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Abstract

Purpose – The purpose of this paper is to explore the relationship between low-wealth business founders in the USA and external startup funding. Specifically, the authors test whether a founders' low personal net worth is correlated with a lower probability of acquiring funding from outside sources during the business creation process.

Design/methodology/approach – The authors use a double-hurdle Cragg model to jointly estimate: first, the decision to acquire external financing; and second, the amount received. The sample is the US- based Panel Study of Entrepreneurial Dynamics II (PSED II). The PSED II tracks business founders attempting to start ventures from 2005 to 2012.

Findings – Receipt of outside financing during business formation is largely determined by the business founder's personal finances (controlling for human capital, venture type and industry, and whether money was sought in the first place). A higher household net worth results in larger amounts of external funding received. Low-wealth business founders, therefore, are less likely to get external funds, and they receive lower amounts when they do. The disparity between low-and high-wealth business founders is more pronounced for formal, monitored sources of external financing such as bank loans.

Research limitations/implications – Because the study eliminates survivor bias by using a nationally representative sample of business founders who are in the venture creation process, the findings apply to both successful business founders and those who disengaged during the business creation process. The authors offer insights into the sources and amounts of external funds acquired by individuals across all levels of wealth. The authors accomplish this by disaggregating business founders into wealth quintiles. The study demonstrates the importance of personal wealth as a factor in acquiring external startup financing compared to human capital, industry, or personal characteristics.

Social implications – If the ability to acquire external funding is significantly constrained, the quality of the opportunity and the skill of the business founder may be less a determinant of success at creating a new business as prior studies have suggested. Consequently, entrepreneurship (as measured by business formation) as a path toward upward, socioeconomic mobility will be afforded only to those individuals with sufficient financial endowments at the outset.

Originality/value – Unlike prior studies, the data used are not subject to survivor bias or an underrepresentation of self-employment. The statistical model jointly estimates acquisition of financing and the amount received. This resolves selection and censoring problems. Finally, the dependent variables directly measure liquidity constraints in the context of business formation, that is, before a new venture is created. Prior research contexts have typically studied existing businesses, and are therefore not true examinations of conditions affecting business creation.

Keywords: Wealth, Entrepreneurialism, Financing, Liquidity constraints, Nascent entrepreneurship

Introduction

The relationship between personal wealth and entrepreneurship is a contentious issue. The principal disagreement focusses on the extent to which wealth is an input affecting new venture creation (Parker, 2009). For example, a positive relationship between wealth and self-employment has been presented as evidence of liquidity constraints. These constraints limit the ability of low-wealth individuals to raise external capital (Evans and Jovanovic, 1989). However, liquidity constraints may also be limited to a small proportion of the self-employed population (Hurst and Lusardi, 2004).

However, much of the research on liquidity constraints focusses on outcomes after a venture is created, rather than on the business formation process itself. Indeed the logic of the liquidity constraints hypothesis is low-wealth individuals are less likely to acquire outside financing, and are therefore less likely to select self-employment over wage or salary work (Evans and Jovanovic, 1989). While some studies address business formation using samples of individuals acting to create a venture, these studies still use outcomes as the dependent variable of interest (Kim et al., 2006; Petrova, 2012).

The present study focusses on acquisition of external financing by individuals involved in the creation of businesses (labeled business founders) in the USA. We disaggregate wealth into quintiles to isolate differences between low-wealth business founders in the bottom 20 percent of the wealth distribution from those who are moderately to very wealthy. We examine whether they are constrained when raising different forms of capital from external sources (e.g. bank loans, lines of credit, and investments from family and friends). We hypothesize whether individual wealth and acquisition of external financing is an empirically significant relationship. Specifically, whether business founders in the lowest quintiles of wealth are less likely to acquire external financing, and among those who do, whether they acquire lower amounts compared to the individuals in higher wealth quintiles.

To test these hypotheses we employ the Panel Study of Entrepreneurial Dynamics II (PSED II) – a nationally representative sample of individuals in the business creation process – who are attempting to start new ventures. Utilizing the PSED II dataset eliminates survivor bias inherent to prior research on liquidity constraints, since a new venture has not yet been launched. This allows us to test the effects of wealth on startup financing for those individuals who abandoned the startup process, as well as for those who successfully created new ventures. The PSED II also measures financing not only from the respondent, but also from the founding team. This overcomes limitations in prior studies based on solo-entrepreneurs.

This study makes four additional contributions. First, it directly examines how household wealth affects a business founder's ability to acquire external financial resources. Second, it sheds light on the characteristics of business founders at the bottom of the wealth distribution, and the types of businesses they are starting. Third, it describes the types of funding acquired by low-wealth business founders. Fourth, by disaggregating the sample into wealth quintiles, it examines in detail the likelihood and amount of external financial support received at various levels of the wealth distribution. Given prior research indicating bank loans are associated with a higher survival rate of startup ventures (Åstebro and Bernhardt, 2003), understanding the ability to raise external funds is important for entrepreneurship policy and practice. If low-wealth business founders are constrained to personal financing then the role of entrepreneurship as a conduit of socioeconomic mobility may be called into question (Parker, 2009).

Hypotheses development

Liquidity constraints and startup financing

The relationship between an entrepreneur's wealth and access to financing is not fully resolved (Parker, 2009). Theoretically, entrepreneurs in the economy can finance all positive net present value projects when capital markets are perfectly efficient. However, entrepreneurs and investors operating in these markets are subject to varying levels of asymmetric information. Entrepreneurs can more accurately measure the risk level of their ventures, their own commitment, and their intentions to repay loans. Adverse selection bias can lead to the majority of investment going toward the riskiest projects with the highest returns (Stiglitz and Weiss, 1981). Lenders therefore demand collateral to safeguard the risk of their loan investment (Aghion and Bolton, 1997; Banerjee and Newman, 1993; Gentry and Hubbard, 2004). In fact, research indicates that 70 percent of US commercial loans are collateralized (Berger and Udell, 1990) and 90 percent of UK loans are over 20,000 pounds (Cressy, 1993). A lack of collateral ipso facto suggests that low-wealth entrepreneurs will be denied loans unless governments offer subsidized loans or guarantees minimizing lender risk (Parker, 2009; Riding and Haines, 2001).

Using US data, Evans and Jovanovic (1989) found that wealthier individuals are more likely to select into entrepreneurship due to liquidity constraints limiting self-employed individuals to raising external funds equal to 150 percent of their net worth. This ceiling means the less wealthy have a greater likelihood of abandoning startup ventures. This results in a suboptimal deployment of capital in the economy. Most empirical studies support this, finding a positive relationship between wealth and the decision to enter into self-employment (Evans and Leighton, 1989; Fairlie, 1999; Fairlie and Krashinsky, 2012; Gentry and Hubbard, 2004; Lofstrom and Bates, 2013; Quadrini, 1999; Zissimopoulos et al., 2010).

However, this relationship can also be explained by an endogeneity bias inherent in the data. Wealthy individuals may have a higher propensity to select into entrepreneurship, and wealth can also accumulate during the business formation process. To account for endogeneity issues, studies have examined the impact of exogenous windfalls (e.g. inheritances, lottery winnings, and housing appreciation) on selection into entrepreneurship. For example, both European and American research indicates that recipients of inheritances have an increased propensity to choose entrepreneurship over wage or salary employment (Blanchflower and Oswald, 1998; Holtz-Eakin et al., 1994). Others observe that inheritances are not truly exogenous as inheritances are passed down in wealthy families (Lofstrom et al., 2014). A truly exogenous instrumental variable is lottery winnings. A study using Swedish data found that lottery winners were associated with a 54 percent higher propensity to select into entrepreneurship (Lindh and Ohlsson, 1996). Recent evidence from the USA indicates another instrumental variable, housing appreciation, is positively associated with entrepreneurial entry (Fairlie and Krashinsky, 2012).

