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Entrepreneurship and Risk Aversion

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ABSTRACT. Evans and Jovanovic (1989, *Journal of Political Economy* **97**(4), 808–827) find that wealth is an important determinant of business startups due to liquidity constraints. However, Cressy (2000, *Economic Letters* **66**, 235–240) argues that if risk aversion is a negative function of wealth, Evans and Jovanovic's empirical results could be spurious and the positive effect of wealth could be due to the omission of risk aversion in the regression equation. In other words, according to Cressy, one's wealth does not have any effect on business startups once the degree of risk aversion is accounted for. This paper attempts to investigate the validity of Cressy's conjecture. We empirically examine the effect of wealth on the transition into self-employment, while allowing for the effect of risk aversion. Our empirical findings show that Evans and Jovanovic's (1989) results are robust, i.e., wealth has a positive effect on business startups even allowing for the confounding effects of risk aversion.

KEY WORDS: business startup, liquidity constraints, self-employment

1. Introduction

The transition into self-employment has been researched extensively. Most put an extra emphasis on the importance of personal wealth. A notable study in this strand of research is Evans and Jovanovic (1989). The paper employs a sample of U.S. youths to estimate a structural model of the choice of whether or not to become an entrepreneur, taking into account the tightness of liquidity constraints and controlling for the correlation between wealth and ability. Evans and Jovanovic (1989) find a positive effect of wealth on business startups and interpret it as evidence of binding liquidity constraints. Similar results have been obtained by others, e.g., Holtz-Eakin et al., (1994), Lindh and Ohlsson (1996), Blanchflower and Oswald (1999), and Dunn and Holtz-Eakin (2000), who, however, mostly focus on the status of self-employment rather than the behavior of business startups.

By contrast, in the theoretical literature models of entrepreneurial choice emphasize the role of risk aversion. As early as the work by Cantillon (1755), Marshall (1890) and Knight (1921) entrepreneurs are being viewed as risk-bearers.[1] In more recent papers, e.g., Kanbur (1979) and Kihlstrom and Laffont (1979), the degree of risk aversion plays a prominent role in one's entrepreneurial decision, such that more risk averse individuals are self-selected into paid employment and more risk tolerant individuals become entrepreneurs. Following the thread of these studies, Cressy (2000) proposes an alternative explanation of the positive effect of the amount of wealth on business startups as obtained by studies in the empirical literature.[2]

It is argued by Cressy (2000) that the positive relationship between one's wealth and business startup may arise from *decreasing absolute risk aversion* (DARA). When the absolute risk aversion decreases with wealth, a positive correlation between one's wealth and business startup will be observed even though liquidity constraints are not effective in preventing business startups. When one's wealth increases, the individual's degree of risk aversion also

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decreases making her more willing to accept the more risky occupation of entrepreneurship. The argument is expounded by a theoretical model.

The alternative explanation proposed by Cressy (2000) seems plausible. However, since it is not empirically tested, it remains a conjecture. The purpose of the present paper is to empirically verify Cressy's conjecture.[3] Our investigation consists of two parts. We first look at the relationship between one's degree of risk aversion and an individual's level of wealth to see whether the DARA preference structure is valid within our sample. After that we empirically test whether wealth is related to business startups when risk aversion is controlled for.

The data we use are drawn from the Panel Study of Income Dynamics (PSID) conducted by the Survey Research Center of the University of Michigan. The PSID data contains rich information on the respondents' socioeconomic characteristics, especially about respondents' employment conditions. The measure of risk aversion used in the present study is developed by Barsky et al. (1997). The measurement, available in the PSID data, is constructed from individuals' responses to a sequence of questions pertaining to hypothetical situations.

2. Data

2.1. *Sample selection*

Our estimation is based on a sample consisting of 2259 households over the years 1995–1997, where each sample household could be included for a maximum of three times and a minimum of one time in the sample. There are a total of 6292 observations. Based on the PSID early release data, we include all households who have ever been interviewed in any year between 1995 and 1997. Following previous studies (e.g., Fairlie, 1999) we delete from the sample observations pertaining to household heads who had an agriculture occupation, who were older than 65 or younger than 18, or not working for money in the previous or current survey year. Households are also excluded from the sample if there are any missing values in the data pertaining to those households.

