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Entrepreneurial decisions and liquidity constraints

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Using a matched sample of federal estate and personal income tax returns, we examine how the receipt of an inheritance affects an individual's decision to become an entrepreneur. Our results suggest that the size of the inheritance has a substantial effect on both the probability of becoming an entrepreneur and the amount of capital employed in the new enterprise. These findings are consistent with the presence of liquidity constraints.

1. Introduction

■ Many strategies for encouraging entrepreneurship focus on entrepreneurs' need for "seed money," building on the notion that people who want to start new businesses are often frustrated by lack of access to capital markets. Thus, for example, some have argued that pension funds for state and local government employees should try to invest in entrepreneurial concerns. And, of course, the very existence of the federal Small Business Administration is premised on the idea that potential entrepreneurs cannot obtain start-up money, so that grants and subsidies will increase the supply of entrepreneurship.

A substantial theoretical literature explains how credit rationing can emerge even in a world in which all agents are optimizing. (See, for example, Stiglitz and Weiss (1981).) Hence, economists have taken seriously the hypothesis that capital market constraints may be an important determinant of the decision to become an entrepreneur. As noted below, a number of careful econometric studies have tested this hypothesis, producing somewhat mixed results. This article brings a unique set of data to bear on this question. The sample consists of the 1981 and 1985 federal individual income tax returns of a group of people who received inheritances in 1982 and 1983, along with information about the size of their

inheritances. Any individual who is a sole proprietor must file a "Schedule C" with his or her tax return. Hence, we can examine who became a sole proprietor between 1981 and 1985 and the extent to which the decision was influenced by the size of the inheritance. As suggested by Blanchflower and Oswald (1990), the receipt of an inheritance is about as close to a "natural experiment" as one is likely to get in this area. If owning a substantial stock of capital is important to starting a business, then those who receive a lump sum of capital should have a higher probability of doing so, *ceteris paribus*.

Another advantage of our tax return data is that they allow examination of some seldom explored questions relating to the impact of liquidity constraints on the operation of new entrepreneurial enterprises. Specifically, we can investigate whether liquidity constraints influence the amount of capital invested in the firm.

Section 2 provides a brief discussion of previous empirical work on the entrepreneurship decision, with an emphasis on the treatment of liquidity issues. Section 3 specifies the models to be estimated. In Section 4 we discuss the data, and we present the results in Section 5. We find that receipt of an inheritance has a substantial effect on the decision to become an entrepreneur. Moreover, conditional on becoming an entrepreneur, an inheritance has a statistically significant and quantitatively important impact on the amount of capital employed by the new firm. These findings are consistent with the presence of liquidity constraints. Section 6 concludes with a summary and suggestions for future research.

2. Earlier studies

■ Empirical work on the impact of liquidity constraints on the decision to become an entrepreneur has been guided by straightforward logic: some initial capital is required for setting up a new enterprise. If individuals are price takers in the credit market, then the ability to obtain capital, and hence, the decision to start the enterprise, should be independent of the prospective entrepreneur's personal financial position. An associated empirical strategy is to use cross-sectional data to estimate a probit or logit equation for the probability of self-employment, including some measure of the individual's assets among the explanatory variables.[1] For example, Meyer (1990) estimated logit equations using 1984 data from the Survey of Income and Program Participation (SIPP) and found that the probability of being self-employed increases with an individual's net worth, *ceteris paribus*. Similarly, Blanchflower and Oswald (1990) employed probit analysis to analyze the incidence of self-employment among a cross section of British males who were 23 years of age in 1981. The survey used by Blanchflower and Oswald contained a question about the size of any gifts or inheritances that the respondent might ever have received, and the response was included as a right-hand-side variable. The results suggested that such transfers are statistically significant and quantitatively important: a person who received £5,000 was twice as likely to be set up in business than a person who had received nothing, *ceteris paribus*.

