Wealth, Human Capital and the Transition to Entrepreneurship

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Abstract

Although the debate about the effect of wealth on entrepreneurship is now almost two decades old, there is little consensus among researchers about the significance of wealth as a determinant for self-employment. In this paper, we shift the focus from whether potential entrepreneurs, as a group, are credit constrained, to whom among potential entrepreneurs is credit constrained. We consider the impact of education and experience on the probability of choosing entrepreneurship, in an environment where individuals may be credit constrained. We find that for individuals with low human capital, wealth and entrepreneurial entry are negatively related, while wealth has no effect on entry for individuals with medium to high human capital. This result is puzzlingly at odds with the classic Evans-Jovanovic model for entrepreneurial entry. We discuss several ways to reconcile the two.
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1 Introduction

Entrepreneurship has been widely recognized as an important contributor to economic growth and job creation. Therefore how the economy fosters entrepreneurs has been a topic of interest to both researchers and policy makers. A substantial portion of the research on this topic has focused on whether potential entrepreneurs are constrained in obtaining capital to start businesses. In this paper, we build on the existing research by investigating whether potential entrepreneurs differ in the degree of capital constraints they face. In particular, we ask the following question: do more educated and more experienced people face higher capital

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constraints when they consider becoming entrepreneurs? The answer to this question has important implications for both policy-makers and researchers. From a policy perspective, identifying the characteristics of those potential entrepreneurs who are most likely to face credit constraints would help policymakers to better channel funds intended to ease these constraints. Shifting the debate from whether potential entrepreneurs are credit constrained as a group, to whom within the group of potential entrepreneurs are credit constrained is an important step in formulating public policy fostering entrepreneurship. Investigating the heterogeneity of aspiring entrepreneurs with respect to their degree of liquidity constraints can also help us better understand and perhaps reconcile the wide range of empirical results on the existence of liquidity constraints for potential entrepreneurs. While the question of whether potential entrepreneurs are credit constrained in starting businesses has been studied extensively, a consensus on the empirical results has failed to form.[1]

In this paper, we focus on how the degree of liquidity constraints may vary across entrepreneurs with different levels of human capital. Human capital is an important dimension of heterogeneity among entrepreneurs, and its effect on the degree of liquidity constraints can be complicated by the numerous ways in which it can affect entrepreneurial choice. Human capital can impact both wage earnings and entrepreneurial earning, so returns to human capital in the wage sector and entrepreneurial work have to be considered in assessing how human capital affects entrepreneurial choice. Furthermore, human capital can affect entrepreneurial earnings in two ways: it can affect entrepreneurial earnings directly by increasing the productivity of the entrepreneur and also indirectly by relaxing or tightening liquidity constraints.

Since human capital can influence many aspects of an entrepreneurial decision, its net effect on entrepreneurial choice and liquidity constraints faced by aspiring entrepreneurs critically depends on the specifications of the theoretical models. For example, in the Evans-Jovanovic model (1989), human capital only enters the wage equation and not the

[1] Early research on this topic has consistently suggested that individuals face binding liquidity constraints in entrepreneurial choice decisions (Evans and Jovanovic 1989; Holtz-Eakin, Joulaian, and Rosen 1994; Blanchflower and Oswald 1998; Quadrini 1999). This view has recently been challenged by Hurst and Lusardi (2004) who argued that liquidity constraints are not binding for aspiring entrepreneurs over a majority of the wealth distribution. Their evidence has generated renewed interest in the question of liquidity constraints and entrepreneurship, and it has been countered by empirical (Fairlie and Krashinsky 2006) and theoretical work (Cagetti and De Nardi 2006).

entrepreneurial earnings equation. As a result of its positive effect on wage, human capital has a negative effect on the probability of becoming an entrepreneur and no effect on liquidity constraints. Astbro and Bernardt (2005) extend the Evans-Jovanovic model by endogenizing the savings decision and making self-employment earning dependent on human capital. Their model implies that the effect of human capital on liquidity constraints may be positive or negative depending on the relative sizes of returns to human capital in wage and entrepreneurial work. On the other hand, Parker and van Praag (2006) extend Bernhardt's (2000) model of credit rationing to include human capital. They show that theoretically the effect of human capital on liquidity constraints is ambiguous if the entrepreneur's production function is nonseparable in human and physical capital. If it is separable, greater human capital relaxes credit constraints of potential entrepreneurs.

Our approach in this paper is one of empirical investigation. We use data from the National Longitudinal Survey of Youth to examine whether the degree of liquidity constraints faced by aspiring entrepreneurs varies with human capital. In that respect, our paper complements a significant body of research aimed at the question of liquidity constraints in entrepreneurial choice.[2] By focusing on the heterogeneity of entrepreneurs with respect to human capital, we investigate whether the findings of previous studies might mask differences among entrepreneurs. The results of our empirical work can also be used in developing theoretical models that illustrate the link between human capital, liquidity constraints and entrepreneurial entry.

We follow a widely used approach to testing for liquidity constraints by looking for a positive relationship between wealth and the likelihood of becoming an entrepreneur. The intuition behind this test is that if individuals are restricted in their ability to finance their businesses by the need to provide collateral for loans, then people with low wealth are likely to face capital constraints in opening their businesses. The key in such an analysis is to find appropriate instrumental variables for wealth since wealth might be endogenous to unobservable factors also determining entrepreneurial entry. We use housing price changes, initially proposed by Hurst and Lusardi (2004), as an instrument for wealth in our analysis.

[2]Some of the prominent papers in this line of research are listed in footnote 1.

In our pooled sample, we find that wealth has a statistically insignificant effect on the probability to become an entrepreneur, suggesting evidence for lack of liquidity constraints. However, we do observe differences in this relationship across people with different levels of human capital. Among individuals with less than a high school degree and those with low work experience, wealth is negatively related to the likelihood to become an entrepreneur. This negative relationship cannot be explained by the credit rationing theory of Evans and Jovanovic. We offer several potential explanations for our finding.

This paper consists of 6 sections. In section 2, we discuss the theoretical framework and the econometric model underlying our analysis, and in section 3 we describe the data used. Section 4 presents our empirical findings, section 5 provides a discussion of our results, and section 6 concludes with a summary of our findings and suggestions for future work.

2 Theoretical Framework

Our empirical investigation is based on Evans and Jovanovic's (1989) model, which describes the role of liquidity constraints for an individual's decision to become an entrepreneur. According to Evans and Jovanovic's model, an aspiring entrepreneur's borrowing ability is determined by the amount of collateral provided, which is itself a function of the individual's wealth. If the amount of capital needed to begin a business is greater than what the individual is able to borrow or use from personal funds, then the individual is constrained and must either abandon the enterprise or begin with a sub-optimal level of capital. Among individuals who are constrained in obtaining the optimal level of capital for their ventures, wealth positively effects entrepreneurial earnings and thus the likelihood of choosing entrepreneurship over wage work. The reason for this effect is that wealth positively effects the collateral that can be posted and therefore the amount that can be borrowed, bringing the individual closer to her optimal level of capital investment. Of course, if the individual is not constrained, i.e., she is able to obtain the optimal capital level, either using her own funds or by borrowing, higher personal wealth, thus higher collateral, would not change her capital investment, entrepreneurial earnings and the likelihood of becoming an entrepreneur.