Our variable of interest pertains to whether a previously employed household head becomes self-employed or not between years $t-1$ and t, which is denoted as S_t. We are interested in whether one's self-employment variable is determined by his/her level of wealth and degree of risk aversion. We explain the construction of these two variables in detail below.

2.2. *Data on wealth*

Data on one's wealth (denoted $WEALTH_t$) come from the 1994 wave of the PSID, which has a module of questions soliciting detailed information on respondents' assets. The variable $WEALTH_t$ is equal to the sum of the value of a respondent's principal residence, other real estate assets, vehicles, businesses or farms, stocks, bonds, annuity, and pension, minus the amount of all debts and mortgages. The mean of $WEALTH_t$ in our sample is \$91,710 and the median is \$26,330. The mean level of wealth in our sample is substantially above that in Evans and Jovanovic's (1989) sample (i.e., \$20,009). This may be because respondents in our sample were substantially older (aged 38 on average) than those in Evans and Jovanovic's (1989) sample (aged 24–34), and because measurement has taken place 5 calendar years later.

2.3. *Data on risk aversion*

Information on households' risk aversion (denoted $1/\theta$) is collected in the 1996 PSID survey as a supplement. The PSID solicited respondents' risk aversion based on a sequence of five questions, asking about the respondent's willingness to take jobs with different prospects in the 1996 wave of the survey. Each question asks whether a respondent is willing to accept a new job with a 50–50 chance to double one's income or to cut the income in different proportions:[4]

(Q1) A respondent was initially asked whether he/she would accept a job with 50% chance of doubling income combined with a 50% chance of cutting income by 1/3.

(Q2) If the respondent was willing to take a chance and answers *yes*, he/she is asked about his/her willingness to accept a job with 50% chance of doubling income, combined with a 50% chance of cutting income by 1/2.

(Q3) If the respondent answered yes again, he/she was asked whether he/she is willing to accept a job with 50% chance of doubling income, and 50% chance of a 3/4 cut.

(Q4) If, however, the respondent answered *no* to the initial double or one-third option, he/she would be asked his willingness to accept a 1/5 cut in income instead.

(Q5) If he/she answered *no* again, he/she would be asked about his/her willingness to accept only a 1/5 cut instead.

These questions were asked if a respondent in fact has a job. Therefore, our sample excludes those respondents who were not working in 1996.

Assuming that the utility function for individual i is characterized by *constant relative risk aversion* (CRRA), i.e.,

$$U(c_i) = \frac{1}{1-1/\theta_i} c_i^{1-1/\theta_i},$$

where c_i denotes consumption, answers to the above questions allow for the estimation of the parameter θ_i (the risk tolerance parameter), and the risk aversion is derived as $1/\theta_i$ The estimation proceeds as follows. Assume that the realized risk aversion for individual i (denoted y_i) is related to the true one (i.e., θ_i) as

$$y_i = \theta_i + u_i, \tag{1}$$

where u_i is a normally distributed measurement error. Based on an respondent's answers to questions in the risk tolerance module (denoted y_{ji}^*), a range $\boldsymbol{B}_{ji} = \{b_{ji}^a, b_{ji}^b\}$ (i.e., a pair of cutoff points) is obtained, where y_{ji}^* represents a sequence of binary (1/0) variables (indexed by j) indicating which offer individual i accepts. While we do not know the exact value of y_i, from y_i^* we know that $y_i \in \boldsymbol{B}i$.[5] An estimate $\hat{\theta}_j$ is obtained based on the likelihood

$$\mathscr{L} = \sum_i \sum_j \left[\Phi(b_{ji}^a - \theta_j) - \Phi(b_{ji}^b - \theta_j)\right]^{y_{ji}^*}, \tag{2}$$

where $\Phi(\cdot)$ is the standard normal cumulative function, and θ_j, a parameter to be estimated, is equal to the expectation of θ_i conditional on y_{ji}^*. The estimate $\hat{\theta}_i$ is obtained from $\hat{\theta}_j$ and y_{ji}^*. It is noted that the estimation is similar to that of ordered probit/logit. The difference lies in the fact that we have known cutoff points $\{b_{ji}^a, b_{ji}^b\}$ in (2), while the cutoff points are parameters to be estimated in conventional ordered probit/logit models.[6]

Two estimates of θ_j are provided by the PSID, one is not corrected for measurement errors and the other one is corrected for measurement errors. We use the estimate that is corrected for measurement errors and use the inverse of θ as a measurement of risk aversion.

