samaniego and Sun (2016).[25] We also find that the income Gini increases by 0.002, as there would be more elite college students and entrepreneurs after we relax the borrowing constraint.

7.2 Policy Experiments

We consider a series of policy experiments that aim to increase the number of incorporated business owners. The first and second experiments provide subsidies to elite and non-elite college students, respectively. We consider a subsidy rate from 0 to 1. The third and fourth ex-

[24] With IGT, high ability students are mostly from rich families and low ability students are mostly from poor families.

[25] Cameron and Taber (2004) find that borrowing constraints are not a major obstacle for entering college.

periments provide subsidies to incorporated and unincorporated business owners, respectively. We consider a subsidy from \$0 to \$50,000.[26] In all four experiments, we use a labor income tax to finance the subsidy so that the government is budget balanced. Besides the impact on the number of incorporated business owners, we also examine the impact on the number of non-elite and elite college graduates, the number of unincorporated business owners, welfare, and the income Gini.

Figure 9 shows the results of the first two experiments. Providing subsidies to elite college students has a significant impact on the number of elite college graduates and incorporated business owners. When we subsidize 50% of tuition for elite colleges, the number of elite college graduates increases by 16.8 ppt (290%), and the number of incorporated business owners increases by 1 ppt (17.5%). The increase in the number of incorporated business owners is relatively small compared to the increase in the number of elite college graduates because the remaining 50% of tuition at elite colleges is still a big burden for many people, preventing them from becoming an entrepreneur. Providing a 100% subsidy further increases the numbers of elite college graduates and incorporated business owners by 18.4 ppt and 1.8 ppt, respectively. This further supports our hypothesis that the expense of attending an elite college prevents many people from opening an incorporated business. Therefore, removing the cost of attending an elite college more than doubles the number of incorporated business owners compared to reducing the tuition by half. We also find that as the subsidy rate increases, social welfare improves. The income Gini first increases and then declines.

The second experiment considers a subsidy to non-elite college students. We find that although this has a big impact on the number of non-elite college graduates, its effect on the number of incorporated business is much smaller. This suggests that going to an elite college has a bigger effect on the probability of opening an incorporated business than going to a non-elite college.

Figure 10 presents the results of the last two experiments, providing direct subsidies to incorporated or unincorporated business owners. Subsidies are quite effective for the targeted group. However, they reduce the number of entrepreneurs in the other group. For example, when the government provides a \$50,000 subsidy to incorporated (unincorporated) business owners, the number of incorporated (unincorporated) business owners increases by 5.9 ppt (10.9 ppt), a change of 104% (87.2%), but the number of unincorporated (incorporated) business owners declines by 1.9 ppt (0.1 ppt), a change of 15.2% (1.8%). Subsidies to entrepreneurs have an indirect effect of increasing the number of elite college students. This again shows that wealth accumulation and entrepreneur incentives are a big hurdle preventing some individuals from going to elite colleges. For both experiments, social welfare increases and the income Gini declines as the subsidies increase, implying that these are "good policies" for the society as a whole, as they encourage more agents to becomes entrepreneurs, without increasing the

[26] Average income is \$293,000 for an unincorporated business owner and \$587,000 for an incorporated business owner.

income inequality or diminishing the overall social welfare.

8 Conclusion

In this paper, we construct and estimate a life-cycle model with education and career choices in which elite colleges are differentiated from ordinary colleges and incorporated entrepreneurs are differentiated from unincorporated entrepreneurs. Our model generates positive entrepreneur premiums, where the premium for incorporated business owners is significantly larger than that for unincorporated business owners. The elite college premium produced by the model is negative, consistent with the recent literature on the "consumption value" of colleges. Elite college attendance leads to greater gains to entrepreneur human capital than ordinary college attendance does, while the gains to worker human capital are not significantly different between the two types of college. These findings suggest that what makes elite colleges "elite" is more success in entrepreneurship, rather than higher incomes for employees.

We also find that elite colleges and incorporated entrepreneurship are closely related. Removing elite colleges would reduce the number of incorporated business owners by 6% and increasing the leverage ratio of entrepreneurs would encourage more people to enroll in elite colleges. Distributing a subsidy to incorporated entrepreneurs can increase the number of elite college students, while providing a subsidy to elite college students has an indirect effect on the number of incorporated entrepreneurs. Our findings suggest that elite colleges are an important engine producing successful entrepreneurs, while the concern of high tuition and borrowing constraint prevents some entrepreneurs from attending an elite college.

In this study, we consider two types of skills, worker human capital and entrepreneur human capital, to differentiate the different skill requirements for entrepreneurs and employees. A few emerging studies analyze whether entrepreneurial human capital is one skill or a set of skills. For instance, Lazear (2004, 2005) stress that entrepreneurs are those who have many skills but may not be excellent in any one area, while specialists may be very outstanding in one skill. This idea is further developed by several authors (Ding, 2011, Hayward et al., 2006, Holm et al., 2013). In our setup, we allow incorporated business to use both worker and entrepreneur human capital. Future work may consider more types of skills.