Thus if individuals are credit constrained there should be a positive relationship between wealth and the probability of becoming an entrepeneur. This hypothesis has formed the basis of a simple test for liquidity constraints used by many researchers (Gentry and Hubbard, 2004; Evans and Leighton, 1989; Quadrini, 1999) and which we also employ. We use a probit specification to investigate the determinants of entrepreneurial entry and the existence of liquidity constraints, so our reduced form econometric model of entrepreneurial entry can be expressed as

$$P(D_{i,t+1} = 1) = F(Z_{it}, A_{it}) \tag{1}$$

where $D_{i,t+1}$ is a dummy variable indicating entry into entrepreneurship at $t+1$ conditional on not being self-employed at t, Z_{it} is a vector of observables that affect the individual's earnings as well as her nonpecuniary gains in each mode of employment, A_{it} is a vector of net assets (or wealth) and F is the cumulative normal distribution function. If individuals face a binding liquidity constraint, we expect a positive coefficient on wealth in Equation (1). However, a positive relationship between wealth and entrepreneurial probability can also suggest that entrepreneurs accumulate more wealth than workers. In order to mitigate such reverse causality, we investigate the effects of wealth and other exogenous variables dated before the entry into entrepreneurship on the entrepreneurial decision. We are aware that this specification may not guarantee the exogeneity of our variables, especially wealth, so we also use instrumental variables regression to take into account the endogeneity of wealth.

3 Data Description

We use data from the 1979 National Longitudinal Survey of Youth (NLSY) to estimate the influence of wealth on the decision to become an entrepreneur. The NLSY is a nationally representative sample of 12,696 men and women who were between ages 14 to 22 when they were first surveyed in 1979. Using the NLSY provides several advantages for studying the existence of liquidity constraints. First, its panel nature allows us to follow wage workers' transition into self-employment and thus control for explanatory variables before entry into

self-employment. Second, it collects detailed information on jobs, assets and the demographic characteristics of respondents. Finally, the NLSY follows the labor market experiences of a young cohort from the beginning of its entry into the labor market. Given that age-earnings profiles tend to be upward sloping, liquidity constraints are more likely to be binding for younger individuals. Thus, the NLSY sample allows us to focus on the entrepreneurial decisions of a cohort likely to face binding liquidity constraints.

We chose to use data from the years 1985 to 1990 and 1992 to 1994 because during these years the NLSY collected detailed information on assets. Prior to 1985 as well as for the 1991 survey wave, individuals were not asked specific details about the value of their assets. We restrict our sample to individuals who are in the labor force in the first year that they appear in the dataset in order to focus on transitions to entrepreneurship. We use data from the Bureau of Labor Statistics on the Consumer Price Index (CPI) and regional CPI for all urban consumers with 1982-1984 as the base year to adjust for inflation. We also use data from the Bureau of Economic Analysis for state GDP to create our variable for housing price appreciation (described below).

Before we begin our analysis, we need to define what we mean by an entrepreneur. There are two main ways to define an entrepreneur: as a self-employed individual, or as someone who reports owning a business (or both). We use the more common approach in the literature and consider a self-employed person to be an entrepreneur. We consider an individual to be self-employed in a particular survey year if the 'class of worker' category question for the current (CPS) job indicated self-employment. We restrict the sample to those who have never been an entrepreneur in order to ensure that wealth is not accumulated while being an entrepreneur which would bias our sample.

We use net worth as the definition for wealth in our analysis because one's ability to obtain credit is most likely determined by assets net of debt obligations.[3] This is also consistent with other studies, such as Hurst and Lusardi (2004). Net worth is calculated as assets less debt obligations, where debt is composed of mortgage debt owed, other property debt (including business or farm property), debt owed on automobiles and other debt valued over $500. Assets

[3]Net worth will be used interchangeably with wealth in our discussion below.

are calculated as the sum of savings accounts, farm and business property assets, the market value of residential property owned, the market value of automobiles plus other assets which are valued above $500. The NLSY top-codes both income and assets at levels that change yearly. The earlier waves of the survey (1979-1983) had restrictive top-coding particularly compared to other surveys, such as the Survey of Consumer Finances (SCF). Cut-off values for responses to asset questions ranged from $30,000 for questions about vehicle values and debts to $500,000 for financial assets and farm or business property. Since the NLSY does not over-sample the wealthy, as the SCF does, the percentage of survey respondents for whom asset top-coding is relevant is less than 10 percent of the survey.

Our analysis also includes the following covariates: age, gender, race (Black or non-Black), marital status (married or not married), number of children in the household, years of education, unemployment experience (how many weeks of unemployment experienced in the previous year), and number of job separations (how many past jobs held, not concurrent jobs). Table 1 provides summary statistics for our sample and highlights the differences between wage-workers and entrepreneurs. Entrepreneurs are more likely to be older, male, married, and to have at least one child. They also have slightly less education, more frequent past job separations, and fewer weeks of unemployment. They are also more likely to have received an inheritance and the average inheritance received by an entrepreneur is almost twice the average amount of inheritance received by wage workers.

Table 1 also presents the mean asset levels held by entrepreneurs and wage workers. The statistics from our sample are consistent with the common finding that entrepreneurs hold more assets than wage workers on average. In our sample, the mean asset level for entrepreneurs is about 2.7 times that for wage workers. The difference in average assets between the two groups is driven by higher business property and housing valuations for entrepreneurs. Entrepreneurs also have higher debt obligations than wage workers. However, the wide gap between entrepreneurs and wage workers remains when we focus on net worth: an average entrepreneur has almost 2.5 times the net worth of an average wage worker.

In addition to examining the pooled sample of workers and entrepreneurs, we categorize workers and entrepreneurs according to their human capital accumulation, measured in

terms of educational attainment and work experience. We break education into three non-overlapping categories, less than high school, high school plus, and college plus. High school plus refers to individuals who received a high school diploma and may have a few years of college, but less than a 4 year degree. College plus refers to individuals who have a 4 year degree and who might also have several more years of higher education. This category also includes individuals with advanced degrees. Work experience is divided into 3 categories: low, medium and high based on the distribution of work experience in the sample. Low work experience includes individuals with experience below the 75th percentile, which is 6 years of work experience, high work experience includes individuals with experience above the 90th percentile, which is 12 years, and medium includes those above the 75 and below the 90th.

4 Results

In this section, we provide evidence on the relationship between net worth and entrepreneurial entry using data from the NLSY. The starting point for our analysis is the estimation of the probit regression presented in Equation (1). We first present the estimates for the entire sample and then discuss the results for different education and experience categories.

4.1 Results for the Entire Sample

Our baseline model consists of a probit regression of entrepreneurial entry as a function of household net worth and a set of control variables. We first describe the effect of the control variables on entry and then the effect of wealth. We use a quadratic in age to capture a possible concavity in the relationship between the probability to become an entrepreneur and age. Our covariates also include years of education, race, family structure (marital status, number of children in the household, whether the spouse is working), whether the individual has experienced unemployment, how many job separations she has experienced and her real income. Table 2 reports the estimation results from four different specifications of the probit equation. The first two columns in Table 2 contain estimates of the probit regression using quantile measures of wealth. The third column presents regression results when net worth

enters the probit equation nonlinearly, and the fourth column lists the regression results when the net worth is instrumented using housing price residuals.

Based on the first three specifications, we find that being older, male, and living in an urban area (measured by being a resident of a Metropolitan Statistical Area) increases the probability of becoming an entrepreneur. Being married has no effect on choosing entrepreneurship. The fact that the spouse is working and thus diversifying the household's income source (provided the spouse works outside the business) has no significant impact on one's likelihood of becoming an entrepreneur. Interestingly, having more children increases the probability of entering self-employment and, given that marriage and the spouse working variable have no effect, this might be related to household stability.