Under the CRRA preference structure, based on which our risk aversion measure is derived, one's wealth does not have any effect on his/her degree of risk aversion $1/\theta$, i.e.,

$$\begin{aligned}\frac{\partial\left(-\frac{cu''}{u'}\right)}{\partial\omega} &= \frac{\partial\left(\frac{-cu''}{u'}\right)}{\partial c}\frac{\partial c}{\partial\omega},\\ &= \left[\frac{-u''}{u'} + c\frac{\partial\left(-\frac{u''}{u'}\right)}{\partial c}\right]\frac{\partial c}{\partial\omega},\\ &= 0.\end{aligned}$$

Because $\frac{-u''}{u'} > 0$, the CRRA preferences implies that $\frac{\partial\left(-\frac{u''}{u'}\right)}{\partial c} < 0$, which is an implication of-DARA. It is noted that even though both CRRA and DARA preferences exhibit decreasing absolute risk aversion, the CRRA is more restrictive since it requires that $\frac{-u''}{u'} + c\frac{\partial\left(-\frac{u''}{u'}\right)}{\partial c} = 0$. The above analysis suggests that if the CRRA preference structure is correct, our risk aversion measure is uncorrelated with wealth.

2.4. *Other control variables*

To explain the decision to enter into self-employment, we also use a set of other socio-economic variables as control variables in the self-employment regression model, namely, age (denoted AGE_{t-1}), age squared (denoted $AGESQ_{t-1}$), marital status (denoted MS_{t-1}), length of job tenure (denoted $JOBTEN_{t-1}$), length of job tenure squared (denoted $JOBTENSQ_{t-1}$), whether the household head is African American (denoted AA), family size (denoted FS_{t-1}), years of education (denoted EDU), the amount of previous year's labor income (denoted $INCOME_{t-1}$, at 1993 constant dollar), amount of cash (including money in

checking and savings accounts) as of survey year 1994 (denoted $CASH_t$, at 1993 constant dollar), whether one's father is self-employed (denoted *FSELF)*, and amount of lump sum cash received (denoted $LUMPSUMP_{t-1}$, at 1993 constant dollar). A more detailed description of the variables is displayed in Table I.

TABLE I
Variable description

Variable	Description	Mean (Std. dev.)	Median
S_t	Whether a previous employed household head becomes self- employed between t and $t + 1$.	0.02 (0.15)	0
$1/\theta$	Household head's degree of risk aversion.	4.58 (2.06)	3.57
AGE_t	Age of household head in year t.	38.16 (9.73)	38
$AGESQ_t$	Square of age of the household head in year t divided by 1000.	1550.61 (783.27)	1444
EDU	Years of education of the household head.	12.31 (3.92)	12
AA	Whether the household head is African American, $AA = 1$, if yes; $AA = 0$, otherwise.	0.26 (0.44)	0
MS_t	Household head's marital status in year t. $MS_t = 1$, if married or co-habiting; $MS_t = 0$, otherwise.	0.63 (0.48)	1
$FSELF$	Whether the household head's father has ever been non-farm self-employed. $FSELF_t = 1$, yes, $FSELF_t = 0$, otherwise.	0.03 (0.17)	0
FS_t	Family size in year t.	2.94 (1.41)	3
$WEALTH_t$	Total wealth (in thousands of dollars) of the household in the 1994 survey year deflated by the current year CPI at *1993* constant dollar. $WEALTH_t$ = (value of principal residence + value of other real estate assets + value vehicles + value of businesses or farms (if sold) + value of stocks + value of bonds + value of annuity + present value of pension − all debts − mortgages)/CPI_t	91.71 (455.01)	26.33
$INCOME_{t-1}$	Total labor income of the household head in year t − 1deflated by the current year CPI at 1993 constant dollar.	32.81 (27.92)	27.50
$CASH_t$	Total cash (including money in checking or savings accounts, in thousands of dollars) of the household in the 1994 survey year de-flated by the current year CPI at 1993 constant dollar.	10.71 (30.58)	1.96
$LUMPSUM_t$	Amount of lump sum (in thousands of dollars) received by the household (e.g., a big settlement from an insurance company, or an inheritance) deflated by the CPI at 1993 constant dollar.	0.36 (17.41)	0
$JOBTEN_t$	Job tenure of the household head.	8.36 (8.24)	6
$JOBTENSQ_t$	Job tenure squared of the household head.	138.80 (299.90)	36