This paper also ignores some potentially relevant elements for tractability. For instance, Dyrda and Pugsley (2018) study how tax reform changes the composition of incorporated entrepreneurs between C-corporations and S-corporations. Unfortunately, the PSID data are unable to distinguish these two kinds of corporations. Future works can further explore how tax policies affect the career choices of agents. Lazear (2016) explores a model with different career paths, where estimates of performance have errors. His theory suggests that overconfidence should be more prevalent in occupations where estimates of ability are noisier, such as entrepreneurship. Dillon and Stanton (2017) also consider the initial uncertainty in entrepreneur earnings and gradual learning about the entrepreneurial earnings process. As an earlier effort to integrate the insights from the human capital literature and the entrepreneur

literature, we abstract from the "signal extraction" considerations to keep the model simple. Future work should further explore the issue of uncertainty and learning in entrepreneurship and how they might affect parameter estimation and their policy implications.

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Table 1: Summary Statistics by Career

	All	Employee	Entrepreneur	Unincorporated	Incorporated
Age	35.90	35.41	38.10	37.44	39.59
Years of schooling	14.34	14.28	14.57	14.32	15.12
College degree	39.67%	38.66%	44.24%	38.44%	57.23%
Income(median)	51,645	51,343	54,010	48,093	72,996
Income(mean)	63,288	60,314	76,689	58,542	117,360
Income(std)	67,632	56,618	102,585	64,426	149,760
Observations	22,563	18,465	4,098	2,833	1,265
Proportion	100%	81.8%	18.2%	12.6%	5.6%

Table 2: List of Elite Colleges

Ranking	Institution name	Quality index	Public
1	California Institute of Technology	6.31	0
2	Franklin W Olin College of Engineering	6.20	0
3	Harvard University	6.18	0
4	Yale University	6.16	0
5	Princeton University	6.14	0
6	Harvey Mudd College	6.14	0
7	Massachusetts Institute of Technology	6.11	0
8	Pomona College	6.01	0
9	Washington University in St Louis	6.00	0
10	Dartmouth College	5.99	0
11	Stanford University	5.99	0
12	Swarthmore College	5.98	0
13	Columbia University in the City of New York	5.94	0
14	Duke University	5.93	0
15	Brown University	5.91	0
16	University of Pennsylvania	5.91	0
17	Amherst College	5.90	0
18	University of Chicago	5.88	0
19	Williams College	5.86	0
20	Tufts University	5.83	0
21	Rice University	5.82	0
22	Northwestern University	5.81	0
23	University of Notre Dame	5.79	0
24	Claremont McKenna College	5.79	0
25	Carleton College	5.77	0
26	Cornell University	5.77	0
27	Georgetown University	5.76	0
28	Vanderbilt University	5.74	0
29	Haverford College	5.73	0
30	Carnegie Mellon University	5.73	0
31	Johns Hopkins University	5.73	0
32	Wellesley College	5.72	0
33	Bowdoin College	5.72	0
34	Emory University	5.72	0
35	Washington and Lee University	5.71	0
36	Reed College	5.71	0
37	Wesleyan University	5.71	0
38	Middlebury College	5.68	0
39	Vassar College	5.67	0
40	University of Southern California	5.64	0
41	Cooper Union for the Advancement of Science and Art	5.64	0
42	Colby College	5.60	0
43	Brandeis University	5.60	0
44	Scripps College	5.59	0
45	Davidson College	5.59	0
46	Oberlin College	5.58	0
47	Barnard College	5.57	0
48	Grinnell College	5.56	0
49	College of William and Mary	5.56	1
50	Colgate University	5.56	0
51	Jewish Theological Seminary of America	5.54	1
52	Macalester College	5.53	0
53	Boston College	5.52	0
54	New York University	5.50	0
55	University of California-Berkeley	5.49	1
56	Kenyon College	5.49	0
57	Whitman College	5.48	0
58	University of Rochester	5.48	0
59	Rensselaer Polytechnic Institute	5.48	0
60	Wake Forest University	5.46	0
61	Wheaton College	5.45	0
62	Connecticut College	5.45	0
63	Georgia Institute of Technology-Main Campus	5.44	1
64	University of Michigan-Ann Arbor	5.43	1
65	Bucknell University	5.43	0
66	Lehigh University	5.43	0
67	SUNY College at Geneseo	5.42	1
68	University of Virginia-Main Campus	5.42	1
69	Colorado College	5.41	0
70	New College of Florida	5.41	1
71	Bryn Mawr College	5.38	0
72	St Olaf College	5.37	0
73	University of North Carolina at Chapel Hill	5.36	1
74	University of California-Los Angeles	5.35	1
75	Kalamazoo College	5.35	0
76	Trinity College	5.34	0
77	Case Western Reserve University	5.33	0
78	Gettysburg College	5.31	0
79	University of Illinois at Urbana-Champaign	5.31	1
80	Trinity University	5.31	0
81	Lafayette College	5.31	0
82	Thomas Aquinas College	5.31	0
83	Occidental College	5.31	0
84	University of Richmond	5.30	0
85	Villanova University	5.30	0
86	George Washington University	5.30	0
87	Beloit College	5.29	0
88	Rose-Hulman Institute of Technology	5.27	0
89	University of Miami	5.27	0
90	Dickinson College	5.27	0
91	Worcester Polytechnic Institute	5.26	0
92	United States Air Force Academy	5.26	1
93	Tulane University of Louisiana	5.26	0
94	Knox College	5.26	0
95	University of Maryland-College Park	5.25	1
96	Furman University	5.25	0
97	United States Coast Guard Academy	5.23	1
98	United States Naval Academy	5.23	1
99	Boston University	5.23	0
100	Illinois Institute of Technology	5.21	0