Blacks have a lower likelihood of becoming entrepreneurs. The reasons for this finding are complicated by many factors explored in Fairlie (1999). We also found that past unemployment spells have a positive effect on entrepreneurial entry, similar to Fairlie and Krashinsky (2006). The mean unemployment spell for a given year is 12 weeks and the median is 8 weeks. Having more job separations also has a positive effect on entrepreneurial entry. There are various explanations for this: individuals who are unhappy with work in the wage sector may change jobs more often seeking a better match or individuals who are not high quality workers may move from job to job. Either of these circumstances may make self-employment a more attractive occupational choice.

When we use an instrumental variable (IV) estimation to account for the potential endogeneity of networth, the marginal effects of being male, living in an urban area and job separations remain significantly positive. However, some of the other covariates change signs and/or lose their statistical significance. For example, age, age squared, being black and number of children in the household no longer have significant effects on entrepreneurial entry propensity under IV estimation. On the other hand, we find that a working spouse decreases the probability of becoming an entrepreneur by 21.7 percent.

Next we turn to the primary marginal effect of interest for the purposes of this study, i.e. the marginal effect of wealth on entrepreneurial choice. In specification (1) of Table 2, we consider a linear relationship between household wealth and entrepreneurial entry. Similar to

other studies, we find a positive and significant coefficient on net worth. The results show that an extra $100,000 worth of assets would increase the probability of choosing entrepreneurship by approximately a tenth of a percent.

In specification (2), we re-estimate the probit model including dummy variables for quantiles of the wealth distribution. We divide individuals into 5 groups: the first 3 groups represent the first 3 quartiles of the wealth distribution (quantile 1=percentiles 0 through 25, quantile 2=percentiles 26 through 50, quantile 3=percentiles 51 through 75), the fourth quantile represents percentiles 76 through 94, and the fifth quantile represents the top 5 percent of the distribution, ranked by wealth holding. The results show that as wealth increases, an individual becomes increasingly likely to choose entrepreneurship. People in the 3rd quantile are 0.8 percent more likely to become entrepreneurs while people in the 4th quantile are 2.3 percent more likely and people in the 5th quantile are 5.7 percent more likely to choose entrepreneurship, all compared to people in the 1st quantile of the wealth distribution. This result suggests that the effect of net worth on entrepreneurial entry may be nonlinear, and thus vary across the wealth distribution, a case that we consider in specification (3) explicitly.

In specification (3) of Table 3 we use a 5th order polynomial in wealth for entrepreneurial entry decisions. We experimented with a variety of polynomial specifications and found that a 5th order polynomial fits our data the best. We find that all of the coefficients for the polynomial terms are significant. We also find, like Hurst and Lusardi (2004), a likelihood ratio test rejects the specification in which wealth is included linearly in favor of the 5th order polynomial version. Testing the joint significance of the coefficients on the polynomial terms shows that they are jointly significant at the 1 percent level. The marginal effect of net worth on the probability of becoming an entrepreneur, evaluated at mean values, is 0.012, which is almost ten times the marginal effect given by the linear specification.

We also present the results of the polynomial model by graphing the relationship between wealth and the probability of entrepreneurship. Figure 1 is drawn using the estimates from specification 3 in Table 2. The graph is slightly convex indicating that wealth has an increasing effect on the probability of entrepreneurship for individuals in the top half of the wealth distribution. We find that the observed relationship between the probability of

entrepreneurial entry and net worth is positive, starting at quite low levels of the wealth distribution. This result is in contrast to that of Hurst and Lusardi (2004) who found that the probability of entrepreneurship is flat through most of the wealth distribution. Our results indicate that at the 25th percentile of the net worth distribution, increasing net worth by $100,000 leads to a 1.12 percent increase in the probability of becoming an entrepreneur. The marginal effect is 1.19 percent at median net worth and is 1.26 percent at the 99th percentile. These marginal effects are all statistically significant. Based on the estimates specification (3), the average predicted probability of becoming an entrepreneur in our sample is 3 percent. Therefore, these reported increases in probability of entrepreneurship associated with a $100,000 increase in net worth represent substantial changes in one's likelihood to enter entrepreneurship.

Figure 1 approximately here.

As mentioned in the theory section above, the positive relationship between net worth and entrepreneurship observed in these regression results may be driven by an omitted variable that is correlated with both net worth and entrepreneurial choice. In order to tease out the direct link between net worth and entrepreneurship, controlling for the potential endogeneity of net worth, we use housing price residuals as an instrument for net worth. Capital gains on housing, originally proposed by Hurst and Lusardi (2004) as an instrument for wealth, exploit the regional variation in housing price appreciation in the 1980s.

The measure of the regional appreciation in house prices that is used in our regressions is purged of the effects of state and regional economic conditions. In particular, we regress changes in the self-reported real value of houses for our sample between 1985 and 1988 on demographic variables (age, gender, race, marital status, family size, education and income) and two regional economic indicators (state real GDP and the regional unemployment rate). The regional unemployment rate is reported in the NLSY for each individual based on the unemployment rate in their MSA. We calculate state real GDP using the Bureau of Economic Analysis data on nominal state GDP and regional CPI measures from the Bureau of Labor Statistics. We run this regression separately for each of the four major Census regions (Northeast, Midwest, South, and West), calculate the regional residuals which are

then matched to each respondent by their region of residence. These residuals capture the regional variation in housing price changes that are not driven by local economic conditions or the individual's demographics. We regress entrepreneurial entry after 1991 (between 1992 and 1994) on net worth, instrumented with residuals from past changes in housing prices, and the same covariates used in the previous probit regressions.

The instrumental variable regression results for the full sample, presented in column 4 of Table 1, indicate that the effect of net worth on the transition to entrepreneurship is statistically insignificant. Therefore, the positive relationship between net worth and the probability of entrepreneurship given by the first three specifications using an ordinary probit regression might have been due to the endogeneity of net worth in the entrepreneurship equation. Based on the theoretical framework, this finding suggests that individuals do not face binding liquidity constraints in deciding to become entrepreneurs, but the results of the non-linear specifications suggest we look closer at the sample before dismissing the link.

4.2 Results by Education and Experience Categories

In Table 3, we present results of the probit regression of entrepreneurial entry for three educational categories. For each category, we estimate the regression using ordinary probit (specification 1 in Table 3) and instrumental variable estimation (specification 2 in Table 3).

The ordinary probit results for people with less than a high school degree show that net worth has a statistically insignificant effect on the probability of becoming an entrepreneur. However, the effect of net worth on entrepreneurship is positive and statistically significant for people with a high school or higher degree. Probit results reveal that increasing net worth by $100,000 is associated with a 0.1 percent increase in the probability of becoming an entrepreneur among workers with a high school degree. A similar increase in net worth leads to a 0.2 percent increase in the probability of entrepreneurship among college educated workers.

We also investigate the potential non-linearity between net worth and the probability of becoming an entrepreneur for these categories, by estimating a probit model in which entrepreneurial entry is expressed as a 5th degree polynomial of net worth. Using the esti-

mates of this non-linear specification, we graph the relationship between the probability of entrepreneurship and net worth, holding other covariates at their mean values (Figures 2-4). Figure 2 shows that for people with less than a high school degree, the probability of entering entrepreneurship initially increases and then decreases as wealth increases. This concave relationship suggests that while wealth positively affects the probability of entrepreneurship at lower wealth levels, it negatively affects that probability at higher wealth levels. The rate of decline in the probability of entrepreneurship in the second half of the wealth distribution is quite steep.