3. Methods and results

3.1. *Empirical analysis of risk aversion*

Before looking at the estimation results pertaining to the model for self-employment, we would like to explore the relationship between risk aversion and wealth. Using the ordinary least squares model, we regress a respondent's degree of risk aversion $1/\theta$ on a set of socioeconomic variables (including total wealth, denoted $WEALTH_t$). Since both the amount of 1994 wealth and the degree of risk aversion is time invariant, we use only one year's data (those pertaining to 1996, when the risk aversion information was collected) to estimate the relationship between the two variables, i.e.,

$$1/\theta_i = \gamma' \boldsymbol{x}_{it-1} + e_i, \tag{3}$$

where $\boldsymbol{x}_{it-1}$ is a set of socioeconomic variables (including an individual's stock of wealth). The results are presented in Table II. We first check the validity of some of the assumptions underlying the OLS model, namely normality and homoskedasticity of the error term e_i.[7] The test statistics in Table II suggest that both normality and homoskedasticity are rejected. In view of this, we adopt another estimation method, which is robust to the invalidity of these two assumptions. Instead of using the OLS method, we use the Least Absolute Deviations (LAD) method (see, e.g., Bassett and Koenker, 1978), which does not depends on the normality assumption.[8] The standard errors of our estimated coefficients are obtained by the bootstrap method (see Efron and Tibshirani, 1993), which is non-parametric. The estimates of the standard errors are heteroskedasticity consistent. The LAD with bootstrapped *t*-statistics are also reported in Table II.

The CRRA assumption suggests that there does not exist a relationship between $1/\theta$ and $WEALTH_{t-1}$, while DARA is consistent with any relationship between $1/\theta$ and $WEALTH_{t-1}$. Thus, if we our empirical results suggest a statistically significant relationship between $1/\theta$ and $WEALTH_{t-1}$, then this finding is inconsistent with CRRA.

The results, as presented in the second column of Table II, suggest that, with the co-efficient of wealth being statistically insignificant at conventional levels, one's wealth and degree of risk aversion are statistically almost uncorrelated. This suggests that the sample respondents' preferences are consistent with the CRRA and the DARA structure, which is characterized by the absence of relationship between wealth and relative risk aversion. Our finding implies that Cressy's (2000) conjecture that absolute risk aversion decreases with wealth (i.e., DARA) is valid. However, our finding is somewhat in contrast to Guiso and Paiella's (2001), who derive a measure of survey respondents' risk aversion based on a question soliciting the respondents' willingness to pay to enter a lottery and find that this measure of risk aversion is inconsistent with a CRRA utility function.

Another pertinent finding is the effect of income ($INCOME_{t-1}$) on $1/\theta$. If one's income is correlated with consumption and does not have any direct effect on risk aversion, then according to the CRRA preference we have

$$\frac{\partial\left(-\frac{cu''}{u'}\right)}{\partial INCOME_{t-1}} = \left[-\frac{u''}{u'} + c\frac{\partial\left(-\frac{u''}{u'}\right)}{\partial c}\right]\frac{\partial c}{\partial INCOME_{t-1}} = 0$$

This implies that the coefficient of $INCOME_{t-1}$ in (3) should also be statistically in-significant. This prediction is not borne out in our results, i.e., the association between $INCOME_{t-1}$ and $1/\theta$ is actually positive and statistically significant. This suggests that labor income has a direct effect on one's risk aversion. Since an individual's amount of wealth is controlled for in the regression and it is found to be uncorrelated with his/her degree of risk aversion, the association between the degree of risk aversion and labor income is unlikely to arise from labor income's wealth effect. With labor income being a function of working hours, it is possible that the positive coefficient of labor income on $1/\theta$ is generated by the interdependence between the preferences for leisure and those for consumption (i.e., $1/\theta$).