Human capital in the form of startup experience, education, and prior managerial employment can also affect startup financing. Research has found an underlying correlation between a lack of wealth and lower human capital (Cressy, 1996).

Controlling for human capital factors, the marginal contribution of finance to startup outcomes may be zero. This correlation can result in spurious results when investigating links between wealth and entrepreneurship. However, other studies have found conflicting evidence on and relationship between human capital factors and entrepreneurial entry. For example, formal education may be associated with a higher propensity to select into entrepreneurship (Davidsson and Honig, 2003; Kim et al., 2006; Reynolds, 1997). Attributes such as prior startup

experience or having self-employed parents may be negatively associated with entrepreneurship (Kim et al., 2006; Parker and Belghitar, 2006).

Yet, the question of whether liquidity constraints affect low-wealth entrepreneurs is not fully resolved. Even when accounting for both wealth endogeneity and human capital. Data from the US Panel Study of Income Dynamics (PSID) reveals that entry rates into entrepreneurship remain are flat all the way to the 95th percentile of the wealth distribution (Hurst and Lusardi, 2004). This suggests liquidity constraints may not be binding for the majority of self-employed individuals.

Financing of emerging ventures during business formation

Prior research has relied almost exclusively on large datasets of self-employed individuals, rather than of business founders in the process of business creation. This distinction is important for research on startup finance because the process of business formation is likely to differ from that of established firm financing. Investors may rely more on characteristics of the founder when making investment decisions for funding the creation of a business as there is no information on the operations of a business that does not, yet, exist (Ang, 1991). Also, the self-employed individuals that make up large datasets such as the PSID do not allow for adequate examination of wealth effects on financing. These datasets use self-reported measures of self-employment and this option in the questionnaire is mutually exclusive from listing wage or salary work (Reynolds and Curtin, 2008). Yet, we know many individuals starting businesses simultaneously work full- or part-time jobs. These datasets therefore underrepresent self-employment in the larger economy. Second, the measure of self-employment itself contains a survivor bias because it represents ventures that have already succeeded. Individuals who failed or otherwise disengaged from the business creation process are not included. Focussing on data on the self-employed (those already in business) results in a biased understanding of how a lack of wealth affects both disengagement and success at business formation.

Models testing the effects of personal wealth on business formation using data from the PSED I and II resolve both issues (Reynolds and Curtin, 2008). The PSED is a representative sample of individuals in the process of starting a business. This dataset were designed to test and predict variation in the transition from not having a venture to successfully starting one, or disengaging from the process. Prior research on business founders in the PSED finds no significant relationship between wealth and entrepreneurial outcomes. The modest financial capital required to start most ventures may explain this – 50 percent of these business creation efforts begin with $2,500 or less (Kim et al., 2006). Other research finds individuals holding a job during the business creation process are not liquidity constrained (Petrova, 2012). Yet, founders with a low personal net worth may be much more likely to disengage from the business creation process rather than new continue (Parker and Belghitar, 2006).

From these conflicting findings we argue the question of liquidity constraints is not a settled issue. On the one hand, studies investigating the effect of wealth on self-employment find evidence supporting the liquidity constraints hypothesis. Yet even where there is agreement, the degree to which a lack of capital affects the self-employed is unclear. This may be due to prior research that has examined liquidity constraints using success or disengagement as the outcome variable of interest. The logic of liquidity constraints is that: first, low-wealth individuals; second, are less able to get funding or are less likely to take on the risks of entrepreneurship; and third, are therefore less likely to succeed or more likely to select wage/salary work (Evans and Jovanovic, 1989). Prior studies inadvertently skip the intermediate step of acquiring external

capital. We therefore examine the following hypotheses to determine the extent to which low-wealth business founders are able to acquire outside financing:

H1a. Business founders with a lower household net worth will be less likely to acquire external funds compared to wealthier business founders.

H1b. Business founders with a lower household net worth, who do acquire external funds, will acquire lower amounts compared to wealthier business founders.

Formal external financing of emerging ventures

Most studies on liquidity constraints examine financing from formal financial institutions, such as banks and venture capitalists, rather than from informal sources such as friends and family. Formal financial support has been linked to positive entrepreneurial outcomes. For example, among efforts to create businesses in the USA, only 15 percent of all discontinued venture efforts reported receiving formal financial support (Reynolds, 2011). The average amount received was $4,000. This may suggest that failure to obtain formal support may be a sign the venture is not viable. Legitimizing behaviors by business founders have also been linked to the acquisition of external funds. Preparation of formal financial projections and legally registering the firm signal that a business founder is organized and prepared (Tornikoski and Newbert, 2007). These activities are also associated with higher amounts of external funding (Gartner et al., 2012).

US data from the Kauffman Firm Survey reveals the importance of access to formal bank debt, owner-backed loans, business loans, and credit lines for startups. The average new firm had obtained approximately half of their financial capital (over $50,000) from external capital sources using personal assets as collateral (Robb and Robinson, 2014). However, borrowing constraints may be limited in practice, as a typical startup requires only small amounts of capital (Parker, 2009). For example, over 80 percent of Inc. 500 founders bootstrapped their startups and invested a median of $10,000 (Bhide, 2000).

In the UK, small, growing firms lacking significant collateral have major issues obtaining formal external financing. In contrast, established firms are able to obtain almost 81 percent of funding sought (Cosh et al., 2009). Similarly, 80 percent of Dutch founders obtained the necessary external financing (Parker and Van Praag, 2006).

Emerging ventures may also follow a pecking order throughout the funding process, which would explain when and why certain sources of external financing are acquired relative to others. Pecking order is a financing framework addressing agency issues between founders and funding sources. These issues affect the funding sequence. According to pecking order theory, firms select sources of financing to minimize the cost of capital – first using personal sources, followed by external debt, and ending with external equity (Myers, 1984; Myers and Majluf, 1984). In the context of emerging ventures, however, it is unclear whether founders are driven to use personal funds as a result of the capital cost of debt and equity since, at such an early stage, most funding originates with the founder or founding team (Gartner et al., 2012). Nevertheless, prior research has shown that business founders are more likely to use debt and, then, equity later during the process of business creation (Frid, 2015).

In the UK between 2000 and 2003, 80 percent of small- and medium-sized enterprises used some form of external financing: 27 percent used asset financing; 6 percent using grants; 24 percent using term loans; and 3 percent using equity financing. During the same period, 6 percent used either debt or equity from friends and family (Fraser, 2005). Reynolds (2011) calculates that the average emerging enterprise raises $48,000 before legal registration (he terms

this informal support) and $200,000 after legal registration (or formal support). He finds that the amount of informal financial support has little connection to venture outcomes. Given prior studies' mixed findings related to formal and informal funding we test the following hypotheses focusing on formal, external financing:

H2a. Business founders with a lower household net worth will be less likely to acquire monitored funding sources from formal institutions, compared to wealthier business founders.

H2b. Business founders with a lower household net worth, who do acquire monitored funding from formal institutions, will acquire lower amounts compared to wealthier business founders.

Methodology

Sample

The PSED II database is a nationally representative sample of individuals who, between 2005 and 2012, were in the process of creating new ventures (Reynolds and Curtin, 2008). Respondents considering themselves involved in creating a firm, who had taken action toward creating a startup, and expected to own all or part of the new venture once created were considered business founders and allowed to participate in the study. There are 1,214 business founders who make up the PSED II sample, and they completed 60-minute interviews in 12-month intervals. Reynolds and Curtin (2008) provide a detailed description of the sampling method and interview protocol used to create the dataset.