The graphs for high school and college graduates, on the other hand, reveal the more common convex relationship between the probability of entrepreneurship and net worth. The net worth-entrepreneurship probability profile rises more steeply for high school graduates compared to college graduates, indicating a stronger positive relationship between wealth and entrepreneurial entry for people whose highest degree is high school.

Figures 2-4 approximately here.

The relationship between net worth and entrepreneurship as reported by these probit regressions, however, similar to those for the full sample, might be driven by omitted variables that are related to both wealth and entrepreneurial decisions. In order to account for this possibility, we estimate the probit equations of entrepreneurship using exogenous changes in housing prices as an instrument for net worth. The instrumental variable estimation results, presented under the specification (2) columns in Table 3, reveal that net worth has a large negative effect on the propensity to become an entrepreneur among workers with less than a high school degree. According to the results presented in column 2 of Table 3, increasing net worth by $10,000 dollars leads to a 20.63 percent decrease in an individual's probability of choosing entrepreneurship among people with less than a high school degree. For people with high school and college degrees, IV estimation results suggest that net worth has no statistically significant effect on the probability of entrepreneurship which is the same result we found for the whole sample.

Next we consider the effect of net worth on becoming an entrepreneur for different experience groups (Table 4). Ordinary probit regression results presented under specification (1)

for each category show that net worth has a positive and statistically significant coefficient for all levels of labor market experience, which is again similar to the results for the full sample. We also estimate probit regressions in which net worth is entered as a 5th degree polynomial. Figures 5-7 are generated based on the results of this specification. The descriptive relationships between wealth and entrepreneurship as presented in these figures are similar to the figures for different education groups. The figures reveal that among people with low experience, the propensity to become an entrepreneur is concave in net worth, initially increasing and then decreasing. In this experience group, the marginal effect of net worth on entrepreneurial entry is 4.57 at the 25th percentile of the net worth distribution, 4.55 at median net worth, and only 2.04 at the 99th percentile (all statistically significant). For people with medium work experience, the probability of entrepreneurship mildly increases with net worth. For example, the marginal effect of net worth increases from 1.16 to 1.21 when net worth increases from its level at the 25th percentile to that at the 99th percentile for this group. The entrepreneurship-net worth profile is much flatter among people with high experience levels. In accordance with this observation, the marginal effects of net worth for the high experience group are statistically insignificant at the 25th, 50th and 99th percentiles.

Figures 5-7 approximately here.

The instrumental variable regression results are presented under specification (2) in Table 4. When net worth is instrumented using a measure of exogenous changes in housing prices, we find that net worth has a negative and statistically significant effect on the probability of becoming an entrepreneur among people with low labor market experience, which is what we also find for the low education category. In particular, increasing net worth by $10,000 dollars leads to an 18.24 percent decrease in the probability of entrepreneurship. For people with a medium or high level of experience, net worth has a statistically insignificant effect on entrepreneurial entry. These results are consistent with the IV estimation results for different education groups. In general, we find that wealth has a negative effect on entrepreneurial entry for people with low human capital, in terms of either education or wage-work experience, and it has no effect on entrepreneurial choice for people with higher levels of human capital.

5 Discussion

The results of our empirical analysis reveal that the nature of the relationship between net worth and entrepreneurship among people with low human capital, defined by low work experience and low education, might be quite different than the one observed among people with medium and high levels of human capital. At a descriptive level, the relationship between net worth and the probability of entrepreneurship among people with low human capital appears concave, with the probability initially increasing with net worth and then declining. For people with higher levels of human capital, the observed relationship between net worth and the probability of entrepreneurship can be described as convex with the probability of entrepreneurship increasing at an increasing rate with net worth, although the profile is quite flat among people with highest human capital.

Our IV probit regressions suggest that these observed relationships might be partially due to omitted variables that are related to both net worth and entrepreneurial choice. In fact, the IV probit regression results reveal that net worth has a negative effect on the propensity to become an entrepreneur among people with low human capital. For people with medium and high human capital levels, net worth has no statistically significant impact on one's propensity to become an entrepreneur, which is what we also find for the full sample.

Within the theoretical framework developed by Evans and Jovanovic (1989) and summarized above, the statistically insignificant effect of net worth on entrepreneurial entry by workers with medium and high levels of human capital indicates that people with medium and high work experience or education do not face binding liquidity constraints in their entrepreneurial decisions. This result supports the findings of Hurst and Lusardi (2004). However, the negative coefficient on net worth that we find for low education and low experience categories cannot be explained within the standard Evans-Jovanovic framework. The standard Evans-Jovanovic model of entrepreneurial entry describes conditions under which wealth either positively affects entrepreneurship or it does not influence entrepreneurship. Therefore, we need to address two questions at this juncture: 1) what does a negative effect of net worth on entrepreneurial entry signify?, and 2) why is the effect of net worth on en-

trepreneurial entry negative only among people with low human capital? Below we discuss two alternative explanations to these questions.

A situation in which wealth negatively effects entrepreneurial choice may arise when the process of seeking external finance has a positive impact on the value of the entrepreneurial venture. According to this argument, the process of applying for and obtaining credit for entrepreneurial ventures make aspiring entrepreneurs improve their business plans, strategies and hence the profitability of their businesses. In other words, external finance provides a disciplining effect that increases the return to entrepreneurship. As a result, individuals who are more likely to seek external finance, i.e. low-wealth individuals, experience an increase in their potential entrepreneurial income. As their potential entrepreneurial income rises due to the positive impact of the vetting process on their business plans and strategies, low-wealth individuals become more likely to choose entrepreneurship. As wealth increases and the likelihood of seeking external finance falls, so does the individual's potential entrepreneurial income and hence her likelihood of choosing entrepreneurship.

Then the question is why do we observe this negative effect of wealth on entrepreneurship for individuals with low human capital? In other words, why is the positive effect of external finance on the return to entrepreneurship prominent among people with low education and work experience? The discipline of external finance would play a more prominent role in the entrepreneurial choice decisions of individuals with low human capital if these individuals are more likely to open businesses in industries that require high starting capital which make them more likely to seek external finance. In order to assess the validity of this argument against our data, we present a breakdown of workers and entrepreneurs in our sample by their industry category.

We divide industries into three categories: industries with low capitalization requirements, industries with high capitalization requirements and professional industries. We follow Hurst and Lusardi (2004) who use the 1987 National Survey of Small Business Finances (NSSBF) restricted to newly created business in determining the cut-offs for low and high capital industries. Industries with low starting capital consist of construction and services, both of which have median starting capital value of less than $20,000 in 1996 dollars. Industries

with high starting capital consist of mining; transportation, communication, public utilities; finance, insurance, real estate; manufacturing; wholesale trade, and retail trade, all with median starting capital of more than $35,000. Professional services, which include doctors, lawyers, portfolio managers, accountants, etc. are not included in the NSSBF, so we include it as a separate category. We note also that the high capital requirement industry category is large and diverse, including industries from insurance sales to retail trade and there is no a priori requirement for high capital industries to require high human capital attainment. On the other hand, the professional services category typically requires certification in the industry before being able to set up a business, which automatically implies that individuals in these industries will have more education.