Table 3: College Characteristics of Elite and Non-elite Colleges

	Share	Faculty-student ratio	Rejection rate	Retention rate	Faculty salary	SAT score	In-state tuition	Out-of-state tuition
Elite college	16.5%	0.13	0.66	0.94	92,859	1,356	29,068	30,893
Non-elite college	83.5%	0.07	0.32	0.74	59,928	1,035	14,115	17,104

Table 4: Regression on Career Choice

	(1) Incorporated	(2) Unincorporated
Non-elite college	0.0171***	0.00130
	(5.39)	(0.30)
Elite college	0.0201***	0.0150
	(3.39)	(1.85)
Graduate school	0.00463	-0.00327
	(1.28)	(-0.66)
Father has non-elite college degree	0.00863**	0.00720
	(2.98)	(1.82)
Father has elite college degree	0.0295***	0.0215**
	(5.56)	(2.96)
Father ever runs unincorporated business	0.0146***	0.0519***
	(5.42)	(14.03)
Father ever runs incorporated business	0.0402***	0.0322***
	(14.19)	(8.32)
Constant	0.0248***	0.0739***
	(13.31)	(29.04)
N	38009	38009

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Regression on Log Total Income

	(1) Employee	(2) Unincorporated	(3) Incorporated
Non-elite college	0.345***	0.371***	0.103
	(25.74)	(7.10)	(1.62)
Elite college	0.615***	0.369***	0.386***
	(24.21)	(3.95)	(3.51)
Graduate school	0.0727***	0.153**	0.051***
	(4.77)	(2.60)	(0.76)
Father has non-elite college degree	0.104***	0.166***	0.0947
	(8.51)	(3.54)	(1.68)
Father has elite college degree	0.0448	0.264**	0.172*
	(1.94)	(3.20)	(2.04)
Father ever runs unincorporated business	-0.123***	-0.0969*	-0.0344
	(-10.87)	(-2.16)	(-0.55)
Father ever runs incorporated business	-0.0400***	-0.0352	-0.00395
	(-3.35)	(-0.73)	(-0.07)
Constant	10.31***	10.22***	10.61***
	(1355.83)	(290.20)	(212.39)
N	32316	3589	1892

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Fixed Parameters

Parameter	Meaning	Calibration
β	discount rate	0.821
δ	capital depreciation rate	0.266
ζ_t	survival rate after age 65	Health and Retirement Study
σ	utility function parameter	1.5 (CDN2006)
ϕ	pension	40% of average earnings (CDN2006)
λ	budget constraint	1.22 (RR2014)
T_e	college tuition	(Fu2014)
$f_e(k^p, A_w)$	college financial aid	(Fu2014)

CDN2006: Cagetti and De Nardi (2006)
RR2014: Robb and Robinson (2014)
Fu2014: Fu (2014)

Table 7: Survival Rate by Age

Age	65	70	75	80	85	90	95	100
Survival rate	95%	93%	89%	83%	73%	57%	38%	21%

Table 8: Estimated Parameters

Parameter	Meaning	Target moments
σ_w, σ_r	std of EM and EN abilities	income correlation of stayer in EM or UB
ρ	correlation between EM and EN ability	income correlation of switcher between EM and UB
μ^w_{nc}, μ^w_{ec}, μ^r_{nc}, μ^r_{ec}	return to education	EM and UB income by education
σ^c_{nc}, σ^c_{ec}	std of consumption shocks on NC and EC	fraction of NC and EC
P_{em}, P_{ub}, P_{ib}	EM, UB, and IB technology	average income of EM, UB, and IB
α_1, α_2, ν	return to experience and return to investment	EM and UB income by age
$\sigma_{em}, \sigma_{ub}, \sigma_{ib}$	std of the productivity shock	income std of EM, UB, and IB
$\sigma^c_{ub}, \sigma^c_{ib}$	std of consumption shock on UB and IB	fraction of UB and IB
C_{ib}	cost of IB	transition between UB and IB
γ	contribution of EM human capital to IB human capital	income difference between UB and IB by education
θ_w, θ_r	intergenerational ability transfer	intergenerational correlation in education and career
ω	weight on offspring's welfare	parental monetary transfer as a fraction of parental wealth
α	output elasticity of capital	interest rate

EM: employee, EN: entrepreneur, UB: unincorporated business, IB: incorporated business, HS: high school, NC: non-elite college, EC: elite college.