Several articles have suggested that cross-sectional analysis is not the most suitable method for examining the possible role of liquidity constraints. Meyer (1990) argued that a superior approach is to use longitudinal data to examine transitions into entrepreneurship. As noted in the introduction, the policy motivation for this line of research is to determine which policies might be efficacious in encouraging entrepreneurship. This suggests that the transition process is the proper focus of attention. From a technical viewpoint, examining transitions has the advantage of using explanatory variables that are dated before the time the decision is made. This reduces the likelihood that the explanatory variables are consequences of the decision to become an entrepreneur rather than of its determinants. Timing issues are particularly cogent in investigations of the relationship between

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[1] A number of studies estimate cross-sectional equations without any asset variables, principally because of data constraints. See, for example, Fuchs (1982) and Rees and Shah (1986).

self-employment and personal assets. In a cross section, does a positive sign on an assets variable suggest that people with more wealth become entrepreneurs, or that entrepreneurs accumulate more wealth? Of course, even using wealth accumulated before the time of the entrepreneurship decision may not eliminate entirely the problem of endogeneity; individuals may accumulate wealth in anticipation of going into business.

Using the U.S. National Longitudinal Survey for Young Men, Evans and Leighton (1989) found that the probability of becoming self-employed between 1976 and 1981 increased with net worth, as measured by assets. Evans and Jovanovic (1989) used data from the same survey to analyze transitions between 1976 and 1978. The coefficient on their assets variable (net family assets as reported in 1976) was positive and statistically significant, pointing to the presence of liquidity constraints. Meyer (1990) used SIPP data to examine transitions from wage earning to self-employment between 1984 and 1985. He found that from a statistical point of view, assets were significant, but their quantitative impact was quite minor. In his sample, 1.9% of the individuals made the transition to self-employment. Meyer's estimates implied that giving a person an additional $100,000 would raise the transition rate only by .017 percentage points.

Although the impact of personal wealth differs across studies, the following empirical regularities have emerged. At a given point in time, self-employed individuals have higher assets than wage earners, *ceteris paribus*. Looking at transitions from wage earning into self-employment, initial assets also have a positive effect, but the quantitative importance of this effect is controversial. Some murkiness, however, is imparted to the results on transitions, because individuals may save in order to start a business, perhaps inducing an upward bias in the estimated impact of assets.

3. The model

■ In a world with liquidity constraints, the decision to become an entrepreneur depends on an individual's assets, and on a vector of personal attributes that affect the utility achieved as a wage earner versus that as an entrepreneur.[2] Conditional on making a transition to entrepreneurship, the same variables determine the amount of capital invested in the firm. The explanatory variables employed are as follows.

Age. An individual's age may be correlated with his attitudes toward risk and toward the various nonpecuniary aspects of being an entrepreneur. In addition, age is related to the individual's years of labor market experience, and hence his human capital. While an explicit measure of experience would be preferable, no such measure is included in our data. Following the practice in earlier studies, we also include a quadratic term in age. In addition, work in the salaried sector may become relatively less attractive at retirement age, so we include a dichotomous variable that takes a value of one if the individual is 65 years or older and zero otherwise.

Marital status and number of children. These two demographic variables may affect tastes for working in the various modes, although the direction of their effect is not clear. Having to support a family, for example, might make a person less likely to undertake risky ventures. At the same time, however, the presence of family support might make it easier to get a new business going.

Employment status of donor. Lentz and Laband (1990) found that the probability that an individual is a self-employed proprietor increases if his parents were also self-employed

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[2] For a careful theoretical discussion of entrepreneurial choice in the presence of liquidity constraints, see Evans and Jovanovic (1989). We do not address the question of how the supply of venture capital is determined. See Poterba (1989).