As presented in Table 5, 66 percent of workers with less than a high school degree work in high-capital industries, compared to 63 percent of high school graduates and 47 percent of college graduates. These figures suggest that a disproportionate portion of workers with low education may aim to open businesses in high capital industries, and therefore, they may be more likely to seek external finance and experience its disciplining effect. The industry breakdown of new entrepreneurs, on the other hand, shows that 49 percent of people with less than a high school degree have opened a business in a high-capital industry whereas 52 percent of people with high school degrees and 47 percent of those with college degrees have started businesses in a high starting capital industry.

Another situation in which wealth negatively affects the probability of entrepreneurship may arise due to adverse selection in entrepreneurial entry. This argument is eloquently described by De Meza and Webb (1998) in their theoretical model of asymmetric information. Their model is based on the assumption that aspiring entrepreneurs are heterogeneous with respect to their entrepreneurial ability, and creditors cannot distinguish between high ability and low ability entrepreneurs. The resulting equilibrium is one in which high ability entrepreneurs subsidize low ability entrepreneurs due to the lender's inability to discern between the two types. De Meza and Webb argue that such an equilibrium might exhibit too much lending and 'excess entry' into entrepreneurship. When the credit constraint loosens at higher levels of wealth, the amount of lending decreases, the severity of the adverse selec-

tion problem also diminishes, and we observe less entry into entrepreneurship by low ability individuals who are less subsidized by the high ability individuals. Thus, wealth is negatively related to entrepreneurial entry within this model.

How can we then explain the existence of the negative relationship between wealth and entrepreneurship for only low human capital categories? According to the framework of De Meza and Webb, we should observe a negative relationship among people with low human capital if adverse selection is a more prominent issue within this group. It can be argued that adverse selection of the kind described above may be a more significant problem for the low human capital group. People with low education and low experience are likely to have less publicly available information on their accomplishments, where this information may work as a signal of their true ability. For instance, they are less likely to have publicly available information on prior jobs, references and education, merely because their educational and work experiences are shorter compared to the higher human capital group. People with higher levels of education or experience are likely to have a longer record of their prior accomplishments, such as grades in school, performance in previous jobs, etc., which are useful to the lender in distinguishing between different types of entrepreneurs. Thus, adverse selection, stemming from the lender's inability to discern between low ability and high ability individuals, may be a more significant problem among people with low human capital due to less publicly available information on the individual's ability.

Each of these two explanations provides some rationale for our results. However, in order to fully explain the negative relationship between wealth and entrepreneurial entry for low human capital individuals, we need to create a model that can generalize Evans and Jovanovic's model, which we leave for future work. We emphasize that, consistent with other more recent studies, e.g., Nanda and Kerr (2009) and Disney and Gathergood (2009), we find the relationship between wealth and entrepreneurship to be complicated.

6 Conclusion

In this paper, we investigate the extent to which individuals face binding liquidity constraints in their entrepreneurial entry decisions by revisiting the relationship between wealth and the transition to entrepreneurship. Our study contributes to the existing literature by focusing on how the degree of liquidity constraints varies across entrepreneurs with different levels of human capital. Our findings, based on analysis of the National Longitudinal Survey of Youth, suggest that the relationship between wealth and entrepreneurial entry we observe is positive and nonlinear in the full sample. The probability of becoming an entrepreneur increases at an increasing rate with wealth, starting at much lower levels of wealth than reported in Hurst and Lusardi (2004). However, when we use lagged changes in regional housing prices as an instrument for wealth, we find no statistically significant effect of wealth on the entrepreneurial entry decision, suggesting that the observed positive relationship between wealth and entrepreneurial choice may be spurious in nature.

We also find substantial heterogeneity among entrepreneurs with respect to their human capital attainment. We find the relationship between the probability of becoming an entrepreneur and wealth to be convex for individuals with medium and high human capital attainment but concave for individuals with low human capital. However, instrumental variable regression results show that the effect of wealth on entrepreneurial entry is statistically insignificant for individuals with medium and high levels of human capital. Curiously, we continue to find the relationship is significant and negative for individuals with low work experience or less than a high school degree. We suggest that the negative relationship may be explained by either the disciplining effect of applying for and attaining external capital or disproportional adverse selection problems for individuals with low human capital. We leave development of a full theoretical model to explain these results to future work.

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7 Tables

Table 1: Descriptive Statistics of Entrepreneurs and Wage Workers: Pooled sample

Variable	Wage Workers	Self-Employed	p-value of Difference
Age	27.11	28.4	< 0.01
Male	0.51	0.60	< 0.01
Black	0.25	0.14	< 0.01
MSA resident	0.81	0.79	< 0.01
Married	0.45	0.58	< 0.01
Number of Children in HH	0.78	1.0	< 0.01
Years of Education	12.9	12.7	< 0.01
Unemployment Experience	37.6	29.1	< 0.01
Job Separations	7.1	7.8	< 0.01
Work Experience	6.7	7.4	< 0.01
Real Income	\$20,972	\$36,899	< 0.01
Assets	\$37,757	\$102,676	< 0.01
Debts	\$22,745	\$64,601	< 0.01
Net Worth	\$19,993	\$49,366	< 0.01
Ever Received Inheritance	0.08	0.11	< 0.01
Amount of Inheritance	\$553	\$1,130	< 0.05

Note: Financial data are from the 1985-1994 waves of the NLSY excluding 1991. Income, Assets, Debt, Inheritances and Net Worth are deflated using 1982-1984 as a base year based on CPI data from the Bureau of Labor Statistics. Responses are mean values where appropriate and frequencies elsewhere.

Table 2: Pooled Probit Regressions of Entrepreneurial Entry for Full Sample (marginal effects reported)

	Specification			
	(1)	(2)	(3)	(4)
Age	0.006 (.003)*	0.006 (.003)*	0.007 (.003)**	-.25 (.430)
Age^2	-.0001 (6e^{-4})**	-.0001 (.0001)**	-.0001 (6e^{-5})**	.004 (.007)
Gender	0.007 (.002)***	0.006 (.002)***	0.006 (.002)***	.140 (.073)**
Black	-.013 (.002)***	-.011 (.002)***	-.011 (.002)***	-.064 (.091)
Married	0.004 (.003)	-.001 (.003)	0.001 (.003)	0.135 (.122)
Children in HH	0.004 (.001)***	0.004 (.001)***	0.004 (.001)***	0.027 (.033)
Spouse Working	-.001 (.003)	-.002 (.003)	-.001 (.003)	-.217 (.107)**
MSA resident	0.004 (.002)**	0.004 (.002)*	0.003 (.002)	0.198 (.101)**
Yrs of Education	-.0005 (.001)	-.001 (.0004)***	-.001 (.0004)**	-.014 (.020)
Unemployment	0.005 (.004)	0.006 (.004)*	0.005 (.004)	-.053 (.184)
Job Separations	0.002 (.0002)***	0.002 (.0002)***	0.002 (.0002)***	0.037 (.008)***
Income	0.0003 (.0004)	0.0002 (.0005)	0.00001 (.0005)	0.014 (.017)
Net Worth	0.001 (.0003)***		0.010 (.001)***	-.039 (.196)
Quantile 2		0.003 (.003)		
Quantile 3		0.008 (.003)***		
Quantile 4		0.023 (.004)***		
Quantile 5		0.057 (.009)***		
Networth^2			0.002 (6e^{-5})***	
Networth^3			-.00003 (6.12e^{-6})***	
Networth^4			-2.87e^{-7} (5.4e^{-8})***	
Networth^5			7.72e^{-9} (1.65e^{-9})***	
Sample Size	39,772	39,772	39,772	6,479

Note: Sample includes individuals who are part of the labor force. Analysis is restricted to those who are not self-employed in period t; the dependent variable is a dummy variable, indicating transition into entrepreneurship in period $t+1$. Huber-White standard errors reported in brackets. Net worth is divided by \$100,000 to make the coefficients conform in size and is corrected for inflation using 1982-1984 as a base year for the CPI from the Bureau of Labor Statistics. For the IV regression, the instrument is housing price residuals. We report stage two results in column 4. *** Significant at 1 %, ** significant at 5 %, * significant at 10 %.