Table 9: Parameter Estimates

	Employee	Entrepreneur
Technology	1694 (355)	5.4 (1.2)/5.6 (1.3) (UB/IB)
Return to non-elite college	0.26 (0.10)	0.27 (0.09)
Return to elite college	0.32 (0.05)	0.40 (0.07)
Return to potential experience	0.32 (0.08)	-
Return to experience square	-0.032 (0.01)	-
Std of productivity shock	0.45 (0.10)	0.32 (0.13) /0.53 (0.17) (UB/IB)
Fixed cost	-	-/60000 (21500) (UB/IB)
Std of ability	0.65 (0.22)	0.45 (0.14)
Intergenerational ability transfer	0.82 (0.36)	0.53 (0.21)
Std of consumption shock	-	0.0013 (0.0003)/0.00075 (0.0002) (UB/IB)
Correlation between EM and EN ability	0.01 (0.001)	
Contribution of EM human capital to IB human capital	0.20 (0.08)	
Std of consumption shock on college	0.0050 (0.0009)/0.0022 (0.0005) (NC/EC)	
Weight on offspring's welfare	0.017 (0.005)	
Output elasticity of capital	0.27 (0.06)	

Standard errors in the parenthesis.
EM: employee, EN: entrepreneur, UB: unincorporated business, IB: incorporated business, NC: non-elite college, EC: elite college.

Table 10: Career Transition from Year t to $t+5$

Data	EM	UB	IB
EM	87.0%	38.7%	34.3%
UB	9.8%	52.0%	12.7%
IB	3.3%	9.3%	53.0%
Model	**EM**	**UB**	**IB**
EM	89.5%	34.8%	32.8%
UB	7.8%	45.1%	22.7%
IB	2.7%	20.1%	44.5%

Period t in columns and period $t+5$ in rows.
EM: employee; UB: unincorporated business owner;
IB: incorporated business owner.

Table 11: Intergenerational Mobility

Education choice							
Data	HS	NC	EC	Model	HS	NC	EC
HS	80.1%	48.1%	30.3%	HS	67.5%	56.2%	48.8%
NC	16.3%	39.6%	43.1%	NC	29.2%	35.3%	35.0%
EC	3.6%	12.2%	26.6%	EC	3.4%	8.5%	16.3%
Career choice							
Data	EM	UB	IB	Model	EM	UB	IB
EM	49.5%	42.1%	41.0%	EM	46.3%	27.4%	20.1%
UB	28.4%	33.2%	24.9%	UB	30.0%	36.4%	28.4%
IB	22.1%	24.7%	34.2%	IB	23.7%	36.3%	51.5%

Fathers in columns and sons in rows.
HS: high school; NC: non-elite college; EC: elite college. EM: employee; UB: unincorporated business owner; IB: incorporated business owner.

Table 12: Father-son Correlation in Income

	Data	Model
Whole sample	0.42	0.49
Both father and son are devoted employees	0.56	0.62
Father has worked as entrepreneur; son is devoted employee	0.34	0.53
Father is devoted employee; son has worked as entrepreneur	0.42	0.53
Both father and son have worked as entrepreneurs	0.32	0.44

Table 13: Average Ability by Education and Career

Worker ability	Employee	Unincorporated	Incorporated	Total
High school	-0.098	-0.374	-0.003	-0.129
Non-elite college	0.228	0.042	0.247	0.208
Elite college	0.674	0.432	0.601	0.630
Entrepreneur ability	Employee	Unincorporated	Incorporated	Total
High school	-0.108	0.474	0.654	-0.001
Non-elite college	-0.126	0.355	0.472	-0.027
Elite college	-0.083	0.351	0.454	0.048

Table 14: Premium – Income Equivalence

Type	Premium
Elite college	-71,280
Entrepreneur	21,555
Unincorporated	10,262
Incorporated	42,154

Table 15: Counterfactual Results

	Non-elite college	Elite college	Unincorporated	Incorporated	Income Gini
Baseline	29.10%	5.78%	12.49%	5.67%	0.564
No elite college	29.34%	0.00%	12.33%	5.33%	0.557
change	0.24%	-5.78%	-0.16%	-0.33%	-0.008
Shut down IGT (unequal wealth)	29.56%	6.38%	12.69%	5.85%	0.564
change	0.46%	0.60%	0.20%	0.19%	0.000
Shut down IGT (equal wealth)	29.96%	6.12%	13.17%	6.27%	0.567
change	0.86%	0.34%	0.68%	0.61%	0.002
Relax borrowing constraint ($\lambda = 1.5$)	29.68%	6.84%	12.71%	5.79%	0.566
change	0.58%	1.06%	0.21%	0.12%	0.002