The PSED II is appropriate for this study's investigation of startup financing by low-wealth, business founders for four reasons. First, it is a nationally representative sample of individuals in the process of starting a business, but the business itself does not yet exist. Conclusions drawn from this study are generalizable to the US population of business founders. Second, survivor bias is eliminated since respondents do not exit the sample until either a new firm is created or the respondent disengages. Third, respondents' household net worth, and the specific types and amount of financing acquired throughout the startup process were carefully measured and recorded. The business founders in the sample were asked a series of questions on both topics during their phone interviews to ensure accurate and comprehensive financial data. Finally, the data contains information on the personal characteristics of respondents, and on firm and industry characteristics related to their emerging ventures. The PSED II was designed to include variables that explain and predict phenomena occurring during the transition from not having a business, to operating a new firm. In this study we use household wealth, human capital, demographic information, and firm characteristics to describe and predict acquisition of external financing by low-wealth business founders.

Dependent variables

Four dependent variables measure the type and amount of external financing business founders acquire: a binary variable measures whether any external funding was acquired (Model 1a); a continuous variable measures the amount of external funding acquired (Model 1b); a second binary variable measures whether formal external funds were acquired (Model 2a); and a second continuous variable measures the amount of formal external funding acquired. The two continuous variables are log-transformed to ensure normality.

Our measures of external financing are based on prior measures developed by Gartner, et al. (2012). We differentiate unmonitored funds that are provided with little to no oversight, from

monitored funds that are provided by formal institutions after a thorough and ongoing review of the startup and its operation. This distinction allows us to focus on how wealth, or the lack thereof, affects the acquisition of financing from formal institutions that will scrutinize entrepreneurs and their ventures. It also allows us to account for (to some extent) instrumental variables used in prior work that are not available in the PSED, such as housing appreciation (Hurst and Lusardi, 2004; Wolff, 2014; Zumbrun, 2014).

Unmonitored external funding includes money from family members (respondent and team); friends, employees, and co-workers (respondent and team); loans on a second mortgage or car (respondent and team); other asset-backed loans; and money in the form of leases on property and equipment. Formal external funding includes bank loans (respondent and team); working capital loans; loans from suppliers; loans from other financial institutions; venture capital; government loans; and guaranteed loans from government agencies, such as the US Small Business Administration.

Independent variable

To measure household net worth, each respondent was asked: first, the market value of their primary residence; second, how much is still owned on their mortgage; third, the amount of money in savings and investments; fourth, the amount of outstanding loans; and fifth, the amount of debts of all members of the household. Respondents were then asked (in Item Z36), "Based on what you just said, your household net worth would be approximately [difference between assets and liabilities reported] dollars. Is this correct?" For respondents answering "yes," the amount was recorded. For those answering "no," survey administrators repeated the above questions until the respondent agreed with the final total. If a respondent did not report a specific amount, a bracketed dollar amount was given (e.g. $100,000-$149,999) and the midpoint of the bracketed amount was used. Of the 1,214 respondents, 41 (3.3 percent) did not report any net worth and 167 (13.8 percent) opted to report a bracketed amount.

To test for curvilinear effects we also include the squared term of household net worth to our model.

Control variables

We control for a number of personal, firm, and industry characteristics likely to affect the relationship between wealth and external financing. A business founder's human capital (e.g. age, prior experience, and education) affects startup outcomes and resource acquisition (Coleman, 2004; Davidsson and Honig, 2003; Zanakis, et al., 2012). Age (item H2_1) is a continuous variable and is self-reported by respondents in the sample. Work experience (item H11_1) is the number of years the respondent worked in the same industry as the current startup while managerial experience (item H21_1) measures the number of years of supervisory experience in any industry. To test for curvilinear effects of both work and managerial experience, we also add the squared term of each variable to our model. Startup experience (item H12_1) is a binary variable measuring whether the respondent has no prior startup experience, or at least one prior startup. Education (item QS7) is a categorical variable measured where 1 is a high school education or below; 2 is some college; 3 is bachelor's degree; and 4 is graduate school.

The legal form and type of emerging venture are likely to attract external financing differently. Incorporated ventures are more likely to acquire bank loans because incorporation lends legitimacy to both the business founder and to the venture opportunity, compared to

ventures that have not yet been legally registered or are only sole-proprietorships (Cassar, 2004). Regarding venture type, independent new ventures have different financing requirements compared to takeovers, franchise opportunities, multilevel marketing initiatives (i.e. door-to-door sales businesses), and startups sponsored by existing businesses. Legal form (item C1) is coded as 1is sole- proprietorship; 2 is partnership; 3 is limited liability company; 4 is C- or S-corporation; and 5is not yet determined. Startup type is coded as 1is independent new venture; 2 is takeover of existing business; 3 is franchise; 4 is multilevel marketing initiative; and 5 is startup sponsored by existing business.

Industry is a binary variable measuring whether the nascent venture is complex, or otherwise routine. We develop this measure to control for industry and firm effects related to entrepreneurial entry – some industries and types of ventures require greater investment to enter than others (Lofstrom et al., 2014). For example, new businesses that require a dedicated location are likely to need greater amounts of financial investment compared to ventures that are modest in nature and run from the founder's primary residence (Davidsson and Gordon, 2012). To better assess an emerging venture's complexity, four variables from the PSED were used to create the industry control variable. First, respondents were asked about the kind of business they were starting. These responses were coded using the North-American Industry Classification System to six digits – economic sector (first two digits); subsector (third digit); industry group (fourth digit); NAICS industry (fifth digit); and national industry (sixth digit). However, use of the NAICS code is not sufficient for assessing complexity. Consider two ventures, for example, both of which are classified as "jewelry manufacturing." Upon closer examination, one venture is an individual making jewelry from home while the other has multiple locations with large equipment purchases having been made. We use a second variable, therefore, to assess the location where the business is being developed. Responses included the primary residence or a new or existing physical location. Third, respondents were asked whether one or more physical locations would be needed. Fourth, they were asked whether major items like equipment or property had been purchased. A separate data file was created that included each respondent's answers to the four variables. Respondents were then independently coded by the study's co-authors as either creating a complex, or routine, venture. Results indicated an inter-rater reliability estimate of 0.88 consistency[1].

Females tend to start smaller businesses compared to males, and therefore require fewer financial resources (Fairlie and Robb, 2009; Neeley and Van Auken, 2010). Prior studies also demonstrate links between startup capital requirements and race (Coleman, 2005). Sex (item QSEX) is coded as 0 is female; 1 is male. Race (item QS9_1) is coded as 1 is white; 2 is black; 3 is other (Hispanic or Asian).

Startups located in or near metropolitan areas may have more opportunities to acquire formal, external financing compared to those in rural areas. Metro (item METRO) is a binary variable measuring whether the startup is located in or near a metropolitan area, or in a rural area.

The business founders' personal financial stake in the startup may signal a higher level of commitment to starting a new venture, as well as a bet on their own abilities to successfully start the venture. Individuals investing a higher percentage of their own money should attract more funding from external stakeholders. Prior studies have found that it is not the total amount of personal money invested, but the proportion of household income invested, that matters (Frid et al., 2015; Prasad et al., 2000). Personal money invested is the sum of personal savings and credit card debt used as a proportion of household net income. Credit card debt is considered personal

money because it is money provided with no knowledge of its use, and no oversight into the creation and operation of the venture (Gartner et al., 2012).

We also control for the amount of time the business founder has spent in the process of starting the business. The more time in process, the more chances there are to engage with external stakeholders. Time is measured as the number of days that have elapsed between conception of the business idea, and the date of: the latest interview, the creation of a new firm, or disengagement from the process.

Some respondents in the PSED received external financing without reporting that they asked for it. These respondents may have been approached by investors, which would affect their selection probability in the first hurdle of our Cragg model (described below). Ask, therefore, is a dummy variable included in the model identifying those who reported a positive amount of external funding received, but who did not report asking for it. This ensures our model accounts for all respondents seeking external financing.