Table 3: Pooled Probit Regressions of Entrepreneurial Entry based on Education (marginal effects reported)

	Less than HS		HS plus		College plus	
	(1)	(2)	(1)	(2)	(1)	(2)
Age	0.0002 (.011)	1.002 (.982)	0.007 (.004)*	-.757 (.518)	0.021 (.010)**	-.136 (.897)
Age^2	-.00003(.0002)	-.017 (.016)	-.0001 (7e^{-5})**	-.017 (.016)	-.0004 (.0002)**	0.002 (.145)
Gender	-.002 (.007)	0.127 (.236)	0.007 (.002)***	0.179 (.094)**	0.005 (.0034)	-.019 (.142)**
Black	-.013 (.007)	0.020 (.150)	-.014 (.002)***	-.111 (.117)	-.012 (.004)***	0.047 (.198)
Married	0.008 (.009)	0.110 (.212)	0.004 (.004)	-.012 (.168)	-.0007 (.007)	0.162 (.249)
Children in HH	0.001 (.003)	0.043 (.058)	0.003 (.001)***	0.068 (.042)*	0.005 (.002)**	-.007 (.098)
Spouse Working	-.016 (.008)**	-.054 (.288)	0.002 (.003)	-.137 (.138)	-.005 (.007)	-.147 (.231)
MSA resident	0.004 (.007)	0.195 (.173)	0.004 (.002)*	0.146 (.123)	0.006 (.005)	0.571 (.321)*
Yrs of Education	-.001 (.002)	-.061 (.045)	0.001 (.0009)	-.010 (.046)	0.005 (.002)***	.156 (.066)**
Unemployment	-.004 (.0095)	-.028 (.301)	0.005 (.005)	-.434 (.273)	0.015 (.013)	0.711 (.305)**
Job Separations	0.001 (.0006)*	-.031 (.012)***	0.002 (.0002)***	0.055 (.008)***	0.002 (.0004)***	0.034 (.0182)*
Income	-.0054 (.050)	3.33 (1.645)**	0.0002 (.0005)	0.007 (.036)	0.0003 (.0008)	0.0278 (.038)
Net Worth	0.001 (.0006)	-2.063 (.897)**	0.001 (.0003)***	0.252 (.282)	0.002 (.001)***	-.206 (.230)
Sample Size	4,612	624	26,983	4,425	8,269	1,430

Note: Sample includes individuals who are part of the labor force. Analysis is restricted to those who are not self-employed in period t; the dependent variable is a dummy variable, indicating transition into entrepreneurship in period $t+1$. Huber-White standard errors reported in brackets. Net worth is divided by \$100,000 to make the coefficients conform in size and is corrected for inflation using 1982-1984 as a base year for the CPI from the Bureau of Labor Statistics. For the IV regression, the instrument is housing price residuals. We report stage two results in specification 2 (column 2 for each education category). *** Significant at 1 %, ** significant at 5 %, * significant at 10 %.

Table 4: Pooled Probit Regressions of Entrepreneurial Entry based on Experience (marginal effects reported)

	Low work exp		Medium work exp		High work exp	
	(1)	(2)	(1)	(2)	(1)	(2)
Age	-.002 (.007)	-1.754 (1.151)	0.006 (.007)	-.033 (.635)	0.014 (.009)	-.920 (.858)
Age^2	0.00004(.0001)	0.029 (.019)	-.0001 (.0001)	0.0003 (.010)	-.0003 (.0002)*	0.013 (.014)
Gender	0.008 (.003)***	-.078 (.200)	0.009 (.002)***	0.027 (.092)	0.008 (.004)**	0.457 (.160)**
Black	-.018 (.003)***	-.030 (.266)	-.013 (.002)***	-.178 (.121)	-.007 (.005)	0.100 (.174)
Married	0.008 (.005)	0.260 (.326)*	-.003 (.004)	-.075 (.193)	0.012 (.006)*	0.183 (.186)
Children in HH	0.006 (.002)***	-.070 (.089)	0.001 (.001)	0.015 (.048)	0.002 (.002)	0.051 (.062)
Spouse Working	0.001 (.005)	-.061 (.366)	0.006 (.004)	0.015 (.162)	-.016 (.005)***	-.410 (.151)***
MSA resident	0.0002 (.003)	0.484 (.253)*	0.004 (.003)	0.131 (.134)	0.014 (.004)***	0.160 (.184)
Yrs of Education	-.00003 (.007)	0.069 (.056)	-.001 (.0005)	0.007 (.026)	-.001 (.001)	-0.075 (.028)***
Unemployment	-.001 (.005)	-.124 (.288)	0.007 (.008)	-.029 (.230)	0.014 (.014)	–
Job Separations	0.002 (.0004)***	0.046 (.022)**	0.002 (.0002)***	0.051 (.009)***	0.001 (.0004)**	0.012 (.015)
Income	-.037 (.026)	-3.04 (1.527)**	0.0006 (.0004)	0.040 (.030)	-.002 (.001)	-.053 (.048)
Net Worth	0.001 (.0007)**	-1.824 (.895)**	0.001 (.0003)***	-.123 (.245)	0.005 (.003)*	0.327 (.309)
Sample Size	14,005	436	19,953	3,443	5,814	2,554

Note: Sample includes individuals who are part of the labor force. Analysis is restricted to those who are not self-employed in period t; the dependent variable is a dummy variable, indicating transition into entrepreneurship in period $t+1$. Huber-White standard errors reported in brackets. Net worth is divided by \$100,000 to make the coefficients conform in size and is corrected for inflation using 1982-1984 as a base year for the CPI from the Bureau of Labor Statistics. For the IV regression, the instrument is housing price residuals. We report stage two results in specification 2 (column 2 for each experience category). *** Significant at 1 %, ** significant at 5 %, * significant at 10 %.

Table 5: Industry Type and Education

	Workers			New Entrepreneurs		
Education	Low capital	High capital	Prof. Services	Low capital	High capital	Prof. Services
Less than High School	27	66	7	43	49	8
High school plus	18	63	19	34	52	13
College plus	12	47	41	20	47	33

Note: The table reports the percentages with varying levels of education in each industrial type category. Data are from 1985-1994 waves of the NLSY excluding 1991. The educational categories, less than high school, high school plus and college plus, represent individuals who did not graduate high school, who graduated high school and who may also have several years of college (but no college degree), who graduated college and who may also have several years of graduate education or a professional degree, respectively. The division among professional services, high and low starting capital industries is described in the text, section 5. The data describe the industrial composition of firms in our sample between 1985 and 1994. The percentages of firms in each industry only add up to 97.1 because some of our firms could not be classified and so were excluded.