proprietors, in part because children acquire informal business experience from their parents. Of course, tax returns do not ask about parents' lifetime occupations. However, we were able to obtain the 1981 personal income tax returns of the individuals who made the bequests, and determined whether they included a Schedule C. We include on the right-hand side a dichotomous variable indicating whether or not the decedent filed a Schedule C. Assuming that this effect depends on the closeness of the relationship between the decedent and the beneficiary, we also include a variable that interacts the decedent's Schedule C variable with an indicator for whether the recipient is a son or a daughter. We anticipate that these two "taste" variables will raise the probability of self-employment on the assumption that children (and other relatives) of entrepreneurs are more likely to have entrepreneurial human capital imparted to them. Note, however, that these variables might also in some sense influence the budget constraint—children of entrepreneurs may be more likely to inherit businesses. Hence, one must exercise some caution in the interpretation of these variables.

Earnings. Previous studies have generally included some measure of earnings before the transition to entrepreneurship, and so do we. However, 1981 tax returns have data on family earnings only, which complicates the interpretation of this variable. If only one person in the family participates in the labor market, earnings may be viewed as representing the opportunity cost of entering entrepreneurship. In this case, high earnings would tend to depress the probability of becoming an entrepreneur, *ceteris paribus*. However, if both spouses work in the market, then high earnings may be indicative of the fact that the family can expect a regular income flow even if an entrepreneurial venture does not do well. In this event, high earnings would tend to increase the probability of becoming an entrepreneur.[3]

Assets. Our data provide different amounts of information on various assets. Dividends and interest are reported on tax returns; with the assumptions on capitalization rates discussed in the next section, we can impute the stock of assets that generated these flows and include it in the analysis.[4] We are unable to make any meaningful imputations on the value of owner-occupied housing, but on the basis of information on mortgage interest and property tax deductions, we can create a dichotomous variable indicating whether or not the family owns a home. The centerpiece of our analysis is the amount of the inheritance. As noted above, we view the coefficient on inheritance as telling us something about the presence or absence of liquidity constraints. Specifically, a positive coefficient on the inheritance variable is consistent with the presence of liquidity constraints. It might be the case, however, that the impact of an inheritance depends on initial wealth, because people with substantial assets are less likely to be liquidity constrained. We therefore include a variable that interacts the initial level of liquid assets with the inheritance. If the liquidity constraint story is correct, this variable should have a negative sign.

A word is in order about several conventional variables that we are *not* able to include because they are absent from tax returns. First, we have no information on race, and there is some evidence that the process generating self-employment decisions is different for blacks than for whites (Meyer, 1990). As several studies have shown, blacks have much less wealth than whites (see Blau and Graham, 1990), and it is therefore unlikely that many blacks receive substantial inheritances. For this reason, we believe that there are

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[3] We experimented with a term that interacted earnings and the dichotomous marriage variable, with the hope of isolating the opportunity cost effect for single earners. This variable had no effect on the substantive results presented below. In addition, we estimated the model separately for joint and single returns. One cannot reject the null hypothesis that the process generating the transition into self-employment is the same for both types of returns.

[4] There are no data on receipts of tax-exempt interest.

few, if any, blacks in our sample, and the potential problems from pooling together blacks and whites are minimal.

Another variable that might plausibly be included is years of education, which could affect both earnings capacity and attitudes toward risk. Education has been employed in virtually every previous study. Interestingly, Fuchs (1982), Evans and Leighton (1989), Evans and Jovanovich (1989), and Rees and Shah (1986) have all found that it is insignificant as a determinant of the self-employment decision. While this verdict is not unanimous (see Meyer, 1990), the evidence suggests that our forced omission of education may not be doing much harm to the analysis, although it likely muddles the interpretation of the earnings variable.

4. Data

■ **Preliminary considerations.** Earlier empirical studies have relied on surveys designed principally to provide information about individuals' labor market status. In contrast, we have tax return data. The use of such data gives rise to several issues.