Estimation procedure

This study uses a double-hurdle model of the type proposed by Cragg (1971). This involves the joint estimation of: first, a probit on the incidence of receiving a particular kind of financing; and second, a truncated regression on the amount, to explore the hypotheses. In the context of the present study, the first hurdle involves the decision of whether to acquire external financing (i.e. the participation decision). The second hurdle involves the amount of external financing (i.e. the usage decision). Thus, the Cragg model is effectively a Tobit model with the difference being that the double-hurdle Cragg model allows each variable to affect both the participation and usage decisions in different ways, via different coefficients (Katchova and Miranda, 2004). This relaxes the single equation assumption of the Tobit model and models each decision separately, while maintaining Tobit's censoring mechanism. The Cragg model is also preferable to a Heckman model in this study. Unlike the Heckman model, the Cragg model allows for zero observations to arise in both the participation and usage hurdles.

We also ran separate models testing each hypothesis using the square-root transformation of the net worth variable, thereby maintaining its continuous form. This was done to check whether our findings were affected by disaggregating the net worth variable into quintile, ordinal categories. It is important to note that we disaggregated the net worth variable not only to investigate external financing across different tiers of the wealth distribution, but also to keep 113 respondents (10.5 percent of the sample) that reported a negative household net worth, who would have been dropped as a result of the variable transformation. When running this check using the transformed, continuous net worth variable – we find only a slight change in significance levels in Model 1 examining all external financing; and a slight drop in significance for the effect of personal wealth on the amount of formal external financing received.

Results

Descriptive statistics

Table I depicts demographic and firm characteristics by low, middle and upper quintiles of wealth for business founders in the sample. There is little to no difference across these three wealth quintiles based on sex, location, or the complexity of the startup. Approximately 36-38 percent of business founders are female; 72-82 percent of startups are in or near metropolitan areas; and 70-80 percent of all startups are routine ventures. That is, across the distribution in the

PSED dataset, most businesses are run from the home or are otherwise less innovative in nature (e.g. hair salons, day cares, or business services).

Business founders in the bottom 20 percent of the wealth distribution have, on average, lower human capital than the top 20 percent. Specifically, the bottom 20 have: eight years work experience; 6.8 years managerial experience; 30 percent have prior startup experience; 10.7 percent have a graduate degree; and the average age is 38.6 years old. The top 20 have: 11.7 years work experience; 16 years managerial experience; 62.8 percent have prior startup experience; 35.1 percent have a graduate degree; and the average age is 48.8 years old.

Table I reveals racial differences by wealth as well. At the lowest quintile in the wealth distribution 69.1 percent of business founders are white compared to 86.5 percent in the top quintile. Regarding the legal form of the venture and the method by which the venture is started, only 19.8 percent of emerging ventures in the bottom quintile are incorporated compared to 46.6

	Bottom 20%	Middle quintile	Top 20%
Average years' work experience	8.01 years	8.28 years	11.65 years
Average years managerial experience	6.82 years	10.8 years	15.97 years
Prior startup experience (none:1 or more)	163:72 (30.6% 1 or more)	128:103 (44.6% 1 or more)	87:147 (62.8% 1 or more)
Education (high school:bachelors: graduate school)	91:43:16 (10.7% graduate degree)	78:40:24 (16.9% graduate degree)	38:75:61 (35.1% graduate degree)
Sex (female:male)	89:146 (37.9% female)	84:147 (36.4% female)	84:150 (35.9% female)
Average age	38.6 years old	43.3 years old	48.8 years old
Race (white:black:other)	161:45:27 (69.1% white)	184:26:17 (81.1% white)	198:13:18 (86.5% white)
Location (metro:rural)	169:66 (71.9% metro)	165:66 (71.4% metro)	192:42 (82.1% metro)
Legal form of business (% incorporated shown)	130:32 (19.8% incorporated)	126:40 (24.1% incorporated)	101:88 (46.6% incorporated)
Startup type (% takeovers or sponsored shown)	200:4:12 (0.07% takeover/ sponsored)	184:9:15 (11.5% takeover/ sponsored)	185:9:18 (12.7% takeover/ sponsored)
Industry (routine:complex)	181:54 (77% routine)	183:48 (79.2% routine)	168:66 (71.8% routine)

Table I. Business founder demographics and firm characteristics by quintile (bottom, middle and top 20 percent) of the wealth distribution in the USA, 2005-2012

percent for the wealthiest quintile. And, less than 1 percent of ventures among the low-wealth are either takeovers of existing businesses, or new ventures sponsored by existing ventures. Among the wealthiest nascent entrepreneurs, 12.7 percent of ventures are takeovers or sponsored startups.

Table II depicts the sources and amounts of external financing acquired by the bottom, middle, and top wealth quintiles. There are little to no differences in the use of personal savings, leases on property and equipment, loans from suppliers, venture capital, and government and SBA guaranteed loans among low, middle, and high-wealth business founders. There is no difference in external financing acquired by other members of the startup team from their friends, credit cards, and banks. However, the high-wealth business founders are more likely to draw on the personal savings of other team members – 34.6 percent compared to only 20 percent in the bottom 20 percent wealth quintile.

Business founders in the bottom 20 percent of the wealth distribution use more informal sources of external financing – 22.1 percent use money from family compared to only 10.7 percent at the top; and 11.5 percent use money from friends compared to 5.6 percent at the top. However, the top 20 percent are more likely to use external, informal financing from the family members of other team members – 9 percent of the wealthiest quintile does so compared to 5.5 percent in the bottom quintile. Finally, the bottom quintile is less likely to use money from credit cards, banks, second mortgage collateral, and bank lines of credit or working capital loans, compared to the wealthiest business founders.

Two $\chi 2$-tests of independence were performed to examine the relation between household net worth and acquiring external funds. Table III shows the results of these tests for both external financing in general, and for formal sources only. Regarding all external funding, the relation between these variables was insignificant. Regarding formal financing only, the relation was significant, $\chi 2(4, n = 1{,}173) = 15.2118$; p o 0.004. Low-wealth business founders are no less likely to acquire external financing than are the high-wealth nascent entrepreneurship.

Table II. Sources and amounts of startup financing acquired by the bottom 20 percent of the wealth distribution in the USA from 2005 to 2012

		Number and % acquiring by quintile		
	Mean for bottom 20	Bottom 20%	Middle quintile	Top 20%
Personal savings	$8,766	192 (81.7%)	184 (79.7%)	194 (82.9%)
Family	$1,159	52 (22.1%)	30 (13.0%)	25 (10.7%)
Friends, employees, co-workers	$223	24 (11.5%)	9 (3.9%)	13 (5.6%)
Credit card	$2,289	21 (8.9%)	33 (14.3%)	42 (17.9%)
Bank loan	$772	13 (5.5%)	29 (12.6%)	32 (13.7%)
Second mortgage or car as collateral	$113	4 (1.7%)	10 (4.3%)	18 (7.7%)
Asset-backed loan	$6,955	7 (3.0%)	12 (5.2%)	15 (6.4%)
Property and equipment lease debt	$3,385	5 (2.1%)	4 (1.7%)	9 (3.8%)
Working capital loan	$697	4 (1.7%)	9 (3.9%)	21 (9.0%)
Loans from suppliers	$800	6 (2.6%)	9 (3.9%)	11 (4.7%)
Venture capital	–	0 (0.0%)	1 (0.4%)	0 (0.0%)
Government loan	–	3 (1.3%)	0 (0.0%)	0 (0.0%)
SBA loan	$5,341	3 (1.3%)	2 (0.8%)	0 (0.0%)
Team personal savings	$2,242	47 (20.0%)	57 (24.7%)	81 (34.6%)
Team family	$356	13 (5.5%)	12 (5.2%)	21 (9.0%)
Team friends, etc.	$68	6 (2.6%)	5 (2.2%)	3 (1.3%)
Team credit card	$259	4 (1.7%)	4 (1.7%)	4 (1.7%)
Team bank	$868	7 (3.0%)	12 (5.2%)	9 (3.8%)
Team second mortgage	$468	3 (1.3%)	4 (1.7%)	10 (4.3%)

Notes: $n = 235$, 231, and 234 for quintiles 1, 3, and 5, respectively

However, when focusing solely on monitored sources of financing from formal institutions (i.e. removing informal sources of financing such as friends and family), only 11.1 percent of business founders in the first quintile of the wealth distribution acquire it compared to between 21.2 and 23.1 percent in the third, fourth, and fifth quintiles.