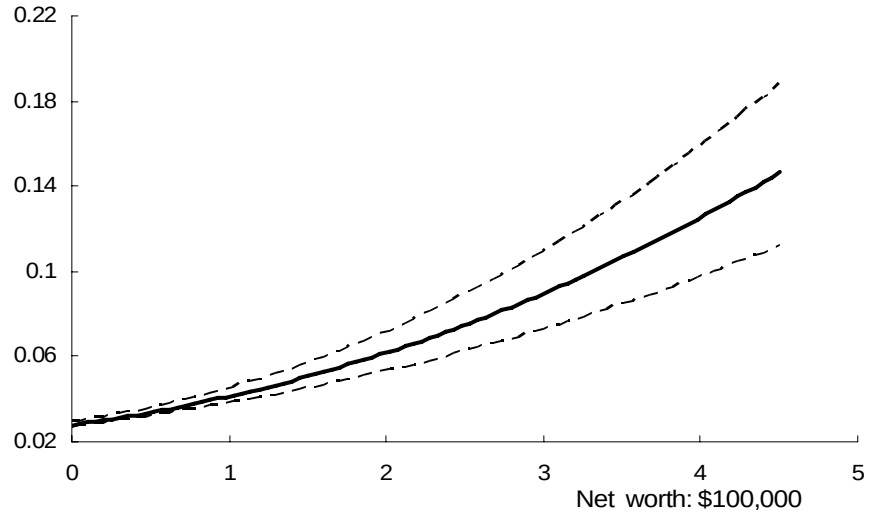

Figure 1: The probability of becoming an entrepreneur for different levels of net worth for the full sample. Graph is based on a polynomial specification, with all covariates held at their mean values. 95 percent confidence intervals shown.

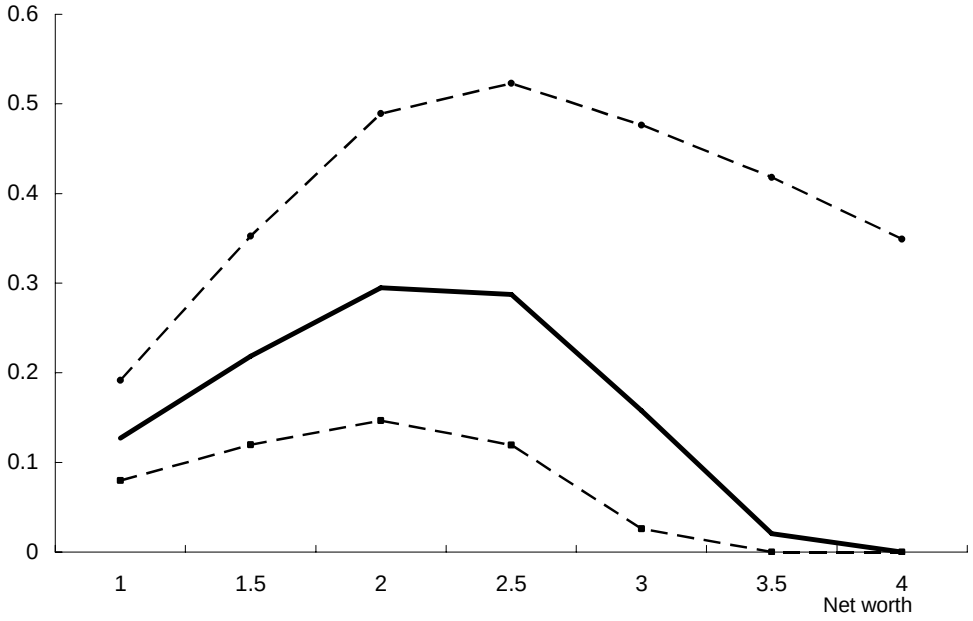

Figure 2: The probability of becoming an entrepreneur for different levels of net worth for individuals with low education (less than highschool). The graph is based on a polynomial specification, with all covariates held at mean levels. 95 percent confidence intervals shown (dotted lines).

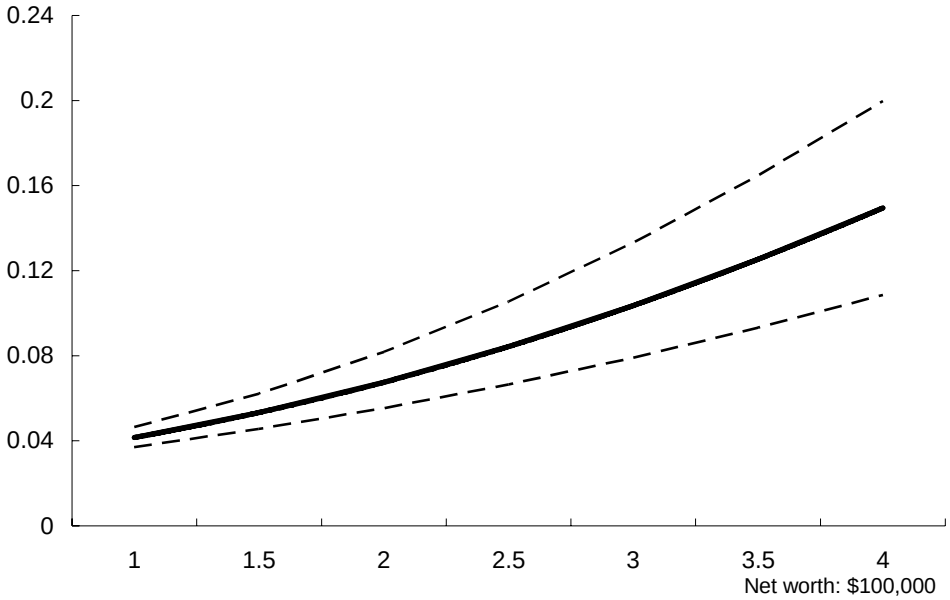

Figure 3: The probability of becoming an entrepreneur for different levels of net worth for individuals with a high school degree and less than a college degree. The graph is based on a polynomial specification, with all covariates held at mean levels. 95 percent confidence intervals shown (dotted lines).

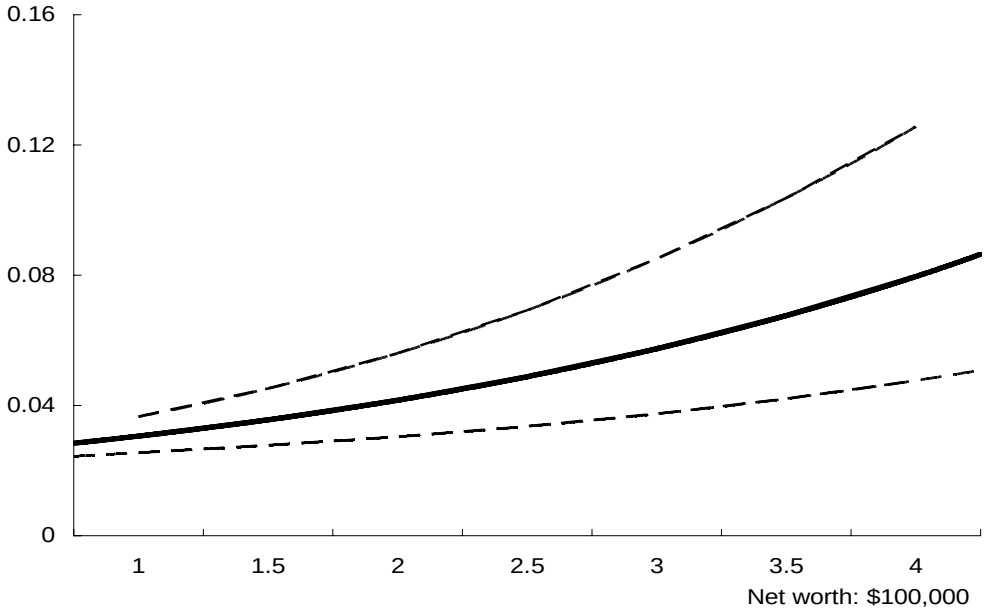

Figure 4: The probability of becoming an entrepreneur for different levels of net worth for individuals with a college degree or more. The graph is based on a polynomial specification, with all covariates held at mean levels. 95 percent confidence intervals shown (dotted lines).