The estimation results also show that an individual with more years of education is less risk averse. The length of job tenure has a quadratic relationship with the degree of risk

TABLE II
Regression results of the degree of risk aversion

Dependent variable	$1/\theta$ (Degree of risk aversion)	
	Linear regression[†]	LAD regression[††]
EDU	−0.0227*	−0.0466*
	(−1.88)	(−1.71)[†]
MS_{t-1}	0.0481	0.2118
	(0.43)	(0.92)
AA	0.2654**	0.5039
	(2.56)	(1.23)
AGE_{t-1}	−0.0189	−0.0065
	(−0.55)	(−0.08)
$AGESQ_{t-1}$	0.0005	0.0008
	(1.28)	(0.83)
FS_{t-1}	0.0065	−0.0082
	(0.17)	(−0.10)
$FSELF$	0.0863	0.0863
	(0.35)	(0.17)
$CASH_{t-1}$	−0.0001	0.0007
	(−0.10)	(0.19)
$WEALTH_{t-1}$	−8.43e-06	0.00004
	(−0.09)	(0.24)
$INCOME_{t-1}$	−0.0053**	−0.0102**
	(−3.14)	(−2.82)
$LUMPSUM_{t-1}$	−0.0005	−0.0019
	(−0.35)	(−0.05)
$JOBTEN_{t-1}$	0.0604**	0.1558**
	(3.59)	(3.38)
$JOBTENSQ_{t-1}$	−0.0012*	−0.0027**
	(−1.97)	(−2.31)
Constant	4.4410*	3.1880**
	(7.39)	(2.55)
R^2	0.0409[‡]	0.0555[‡]
Normality test[n]	13.06	–
	[0.00][p]	
Heteroskedasticity test[l]	25.07	–
	[0.00][p]	
Observations	2259	

[†]Asymptotic t-statistic in parentheses.

[††]Bootstrapped t-statistic in parentheses.

*Statistically significant at 10% level.

**Statistically significant at 5% level.

[‡]Pseudo-R^2

[n] Shapiro-Francia normality test.

[l] LM test for homoskedasticity.

[p] p-value in square parentheses.

aversion. It initially increases with an individual's degree of risk aversion. The association becomes negative as the length of job tenure increases further. By contrast, an individual's age, family size, marital status, race, father's self-employment status, amount of cash holding, and amount of lump sum payment received do not bear a statistically significant relationship with his/her degree of risk aversion.

3.2. *Determinants of the transition into self-employment*

Now we turn to the results pertaining to the self-employment decision. The dependent variable (denoted S_{it}) pertains to whether individual i, who was previously employed, becomes self-employed between years $t-1$ and t. Since it is discrete, we employ a probit model for the analysis, i.e.,

$$S_{it} = \begin{cases} 1\,(\text{becomes self-employed}), & \text{if } \beta' \boldsymbol{x}_{\text{it}-1} + \epsilon_{\text{it}} \geq 0, \\ 0\,(\text{stay employed}), & \text{otherwise;} \end{cases} \quad (4)$$

where $\boldsymbol{x}_{it-1}$ is a vector of socioeconomic variables, pertaining to year $t-1$, including one's degree of risk aversion and wealth, β is a vector of coefficients and $\in_{it}$ is a mean-zero, unit-variance and normally-distributed random variable (i.e., the so-called error term).

The regression results pertaining to the self-employment transition probability are pre-sented in the first column of Table III. We have estimated two versions of the model, one with random effects (to account for the panel structure of the data) and one without.[9] We find that the standard error of the individual effect is statistically insignificant, indicating the sufficiency of the specification without random effects. Since the random effects speci-fication is not necessary (i.e., overspecified), we rely on the estimation results of the model without random effects. Actually, comparing the two sets of results (i.e., with and without the random effects specification), we find that the coefficient estimates and t-statistics are almost exactly identical.