To further examine differences in external financing based on wealth, two, one-way analysis of variance tests were run, the results of which are shown in Table IV. They reveal significant differences across the wealth distribution for the receipt of all forms of external financing (F(4,1,168)1⁄442.32, po0.05), and for only formal, monitored sources (F(4, 1,168) 1⁄4 5.10, p o 0.0004). Low-wealth entrepreneurs, in both cases, acquire lower amounts of external financing compared to the wealthy. Post hoc comparisons reveal, however, that the differences between the low- and high-wealth business founders are much larger when we focus on only monitored sources of financing from formal institutions. The difference between quintiles 1 and

5 in the log sum for all external financing received is 1.11, whereas the difference for formal financing received is 1.46. The incremental changes in the log sums from one quintile to the next are also greater for formal financing.

Net worth quintile	Acquired external funding: Yes	No	Total	Net worth quintile	Acquired formal external funding: Yes	No	Total
1st	82 (34.9%)	153 (65.1%)	235 (100%)	1st	26 (11.1%)	209 (88.9%)	235 (100%)
2nd	79 (33.2%)	159 (66.8%)	238 (100%)	2nd	38 (16.0%)	200 (84.0%)	238 (100%)
3rd	76 (32.9%)	155 (67.1%)	231 (100%)	3rd	49 (21.2%)	182 (78.8%)	231 (100%)
4th	83 (35.3%)	152 (64.7%)	235 (100%)	4th	50 (21.3%)	185 (78.7%)	235 (100%)
5th	89 (38.0%)	145 (62.0%)	234 (100%)	5th	54 (23.1%)	180 (76.9%)	234 (100%)
Total	409 (34.9%)	764 (75.1%)	1,173 (100%)	Total	217 (18.5%)	956 (81.5%)	1,173 (100%)
$\chi^2(df = 4) = 1.7418$; $p < 0.783$				$\chi^2(df = 4) = 15.2118$; $p < 0.004$			

Note: All and formal only

Table III. χ^2-tests of relation between household net worth and acquiring external funds

	Sum of squares	df	Mean square	F	Sig.	Wealth quintiles	Mean (log sum)
External financing (all)							
Between groups	198.865	4	49.716	2.32	0.0554	1st	2.796
Within groups	25,061.458	1,168	21.457			2nd	2.965
Total	25,260.324	1,172	21.553			3rd	3.008
Bartlett's test for equal variances: $\chi^2(4) = 20.3022$, $p > 0.000$						4th	3.521
						5th	3.905
Formal external financing (only)							
Between groups	308.292	4	77.073	5.10	0.0004	1st	1.011
Within groups	17,641.526	4	15.104			2nd	1.496
Total	17,949.8184	1,172	15.316			3rd	1.977
Bartlett's test for equal variances: $\chi^2(4) = 53.899$, $p > 0.000$						4th	2.146
						5th	2.470

Note: All, and only formal monitored sources

Table IV. Analysis of variance in amount of external financing received

Regression results

The aim of the double-hurdle Cragg models is to identify whether low-wealth business founders differ in their likelihood of acquiring external financing. And, among those who do acquire it, whether they acquire different amounts compared to wealthier business founders. In all models we control for effects of human capital, demographic characteristics, firm and industry characteristics, and whether external financing was sought. Note that interpretation of results is given only in general terms, according to the direction (positive or negative) and relative strength of effect sizes. This is because of the manner by which the Cragg model calculates coefficients in the probit and truncated models simultaneously (Cragg, 1971; Katchova and Miranda, 2004).

Table V shows the correlation among variables used in the model. All moderate correlations of 0.30 or higher are highlighted in grey. The following are moderately correlated: work experience and managerial experience; the dummy variables for college and pre-college education; and age with the three types of experience (work, managerial, and startup experience – note the high correlation of 0.6242 with managerial experience). However, the Variance Inflation Factor does not exceed 1.88 for any of the variables, and the mean VIF is 1.22. This is

well below a VIF threshold of 10.00, which would indicate multicollinearity among the independent variables. We therefore conclude that our model is not affected by multicollinearity.

Two Cragg models were run, one on each hypothesis. Both models are significant at the po0.001 level. Table VI depicts the results. The first set of probit and truncated regressions jointly test for the effects of wealth on the acquisition and subsequent amount of external financing received. The second set jointly tests for the effects of wealth on only monitored sources of financing provided by formal institutions. The sample size for these models is 1,077 and missing cases are the result of attrition between the first two waves of data collection.

H1a and H1b predicted that, compared to wealthier business founders, low-wealth business founders would be less likely to acquire external financing, and for those that did, it would be in lower amounts. Results from our first double-hurdle model show that H1a is not supported as we find an insignificant statistical association between household wealth and external financing in the probit model. H1b is supported (at a statistical significance of po0.10). The truncated model shows that the amount of external financing acquired by wealthier business founders will be higher compared to low-wealth business founders (β1⁄40.6097, po0.10). We find no evidence of a curvilinear effect in either model.

H2a and H2b predicted that low-wealth business founders would be less likely to acquire monitored sources of financing from formal financial institutions, and for those that do, it would be in lower amounts. Our second double-hurdle model shows that H2a is supported (β1⁄40.4832, po0.01). Low-wealth business founders are less likely to acquire formal external financing. We also find evidence of a curvilinear relationship (i.e. an inverse U) between personal wealth and the likelihood of acquiring formal external financing. As personal wealth increases, the likelihood of acquiring formal financing increases. At some point, this relationship reverses itself such that the likelihood of acquiring formal financing drops as wealth increases.