Figure 1: Education and Career Choice

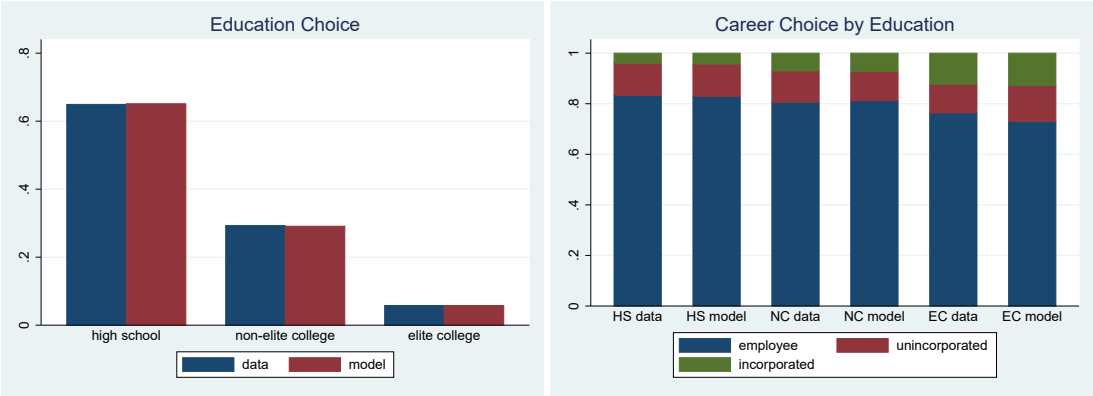

Figure 2: Career Choice by Age

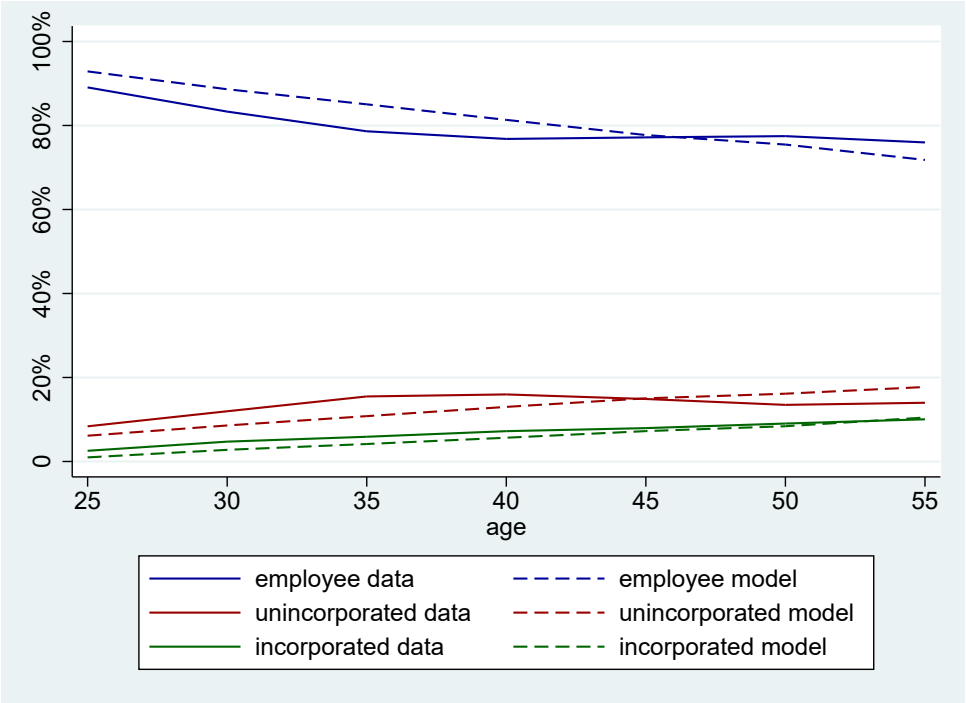

Figure 3: Income by Education and Career

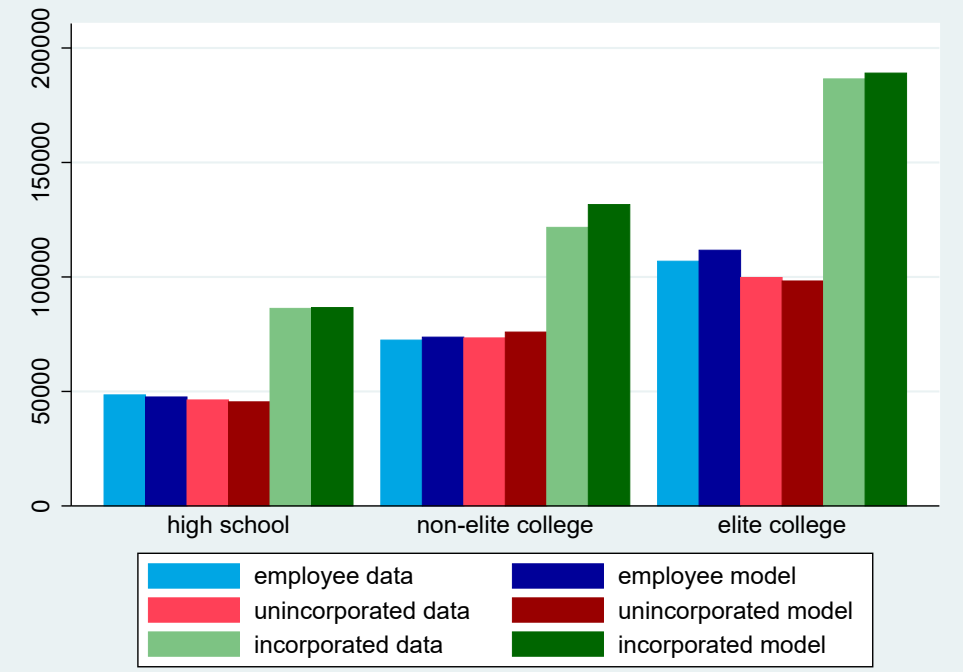