The coefficient of net wealth (i.e., $WEALTH_{t-1}$) on entering into self-employment is positive and, with a t-statistic of 2.55, the coefficient is highly significant.[10] This result is congruent with Evans and Jovanovic's (1989). Thus, Evans and Jovanovic's (1989) empirical result concerning the positive relationship between wealth and the transition into self-employment (implying the presence of binding liquidity constraints) is robust to the omission of risk aversion in their empirical analysis. This demonstrates that, despite the fact that the DARA preference structure proposed by Cressy (2000) is found to be consistent with our empirical results, his conjecture on the effect of wealth on the transition into self employment is not borne out. It is noted that our finding is also similar to that obtained by Lindh and Ohlsson (1996), based on Swedish data without controlling for risk aversion, find that self-employment is positively associated with winning lotteries.

The coefficient of risk aversion is statistically significant and negative. This implies that those who are more risk averse are less likely to be self-employed. This finding lends support to the literature's theoretical studies, which either assume or conclude that the less risk averse are more likely to be entrepreneurs. It is also consistent with the empirical findings obtained by Van Praag and Cramer (2001) and van Praag et al. (2002), who use a different measure of risk aversion.

The results pertaining to the effect of other socioeconomic variables on the decision to enter self-employment are similar to those obtained by previous studies (e.g., Evans and Jovanovic, 1989; Evans and Leighton, 1989; Blanchflower and Meyer, 1994; and Fairlie, 1999). For example, an African American is less likely to become self employed, one's age does not have any effect on business startups, one's length of job tenure ($JOBTEN_{t-1}$) has a quadratic effect (being negative initially and positive as the length of job tenure increases further) being married (MS_{t-1}) has a negative effect, and years of education (EDU) have a positive effect.

An individual's labor income in the previous year (denoted $INCOME_{t-1}$) has a positive effect on business startup. Our *a priori* conjecture is that $INCOME_{t-1}$ may exert a positive and a negative effect on business startup. A positive effect may arise from the fact that $INCOME_{t-1}$ is correlated with an individual's ability and financial situation, and a negative effect may come from the fact that it poses as the opportunity cost of becoming self-employed. Our finding of a positive coefficient for $INCOME_{t-1}$ indicates that the ability and financial situation effects are more important than the opportunity effect.

The variable $CASH_{t-1}$ is to capture the effect of one's financial liquidity on the transition into self-employment. However, the variable is neg-

TABLE III
Probit estimation results of the transition into self-employment

Dependent Variable	S_t (Transition into self-employment)	
	Without Random Effects	Random Effects
$1/\theta$	−0.0478**	−0.0478**
	(−2.70)†	(−2.70)
EDU	0.0247**	0.0247**
	(2.24)	(2.24)
MS_{t-1}	−0.1836**	0.1836**
	(−2.02)	(−2.02)
AA	−0.2316**	−0.2316**
	(−2.36)	(−2.36)
AGE_{t-1}	−0.0247	−0.0247
	(−0.95)	(−0.95)
$AGESQ_{t-1}$	0.0004	0.0004
	(1.32)	(1.32)
FS_{t-1}	0.0599**	0.0599**
	(1.97)	(1.97)
$FSELF$	0.1151	0.1151
	(0.62)	(0.62)
$CASH_{t-1}$	0.0005	0.0005
	(0.42)	(0.42)
$WEALTH_{t-1}$	0.0001**	0.0001**
	(2.55)	(2.55)
$INCOME_{t-1}$	0.0025**	0.0025**
	(2.66)	(2.66)
$LUMPSUM_{t-1}$	−0.1374	−0.1374
	(−0.76)	(−0.76)
$JOBTEN_{t-1}$	−0.0388*	0.0388**
	(−4.79)	(−4.79)
$JOBTENSQ_{t-1}$	0.0005**	0.0005**
	(2.67)	(2.67)
Constant	−1.6918**	−1.6918**
	(−3.58)	(−3.58)
σ_u‡	–	0.0009
		(0.00)
Log likelihood	−664.0467	−664.0467
Observations	6292	

†Asymptotic t-statistic in parentheses.

*Statistically significant at 10% level.

**Statistically significant at 5% level.

‡Standard error of individual effects.

ative and statistically insignificant. It is likely that the amount of net wealth is enough to pick up this effect.

Some of our estimation results are slightly different from those obtained by previous studies. The effect of family size (FS_{t-1}) is found to be positive on entering self-employment. This is contrary to Fairlie's (1999) finding that the number of children has statistically insignificant effects, and it has a positive effect for African Americans and a negative effect for Caucasian Americans.