H2b is not supported, suggesting no difference in the amount of formal external financing received across the wealth distribution. However, when we remove the squared term for personal wealth we find strong support for this hypothesis (β 1⁄4 0.2986, p o 0.001). This suggests wealthy business founders acquire more formal financing. However, given the loss of significance when adding the squared term, we interpret this finding with caution and report that H2b is not supported.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. External $	–												
2. Wealth	0.1450	–											
3. Asked	0.2519	0.0158	–										
4. Work exp.	0.0154	−0.0058	0.0423	–									
5. Mgr. exp.	0.0887	0.1199	0.0807	0.3221	–								
6. Startup exp.	0.0672	0.0678	0.1182	0.0861	0.3294	–							
7. College	−0.0537	−0.0431	−0.0048	−0.0703	−0.0384	0.0139	–						
8. College grad	0.0163	0.0516	0.0518	0.0182	0.0479	0.0724	−0.3992	–					
9. Grad school	0.0724	0.0554	0.0366	0.0927	0.1994	0.1057	−0.2767	−0.2173	–				
10. Takeover	0.0098	0.0004	0.1275	−0.0248	0.0574	0.0055	0.0488	0.0047	−0.0517	–			
11. Franchise	0.0160	−0.0083	0.0536	−0.0714	−0.0258	−0.0022	0.0233	−0.0008	0.0004	−0.0335	–		
12. Marketing	−0.0364	−0.0123	−0.0493	−0.0943	−0.0078	0.0299	0.0135	−0.0143	−0.0232	−0.0394	−0.0431	–	
13. Sponsored	0.0241	−0.0078	0.0106	0.0417	0.0796	0.0365	−0.0516	−0.0123	0.1034	−0.0472	−0.0516	−0.0607	–
14. Partnership	−0.0462	−0.0236	−0.0215	−0.0280	−0.0635	−0.0841	0.0682	−0.0561	−0.0566	0.0378	0.0705	−0.0286	0.0045
15. LLC	0.1000	0.0004	0.1864	0.0312	0.1327	0.1173	−0.0208	0.0512	0.0775	−0.0002	0.0948	−0.0591	0.0318
16. Corporation	0.2318	0.1501	0.1195	0.0206	0.1275	0.1591	−0.0858	0.1054	0.0735	0.0333	0.0543	−0.0748	0.0833
17. Industry	0.0379	−0.0170	0.0222	0.0330	0.0052	0.0197	0.0167	−0.0804	−0.0388	0.0890	0.0762	−0.0795	0.0499
18. Sex	0.0812	0.0301	0.0541	0.1637	0.0885	0.0562	−0.0335	−0.0904	0.0548	0.0421	−0.0010	−0.0627	0.0131
19. Age	0.0015	0.0776	−0.0228	0.3495	0.6242	0.2984	−0.0330	0.0072	0.2008	0.0338	−0.0392	−0.0177	0.0298
20. Black	−0.0408	−0.0298	0.0359	−0.0196	−0.1513	−0.0306	0.0231	0.0316	−0.0686	0.0018	0.0366	−0.0043	−0.0212
21. Other race	0.0067	−0.0190	−0.0495	−0.0737	−0.1143	−0.0552	0.0659	−0.0839	−0.0387	0.0058	0.0143	0.0406	−0.0288
22. Metro	0.0374	0.0296	−0.0471	−0.0581	−0.0048	−0.0320	−0.0300	0.1226	0.0531	0.0122	0.0413	0.0061	−0.0284
23. Personal $	0.0901	0.0419	0.1264	0.0194	0.0155	0.0208	−0.0111	−0.0282	0.0288	0.0174	0.0552	−0.0414	0.0243
24. Years	0.0294	0.0251	0.0178	0.2022	0.0841	0.0104	−0.0155	0.0309	0.0001	−0.0433	−0.0313	−0.0642	−0.0118

	14	15	16	17	18	19	20	21	22	23	24
14. Partnership	–										
15. LLC	−0.1384	–									
16. Corporation	−0.1214	−0.1257	–								
17. Industry	0.0892	0.0480	0.0745	–							
18. Sex	0.0326	0.0081	0.0331	0.0938	–						
19. Age	−0.0851	0.0075	0.0955	−0.0308	0.0116	–					
20. Black	0.0929	−0.0036	−0.0286	0.0486	−0.0181	−0.1136	–				
21. Other race	0.0442	−0.0041	−0.0339	0.0568	0.0436	−0.1128	−0.1131	–			
22. Metro	−0.0017	0.0622	0.0628	−0.0602	0.0221	−0.0264	0.1760	0.0267	–		
23. Personal $	−0.0436	0.1420	0.0507	0.0355	0.0529	−0.0163	−0.0033	−0.0277	0.0214	–	
24. Years	0.0106	0.0168	−0.0225	0.0471	0.0582	0.1370	0.0522	0.0060	−0.0142	0.0547	–

Table VI.
Double-hurdle model with dependence between participation (acquiring external financing) and use (receipt of external financing)

	All external financing		Formal external financing only	
	Probit model acquired money	Truncated model amount received	Probit model acquired money	Truncated model amount received
Personal wealth	0.0145 (0.1547)	*0.6097 (0.3570)*****	*0.4832 (0.1873)***	−0.2433 (0.4737)
Personal wealth (squared)	−0.0009 (0.0257)	−0.0435 (0.0590)	*−0.0654 (0.0304)***	0.0876 (0.0749)
Asked for external financing	*0.9932 (0.0960)****	*1.3105 (0.2066)****	*0.9862 (0.1048)****	*0.9489 (0.2648)****
Work experience	−0.0140 (0.0122)	0.0007 (0.0274)	−0.0080 (0.0140)	−0.0009 (0.0330)
Work exp. (squared)	0.0004 (0.0004)	0.0001 (0.0008)	0.0003 (0.0004)	0.0003 (0.0010)
Managerial experience	0.0178 (0.0140)	*0.0615 (0.0356)*****	*0.0315 (0.0165)**	0.0459 (0.0446)
Managerial exp. (squared)	−0.0004 (0.0004)	−0.0013 (0.0010)	−0.0005 (0.0004)	−0.0006 (0.0012)
Startup experience	0.1472 (0.0951)	−0.1148 (0.2134)	0.0001 (0.1105)	−0.3477 (0.2575)
Education (base = high school)				
Some college	−0.0179 (0.1082)	0.0666 (0.2486)	−0.0103 (0.1290)	−0.0944 (0.3201)
Bachelor's degree	0.0793 (0.1224)	0.0833 (0.2702)	0.1105 (0.1408)	0.0298 (0.3352)
Graduate school	−0.1555 (0.1554)	*0.8567 (0.3599)***	0.0431 (0.1747)	0.1483 (0.4114)
Legal form (base = sole proprietorship)				
Partnership	0.2419 (0.1319)	−0.0775 (0.3026)	0.2164 (0.1535)	0.1119 (0.3943)
LLC	*0.3492 (0.1350)***	*0.7698 (0.2720)****	*0.2811 (0.1487)**	0.3253 (0.3314)
Corporation	*0.3552 (0.1516)**	*1.8879 (0.3072)****	*0.5037 (0.1611)****	*1.0136 (0.3466)****
Startup type (base = independent firm)				
Takeover of existing business	0.2786 (0.2461)	0.7202 (0.4658)	*0.6464 (0.2484)***	0.6084 (0.4822)
Franchise opportunity	−0.0297 (0.2297)	−0.3063 (0.4746)	0.2209 (0.2464)	0.2143 (0.5390)
Multilevel marketing business	−0.2133 (0.2132)	−0.5664 (0.5591)	0.0461 (0.2474)	−0.0853 (0.6612)
Startup sponsored by existing firm	0.0520 (0.1713)	0.1475 (0.3734)	0.0723 (0.1918)	−0.4032 (0.4427)
Industry complexity	−0.0932 (0.1018)	*0.4093 (0.2269)*****	−0.0011 (0.1168)	0.2601 (0.2770)
Sex	0.0500 (0.0912)	0.1942 (0.2108)	0.0707 (0.1081)	0.2350 (0.2628)
Age	*−0.0217 (0.0047)****	*−0.0185 (0.0113)*****	*−0.0220 (0.0056)****	−0.0188 (0.0142)
Race (base = white)				
Black	*−0.2226 (0.1383)*****	−0.0151 (0.3180)	*−0.2862 (0.1705)*****	−0.4328 (0.4333)
Other (Asian or Hispanic)	0.1765 (0.1491)	−0.1441 (0.3425)	−0.0986 (0.1870)	−0.5479 (0.4876)
Location (metropolitan vs rural)	−0.0142 (0.0983)	−0.1920 (0.2215)	*−0.1813 (0.1121)*****	−0.4037 (0.2602)
Personal funds invested	*0.1115 (0.0392)****	*0.0824 (0.0394)**	0.0161 (0.0231)	*0.3000 (0.1099)****
Years in process	*0.0281 (0.0089)****	0.0166 (0.0182)	*0.0273 (0.0097)****	−0.0283 (0.0251)
n	1,077		1,077	
Log likelihood	−1,359.9409		−796.6069	
Wald χ^2	$\chi^2(26) = 198.41$***		$\chi^2(26) = 176.94$***	

Notes: *,**,***,****Significant at 0.05; 0.01; 0.001; 0.1, respectively

Statistically significant results for the personal funding variables, human capital variables, and firm and industry variables, are detailed below.