Figure 4: Income by Career and Age

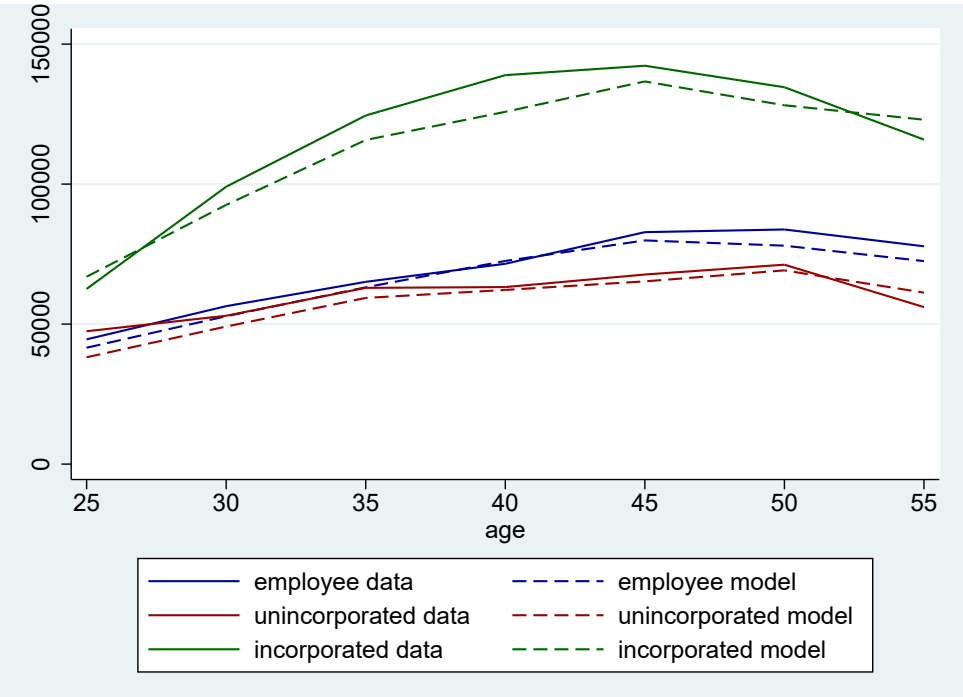

Figure 5: Education Choice by Worker Ability and Wealth

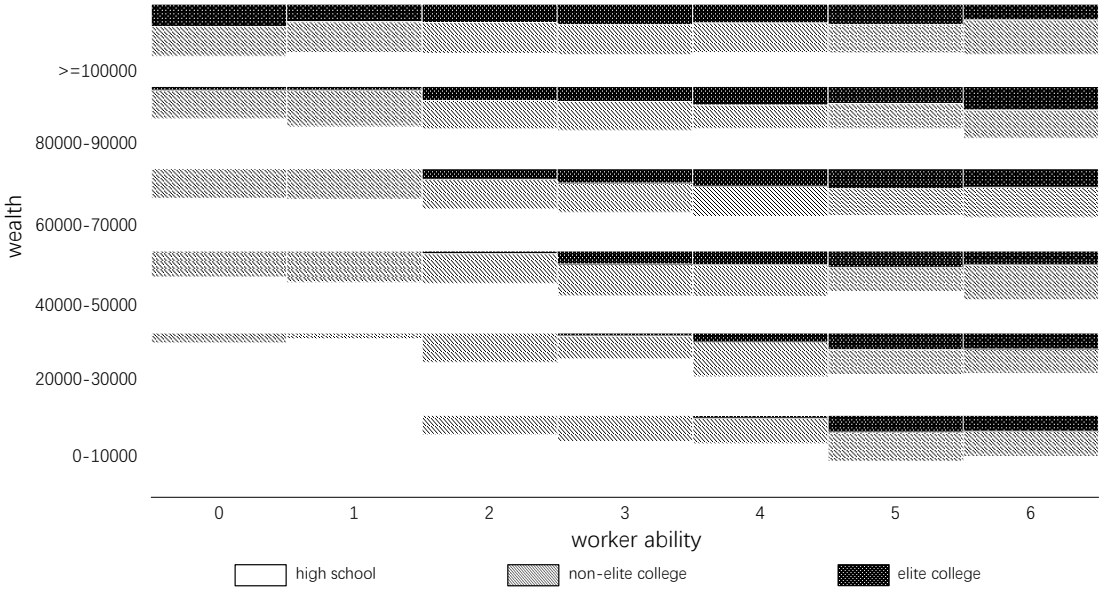