Our findings on the effects of whether one's father was self-employed *(FSELF)* and the amount of lump sum ($LUMPSUM_{t-1}$) received are different from previous studies, too. While we find them to have no effects on the decision to become self-employed, others (e.g., Blanchflower and Oswald, 1999; and Fairlie, 1999) find that they have positive effects.

4. Conclusion

In this study we look at the relationship between one's net wealth and business startups. The empirical studies in the literature find that wealth is positively related to business startups (notably Evans and Jovanovic, 1989), alluding to the existence of binding liquidity constraints. However, Cressy (2000) argues that this relationship is spurious and is due to the negative relation between wealth and absolute risk aversion (i.e., the DARA preference structure).

The current study attempts to verify the conjecture proposed by Cressy and tests whether Evans and Jovanovic's empirical results are robust to the inclusion of individuals' degree of risk aversion. Our empirical analysis is based on a sample of individuals in the 1995–1997 waves of the Panel Study of Income Dynamics, which contain a measure of the respondents' degrees of risk aversion. In the empirical analysis, we estimate the effect of an individual's wealth on his/her decision to become self-employed, allowing his/her degree of risk aversion to be a confounding factor. Our finding on the effect of wealth on the decision to become self-employed is similar to that obtained by Evans and Jovanovic. Thus, Evans and Jovanovics results are robust to their omission of individuals' degree of risk aversion. Cressy's conjecture receives no empirical support. Nevertheless, the DARA preference structure conjectured by Cressy (2000) is found to be valid within our sample, since we find that our measure of risk aversion (based on a constant relative risk aversion utility function) is not correlated with wealth, implying that absolute risk aversion is decreasing with wealth.

Moreover, we find that the degree of risk aversion has a negative impact on the decision to become self-employed. This acknowledges the validity of some theoretical studies' vital assumption/conclusion: That less risk averse individuals becomes entrepreneurs (e.g., Marshall, 1890; Knight, 1921; Kanbur, 1979; Kihlstrom and Laffont, 1979).

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Notes

[1] In contrast, Schumpeter (1911) views entrepreneurs as innovators.

[2] This conjecture is actually supported by Cressy (1996), who find that liquidity constraints is endogenous, implying that wealth is not important in business startups.

[3] It is noted that in the empirical literature, there are studies investigating the effect of risk aversion on business startups (notably Van Praag and Cramer, 2001, and van Praag et al., 2002). However these studies do not control for wealth simultaneously.

[4] The exact wording of the questions can be found on the PSID website at http://www.isr.umich.edu/src/psid/.

[5] For example, if a respondent rejected the offer of the 50–50 chance of doubling the income and a 50–50 chance of a 10 percent income reduction (which is the lowest percentage of income reduction offered), we have $\frac{1}{2}\frac{1}{1-1/\theta_i}(c\times 2)^{1-1/\theta_i}+\frac{1}{2}\frac{1}{1-1/\theta_i}(c\times 0.9)^{1-1/\theta_i}<\frac{1}{2}\frac{1}{1-1/\theta_i}c1-1/\theta_i$, implying that the realized risk tolerance for the individual is $0<y_i\leq 0.1329$.

[6] See Barsky et al., (1997).

[7] Our normality test is based on the Shapiro–Francia test. Our test for heteroskedasticity is based on the Laguange-multiplier test, which requires the estimation of the following regression with OLS:

$$\hat{e}_i^2=\delta'\boldsymbol{x}_{it-1}+r_i,$$

where $\hat{e}_i$ is the predicted residual $\hat{e}_i=1/\theta_i-\hat{\gamma}'\boldsymbol{x}_{it-1}$ from the estimation of (3). The test statistic is NR^2, where R^2 is the R-squared of the above regression, N is the sample size, and $NR^2\sim\chi_K^2$ with K being the number of regressors in $\boldsymbol{x}_{it-1}$ excluding the constant term.

[8] The LAD estimator minimizes the sum of absolute residuals, i.e.,

$$\hat{\delta}=\underset{\delta}{\text{Argmin}}\sum_i|e_i|\,.$$

[9] In the random effect specification, the error term ϵ_{it} are assumed to be composed of two terms, η_i and v_{it}, where $\eta_i\sim Normal\ (0,\ \sigma_\eta^2)$ (the random effects) and $v_{it}\sim Normal\ (0,\ \sigma_v^2)$. If σ_η is found to be statistically significant we can conclude that the random effects η_i is present (i.e., the random effects specification is valid), and vice versa.