Personal funds invested. Business founders that invest more personal money, as a proportion of net income, acquire greater amounts of external funding – both all forms of external funding, and only formal monitored sources (β 1⁄4 0.0824, p o 0.05; β1⁄40.3000, po0.001). Additionally, these individuals with more "skin in the game" (Frid et al., 2015; Prasad et al., 2000) have a greater likelihood of acquiring external 16 funding in general, but not formal funding (β1⁄40.1115, po0.001).

Human capital variables. Those who have attended graduate school acquire more funds compared to those with only a high school diploma (β1⁄40.8567, po0.01), and more managerial experience results in higher amounts of external financing (β 1⁄4 0.0615, p o 0.10), and a greater likelihood of acquiring formal external financing (β1⁄40.0315, po0.05).

Legal form of startup. Compared to sole-proprietorships, business founders creating incorporated ventures (i.e. C- and S-corporations) are more likely to acquire external and formal external financing; and they receive higher amounts of each (β 1⁄4 0.3552, po0.05; β1⁄40.5037, po0.001; β1⁄41.8879, po0.001; β1⁄41.0136, po0.001). We see similar patterns for limited liability companies compared to sole-proprietorships (β 1⁄4 0.3492, po0.01; β 1⁄4 0.7698, po0.001; β 1⁄4 0.2811, po0.05).

Startup type. Compared to business founders starting independent new businesses, those involved in takeovers of existing businesses are more likely to acquire formal external financing (β1⁄40.6464, po0.01).

Industry. Business founders starting more complex ventures acquire larger amounts of external financing (but not formal), although the significance level is weak (β1⁄40.4093, po0.10).

Personal characteristics. Older business founders are less likely to acquire external and formal external funds (β1⁄4−0.0217, po0.001; β1⁄4−0.0220, po0.001), and they acquire lower amounts of external funding (β1⁄4−0.0185, po0.10). Black business founders are less likely to acquire external funds or formal funds alone, compared to whites, but the significance is weak (β1⁄4−0.22236, po0.10; β1⁄4−0.2862, po0.10). And, business founders living in rural areas are less likely to acquire formal external funding compared to those in metropolitan areas, although the significance is weak (β 1⁄4 −0.1813, p o 0.10).

Asking for external funding and years in process. Our variable controlling for asking for external financing reveals that asking leads to a higher likelihood of receiving greater amounts of all forms of external financing. Similarly, more years in the startup process results in a greater likelihood of receiving external and formal external financing (β1⁄40.0281, po0.001; β1⁄40.0273, po0.001).

Discussion

This study tested the relationship between wealth and external startup funding during the process of business creation, while controlling for knowledge, startup experience, venture type and complexity, and whether such funds were sought in the first place. Our findings contribute to the literature on liquidity constraints by demonstrating the importance of personal wealth as a driver of external startup financing over human capital, industry, or personal characteristics. Most previous models were developed and tested using samples of existing firms. Some notable exceptions include investigations by Kim (2006), Parker and Belghitar (2006), and Petrova (2012). However, those studies focused on startup entry rather than funding acquisition, and they also did not consider how the complexities of the industry and venture affect the results.

Summary of findings

Consistent with studies on liquidity constraints (which investigated startup entry), our findings suggest low-wealth entrepreneurs are less likely to acquire some forms of external financing. And, when they do so, it is in lower amounts compared to wealthier entrepreneurs (Evans and Jovanovic, 1989; Evans and Leighton, 1989; Fairlie, 1999; Fairlie and Krashinsky, 2012; Gentry and Hubbard, 2004; Lofstrom and Bates, 2013; Quadrini, 1999; Zissimopoulos et al., 2010). That low-wealth entrepreneurs are less likely to acquire external funding is not surprising given prior research. However, we show the constraints low-wealth entrepreneurs face depend on whether the external funds are formal or informal in nature. During funding acquisition, low-wealth entrepreneurs are less likely to acquire funds from formal institutions. This suggests the option of money from friends and family is still available. For individuals considering entrepreneurship, it is important to be aware of this, so that both personal funds and informal avenues are thoroughly explored.

The results of our hypotheses tests may be affected by a business founder's perceptions of financial constraints. To the extent that respondents in the PSED II sample perceive such constraints, estimates of actual financial constraints will be inflated. Similarly, such perceptions – real or imagined – might lead respondents to turn toward informal sources of external finance, or rely solely on personal funds, rather than monitored, formal sources. Future research could investigate the interaction effect between founder perceptions and the decision to pursue certain types of ventures and certain sources of financing.

This disparity between low-wealth and wealthy business founders in the amount of external financing received is congruent with research by Reynolds (2011), who finds informal financial support tends to be much lower, on average, than formal support. The present study differs in that our definition of formal financing is based on a formal institution's scrutiny of the entrepreneur and the venture opportunity (Gartner et al., 2012). We also find investment of personal funds is positively associated with larger amounts of external and formal financing. This corroborates prior work finding the reliance on personal savings may act as a signal to potential external funders of "commitment" or "skin in the game" by the nascent entrepreneur (Frid et al., 2015; Prasad et al., 2000). Interestingly, business founders across all wealth quintiles acquire only limited financial help from their teams. The founder or spousal team assumes most of the financial risk in new venture creation. In fact, personal savings is the predominant source of initial financing for most business founders (Gartner et al., 2012; Reynolds and Curtain, 2011). This may reflect pecking order considerations whereby business founders prefer to internally fund their startups. Internal funding alleviates problems related to information asymmetries associated with the startup process. External financers are unable to perform a strict due diligence of emerging ventures (Atherton, 2010; Cassar, 2004).

Legitimizing behaviors rooted in human capital do not appear to have a large effect on the acquisition and amount of external capital received, further isolating wealth as a driver of the acquisition of startup capital – with the exception that experience and education have significant effects on external financing. We make this assertion with caution in light of these findings, and other scholars have documented numerous correlations between human capital and wealth (Cressy, 1996). However, prior research has also found human capital to have little effect on wealth related, entrepreneurial outcomes (Kim et al., 2006; Parker and Belghitar, 2006). These studies investigated that issue in the context of the business creation process, as we do in the present study.

We suggest these correlations are reduced or do not exist in the context of business creation due to the large percentage of low-wealth individuals that are engaged in this process. Our findings indicate that low-wealth individuals tend to be "lower" in everything else – lower in managerial experience, startup experience, education, and so on. Given the heterogeneity inherent in the business creation process (Davidsson, 2004), we are likely to observe varying levels of human capital endowments at all levels of the wealth distribution.

Although we find nascent entrepreneurs with a graduate degree acquiring more external financing compared to those with only a high school degree, this effect is not significant when looking at formal sources only. This suggests while there are some avenues for low-wealth business founders to acquire external financing through informal sources, they will receive much less and it may be due to their social ties as they relate to money. For example, research on access to startup financing in New York City found low-wealth entrepreneurs that had access to larger amounts of financing was when these individuals came from families with generational wealth or, through their education, had connections with such families (Laney et al., 2013). We caution, however, that the present study cannot fully determine the extent to which wealth is driving liquidity constraints. Ultimately, while human capital may not have a marked effect, we do not fully account for social ties and networking effects that could affect legitimacy and external financing.

Our ANOVA results showing a greater disparity in the amount of formal external financing acquired between the low-wealth and wealthy, compared to all external financing, contributes to prior work on liquidity constraints. Hurst and Lusardi (2004) that found that these constraints affect entrepreneurs equally for those with a net worth of up to $300,000. By disaggregating the formal sources of financing in our ANOVA analysis we see a large difference between the amounts received by first and fifth quintiles of the wealth distribution, as well as larger incremental breaks between each quintile. By contrast, the change for total external financing together is relatively consistent from one quintile to the next. This may indicate that informal external funds from friends and family offer low-wealth entrepreneurs a means of securing needed capital during the startup process. However this interpretation comes with some caveats. While we control for whether external financing was sought at all (receipt of external financing is, after all, conditional on asking for it), we do not have access to individual loan applications or other important details on the financial transactions that could influence our findings. Different financial institutions have different funding conditions, and some may charge higher interest rates. All else being equal, two business founders in different locations may experience different outcomes related to acquisition of funds. In addition, we do not have information on outright rejections of loan applications, nor do we have access to respondents' credit reports. These factors alone could lead to a rejection. Future research might investigate individual loan applications to develop a more nuanced view of why business founders do not receive funding. There are sampling issues as well. For example, there may be unobserved variation among business founders who, after the end of the data collection period, had neither started a business nor abandoned it.