Figure 6: Education Choice by Entrepreneur Ability and Wealth

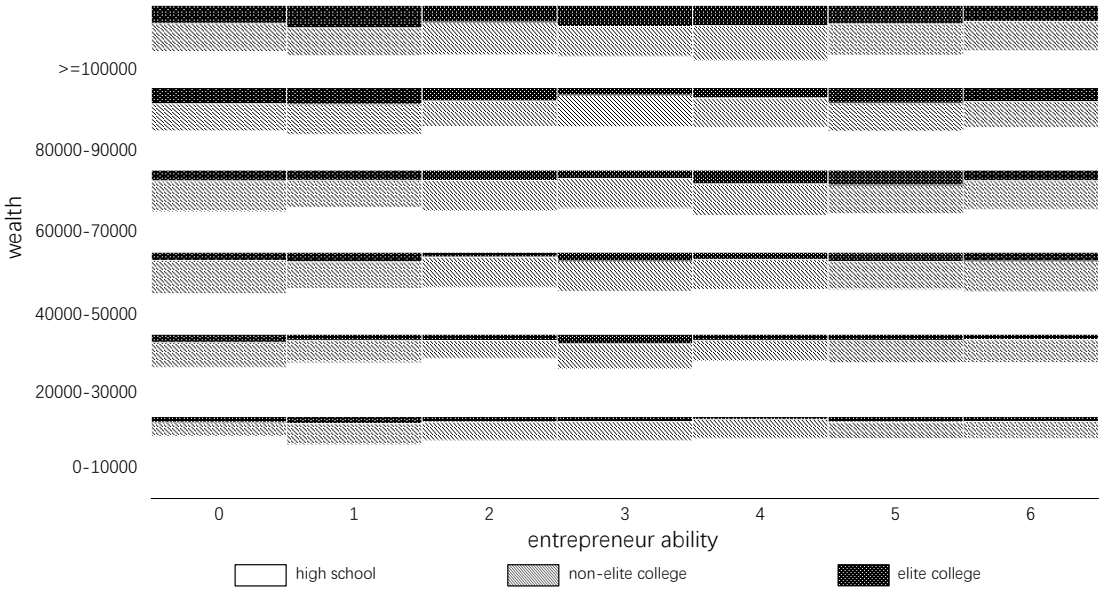

Figure 7: Career Choice by Worker Ability and Wealth

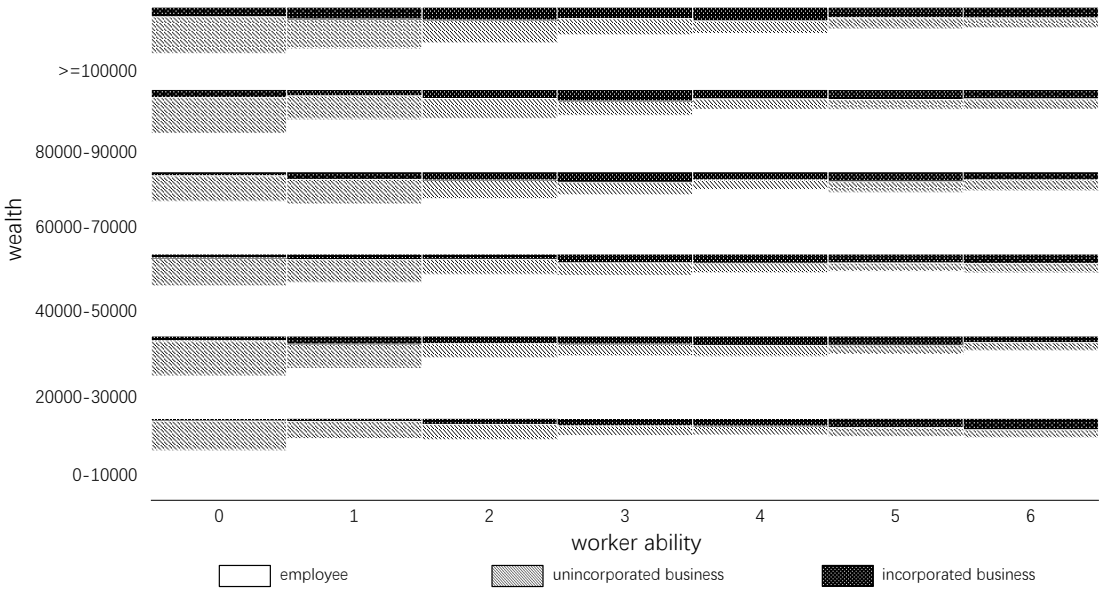

Figure 8: Career Choice by Entrepreneur Ability and Wealth