[10] It is acknowledged that wealth is endogenous since ability, which is an omitted variable, is potentially correlated with wealth. Since one's wealth and ability are likely to be positively correlated, the omission of ability may inflate the size of estimate of wealth's effect on the transition into self-employment.

References

Barsky, R. B., F. T. Juster, M. S. Kimball and M. D. Shapiro, 1997, 'Preference Parameters and Behavioral Heterogeneity: An Experimental Approach in the Health and Retirement Study', *Quarterly Journal of Economics* **112**(2), 537–579.

Bassett, G, Jr. and R. W. Koenker, 1978, 'Asymptotic Theory of Least Absolute Error Regression', *Journal of the American Statistical Association* **73**(363), 618–22.

Blanchflower, D. G. and B. D. Meyer, 1994, 'A Longitudinal Analysis of the Young Self Employed in Australia and the United States', *Small Business Economics* **6**, 1–19.

Blanchflower, D. G. and A. J. Oswald, 1999, 'What Makes an Entrepreneur?' *Journal of Labor Economics* **16**(1), 26–60.

Cantillon, R., 1755, *Essai sur la nature du commerce en general*, T. Tsuda (ed.). Tokyo: Kinokuya.

Cressy, R., 1996, 'Are Business Startups Debt-Rationed?' *Economic Journal* **106**, 1253–1270.

Cressy, R., 2000, 'Credit Rationing or Entrepreneurial Aversion? An Alternative Explanation for the Evans and Jovanovic Finding', *Economics Letters* **66**, 235–240.

Dunn, T. and D. Holtz-Eakin, 2000, 'Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links', *Journal of Labor Economics* **18**(2), 282–305.

Efron, B. and R. Tibshirani, 1993, *An Introduction to the Bootstrap*, Chapman and Hall. New York.

Evans, D. S. and B. Jovanovic, 1989, 'An Estimated Model of Entrepreneurial Choice under Liquidity Constraints', *Journal of Political Economy* **97**(4), 808–827.

Evans, D. S. and L. S. Leighton's, 1989, 'Some Empirical Aspects of Entrepreneurship', *American Economic Review* **79**(3), 519–535.

Fairlie, R. W., 1999, 'The Absence of the African American Owned Business: An Analysis of the Dynamics of Self-Employment', *Journal of Labor Economics* **17**(1), 80–108.

Guiso, L. and M. Paiella, 2001, 'Risk Aversion, Wealth and Background Risk' CERPR Discussion Paper 2728, Centre for Economic Policy Research, London.

Holtz-Eakin, D., D. Joulfaian and H. Rosen, 1994, 'Entrepreneurial Decisions and Liquidity Constraints', *RAND Journal of Economics* **25**(2), 334–347.

Kanbur, S. M., 1979, 'Of Risk Taking and the Personal Distribution of Income', *Journal of Political Economy* **87**, 760–797.

Kihlstrom, R. R. and J. J. Laffont, 1979, 'A General Equilibrium Entrepreneurial Theory of New Firm Formation Based on Risk Aversion', *Journal of Political Economy* **87**, 304–316.

Knight, F., 1921, *Risk, Uncertainty, and Profit*, Chicago: University of Chicago Press.

Lindh, T. and H. Ohlsson, 1996, 'Self-Employment and Windfall Gains: Evidence From the Swedish Lottery', *Economic Journal*, 106(November), 1515–1526.

Marshall, A., 1890, *Principles of Economics*, London: Macmillan.

Schumpeter, J., 1911, *The Theory of Economic Development*, Cambridge: Mass.: Har-vard University Press.

van Praag, C. M. and J. S. Cramer, 2001, 'The Roots of Entrepreneurship and Labour Demand: Individual Ability and Low Aversion', *Economica* **68**(269), 45–62.

van Praag, M., J. S. Cramer, J. Hartog and N. Jonker, 2002, 'Low Risk Aversion Encourages the Choice for Entrepreneurship: An Empirical Test of a Truism', *Journal of Economic Behavior and Organization* **48**(1), 29–49.