Regarding the legal status of the firm, registration as a C- or S-corporation is positively associated with access to and total amounts of formal funds acquired. Theoretically, legal registration not only acts as an important, positive milestone in the startup process (Carter et al., 1996; Delmar and Shane, 2004; Parker and Belghitar, 2006; Reynolds, 2011), but the greater transparency enforced by such reporting requirements could reduce information asymmetries associated with the startup process and facilitate increased lending by formal financers. These

results suggest liquidity constraints bind most severely at the earliest stages of business formation, but continue to influence financing levels of lower wealth entrepreneurs even after the legal registration of their venture. The scale of the financing problem leads us to examine if there are other dynamics in play – such as personal characteristics – that would explain the relative underfunding of low-wealth business founders.

Overall, our double-hurdle Cragg model presents a nuanced picture on the impact of personal characteristics on external financing. We find that gender or race does not affect access or the amount of external or formal financing (although there is weak statistical support for our finding that black nascent entrepreneurs are less likely to acquire external findings compared to whites). These findings differ from prior studies finding women (Kwong et al., 2012) and minorities (Irwin and Scott, 2010) face financial barriers to acquiring external funds. However, the present study models wealth effects on the end result (i.e. external financing), whereas prior research on women and minorities examines the process. Regarding research by Kim et al. (2006), we find conflicting effects for age. A marginal increase in age is associated with a reduction in external financing acquired.

Three other control variables are positively associated with external and/or formal financing. First, taking over an existing business is positively associated with the acquisition of formal financing. We attribute this to the extra capital required to take over a business and the increased transparency associated with a trading history. A metropolitan location and more years in process were positively associated with formal funding, although the statistical significance for location was weak.

Implications for entrepreneurs and society

Our findings suggest low-wealth business founders are likely to launch their new ventures with a suboptimal amount of financial capital. This can limit a venture's future growth or even threaten its survival (Åstebro and Bernhardt, 2003). If a goal of our society is to provide greater upward mobility for entrepreneurs, then a number of practical policy options are available to help alleviate the problem of liquidity constraints. For example, Rouse and Jayawarna (2006) suggest financing from grants, soft loans, tax credit systems, and childcare subsidies may help undercapitalized startups.

These policy options are especially important for low-wealth business founders who are disconnected socially from individuals with wealth who might provide equity financing to talented individuals unable to acquire formal financing. The New York City Economic Development Corporation, for example, has been increasing support to entrepreneurs since 2009 – however much of the focus has been on technology or fashion startups, or on microfinance for immigrant entrepreneurs, rather than native- born low-wealth entrepreneurs (Laney et al., 2013). However, it is precisely the low- wealth, native-born entrepreneurs who lack the social connections necessary to connect with potential investors. Or, they live in ethnic enclaves supporting other immigrant entrepreneurs from within. We therefore recommend programs designed to target this underrepresented group of business founders.

Policymakers could disaggregate their financing reports according to wealth quintiles and specifically evaluate the efficacy of financing directed to business founders in the bottom quintile of the wealth distribution. Our sample showed that less than 2 percent of business founders received any financial assistance from the government agencies, so expanding these programs to target low-wealth business founders might be considered. Finally, policy makers could emphasize policy actions focusing on the local community. Asymmetrical information in

the startup process means the community may be the best judge of the "investment readiness" of a new venture opportunity. A strong ecosystem of clinics, incubators, and pitch competitions might create networking opportunities that offer financing and business advice targeting lower wealth business founders.

Other limitations and directions for future research

In addition to design issues previously mentioned, the PSED II data were collected before, during, and after the 2008 financial crisis. This may have had a substantial effect on the ability for some entrepreneurs to acquire startup funds. For example, a UK study found large firms and firms with declining sales were more likely to increase their demand for external finance during the recession (Cowling et al., 2012). Frid (2015) addressed this issue in a study comparing the rate of bank financing by nascent entrepreneurs before and after the crisis using both the PSED I and II. Nascent entrepreneurs actually experienced a two percent increase in bank financing from 1999 to 2012, demonstrating that the financial crisis did not impact venture financing during the pre-launch phase.

The present study also does not directly control for housing price appreciation (Hurst and Lusardi, 2004), nor the extent to which these business founders' net worth is tied up in their homes (Wolff, 2014; Zumbrun, 2014). For those who truly are constrained by money and who also have most of their net worth tied up in a home or other large asset, acquiring more funding from external sources will depend on a willingness of the business founder to assume the risk of taking out a second loan on the home, and on a bank's willingness to agree to the transaction. The PSED data, however, does not provide details on loan applications or on the loan decision. Future research could examine the relationship between home values and personal risk, as well as replicate prior work on failed loan applications. For example, in the UK, it was found that between 2000 and 2003, 11 percent of loan applications were rejected outright (Fraser, 2005).

Additionally, the PSED II lacks qualitative depth. This is a limitation because we know women and minority groups perceive financial barriers, and this deters them from seeking external financing and starting a business (Irwin and Scott, 2010; Kwong et al., 2012). This study did not explore the perceptual barriers to external financing. Future research might examine how perceptual barriers inform the preference low- wealth nascent entrepreneurs have for friends and family financing. The heterogeneous complexity of startups means there is no "typical" business founders (Delmar et al., 2003; Gartner, 1985; Reynolds, 2011). Kim et al. (2006) observe that half of business founders started with $2,500 or less. This is also an interesting area for qualitative research. On the one hand, low capital funding for a startup could reflect the low capital cost of venture opportunities. Conversely, difficulties acquiring external funding could mean that business founders can only undertake low cost opportunities. As the majority of business founders engaged in the startup process while either part- time or fully employed (Petrova, 2012), we suspect that $2,500 is insufficient to scale a business. In-depth case studies may resolve this debate.

Finally, research on how cities have encouraged successful entrepreneurship has shown that policy initiatives tend to focus on four key areas: developing social networks; creating mentor relationships; improving startup skillsets and knowledge; and access to capital (Laney et al., 2013). Future research should look at the interaction among all four of these areas, and how these interactions might affect startup funding.

Conclusion

This study contributes to the research on whether liquidity constraints affect business formation by measuring the external financing and formal financing received by business founders across the distribution of wealth for all business founders. Our findings suggest startup attempts by low-wealth business founders may be undercapitalized. They are not acquiring external funds, especially monitored funds from formal sources, to the same degree as wealthier business founders. Investigating liquidity constraints during the process of venture creation is complex given the considerable heterogeneity in the financing patterns and requirements of business founders. Moreover, startup financing occurs in a dynamic context (Lam, 2010). Thus, liquidity constraints may ebb and flow with temporal, spatial, institutional and personal characteristics associated with any given entrepreneurial opportunity. Investigating these boundary conditions to liquidity constraints theory is critical in light of this study's finding that low-wealth, business founders face significant hurdles to financial resource acquisition during the venture creation process.

Note

1. We recognize our approach to creating the industry complexity variable is open to some degree of subjectivity, despite the inter-rater approach. Some ventures we have identified as complex may indeed be more routine, and vice versa. However, we also submit that the primary driver in constructing this variable is the amount of investment needed to pursue the opportunity. Additional location requirements, or the need for specialized equipment, all drive up the cost of starting a business. It is in this manner that we account for industry effects similarly to prior studies (Lofstrom et al., 2014).

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