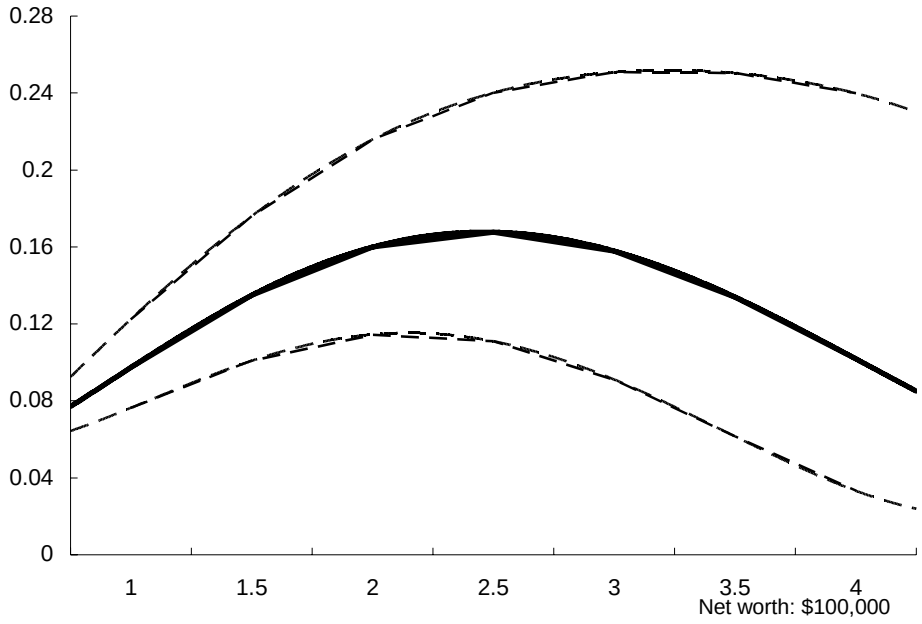

Figure 5: The probability of becoming an entrepreneur for different levels of net worth for individuals with low work experience. The graph is based on a polynomial specification, with all covariates held at mean levels. 95 percent confidence intervals shown (dotted lines).

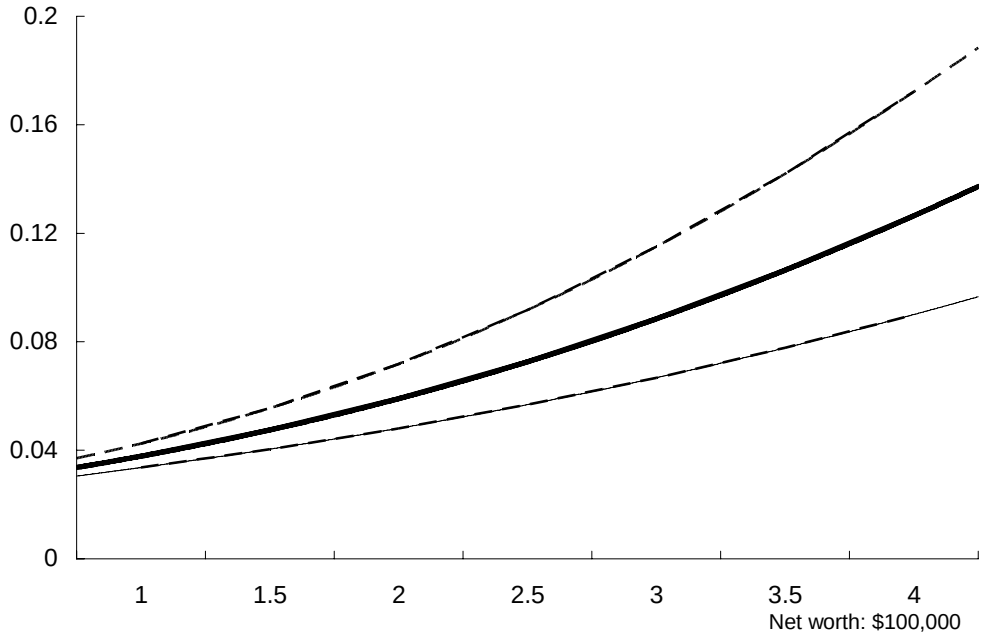

Figure 6: The probability of becoming an entrepreneur for different levels of net worth for individuals with medium work experience. The graph is based on a polynomial specification, with all covariates held at mean levels. 95 percent confidence intervals shown (dotted lines).

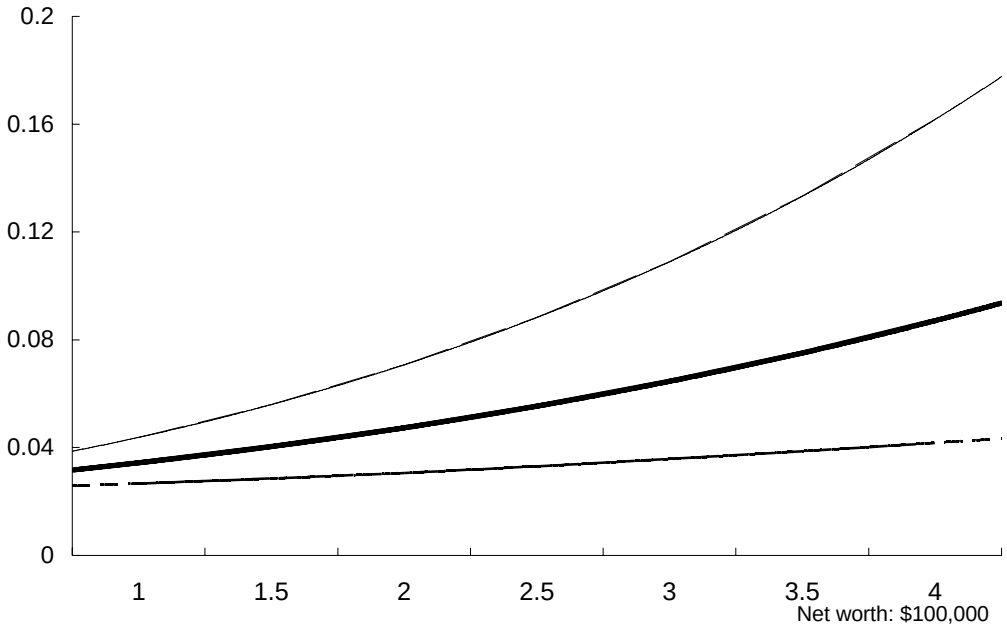

Figure 7: The probability of becoming an entrepreneur for different levels of net worth for individuals with high work experience. The graph is based on a polynomial specification, with all covariates held at mean levels. 95 percent confidence intervals shown (dotted lines).