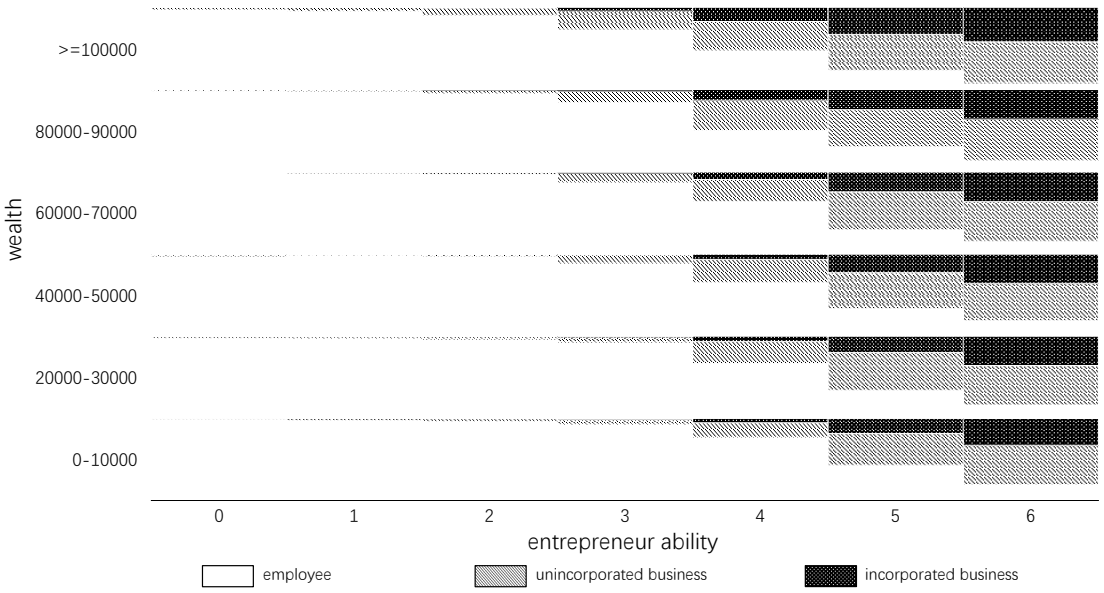

Figure 9: Subsidy to Elite/non-elite College Students

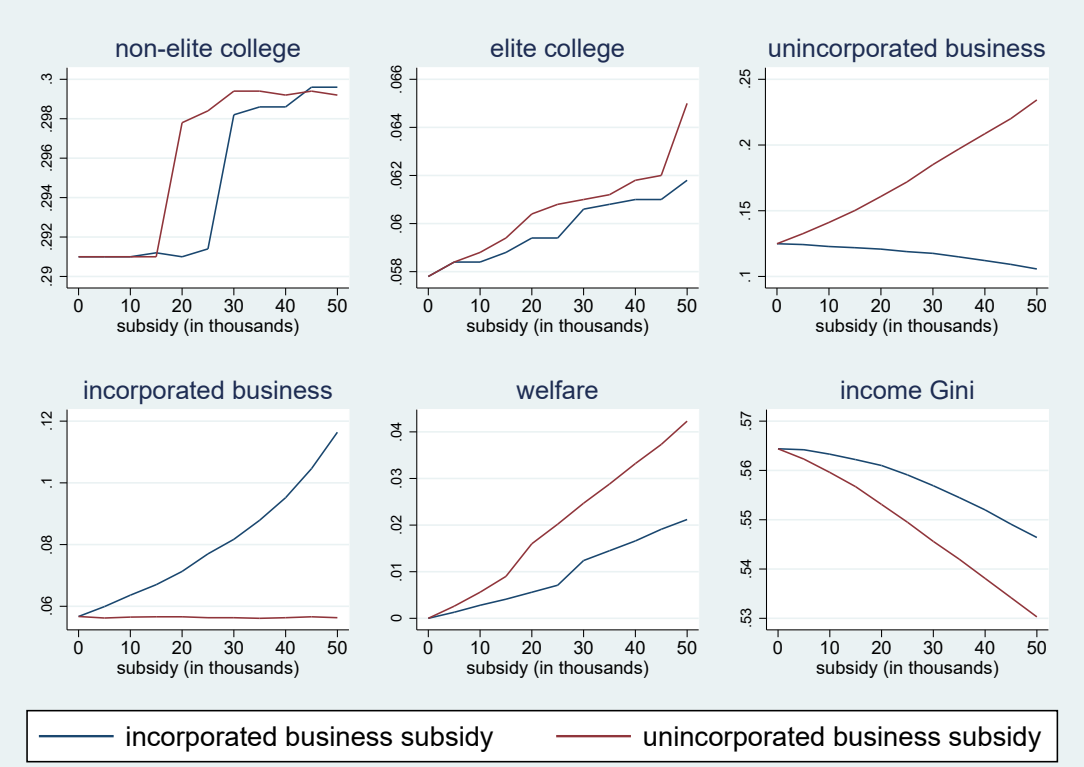

Figure 10: Subsidy to Incorporated/unincorporated Business Owners