The first relates to a problem faced by every empirical researcher in this area—making operational the notion of entrepreneurship. How do we know who is an entrepreneur? In the nonstatistical literature on this topic, entrepreneurs are characterized in terms of their daring, risk taking, animal spirits, and so on:

> To act with confidence beyond the range of familiar beacons and to overcome that [social] resistance requires aptitudes that are present in only a small fraction of the population and that define the entrepreneurial type. . . (Schumpeter, 1942, p. 132).

Those who do statistical work must settle for observable (and, hence, more prosaic) criteria for classifying someone as an entrepreneur. In previous studies, the key criterion has been whether the individual classifies him or herself as being primarily self-employed, a natural choice if the data set focuses on labor market issues. With tax return data, the most sensible proxy for "entrepreneurship" is the presence of a Schedule C in the tax return.[5]

One could argue that the presence of Schedule C is more indicative of tax sheltering activity than entrepreneurial activity. For example, some economists may report their consulting income and honoraria on Schedule C solely in order to be eligible for certain deductions. However, data from the 1985 *Statistics of Income* suggest that such personal service activities are undertaken by only a small proportion of Schedule C filers, about 16%.[6] And surely at least some of these activities reflect classical entrepreneurial behavior of the sort described by Schumpeter (1942).

Several algorithms for identifying which Schedule C filers are "serious" entrepreneurs have been suggested to us. One possibility is that gross receipts be above some threshold level. But many start-up enterprises have low or even zero receipts. Another possibility is that the ratio of Schedule C income to earned income be above some threshold. But as already suggested, serious entrepreneurs can have very low incomes. Another version of this idea is to identify people whose earned income falls by more than a threshold percentage when they make the transition to filing Schedule C. However, at the start of his

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[5] The Characteristics of Business Owners dataset created by the U.S. Census Bureau also uses a tax-based definition of entrepreneurship. (See Holmes and Schmitz, 1991.) However, these data characterize members of partnerships and Subchapter S corporations (from Schedule E) as well as sole proprietors as "entrepreneurs." The inclusion of a Schedule E on a tax return may be more reflective of tax shelter activity than entrepreneurship. In the context of this study, a practical advantage of a Schedule C criterion is that, unlike Schedule E, it provides information that can be used to estimate the enterprise's capital stock.

[6] This figure includes "business services" (advertising, management consulting, public relations, computer services, etc.) and "accounting and bookkeeping services."

or her career as a serious entrepreneur, an individual may not be ready to quit his or her job.[7]

We conclude that trying to weed out ersatz entrepreneurs from the population of Schedule C filers is not likely to be terribly fruitful. Nevertheless, in Section 5 below we experiment a bit with the criteria for being classified as an entrepreneur and find that they have no serious impact on our substantive results.

The second issue that arises when using tax return data concerns the measurement of assets prior to becoming an entrepreneur. Conventional data sources rely on self-reported values of the stocks of various assets. The possible biases in such measures are well known (see, for example, Avery, Elliehausen, and Kennickell, 1988). Tax return data do not contain information on stocks of assets per se. However, one can impute the value of a household's assets by capitalizing the flows of unearned income. In addition, from the matched estate tax returns (Form 706, p. 2), we have information on inheritances received after the first income tax return (in 1981) and before the second return (in 1985). As stressed above, inheritances are more likely to be exogenous than conventional measures of assets, and hence provide a better variable for use in examining the role of liquidity constraints.[8] Inheritance information from estate tax data has a second advantage: as Menchik (1988) has persuasively argued, administrative bequest records are likely to contain more accurate information than either self-reported or imputed measures.

A third issue relates to the capital acquisition decision of new entrepreneurial enterprises. Previous studies have been able to ask virtually only one question relating to liquidity constraints: Does the magnitude of an individual's assets affect the probability that he or she will become an entrepreneur? This is an important question, which is also investigated herein. However, liquidity constraints might have relatively little impact on whether someone sets up a firm but, at the same time, have an important effect on the amount of capital acquired for the new firm. Schedule C has information on depreciation allowances that can be used to investigate this issue. It also would have been interesting to see if liquidity constraints had a differential impact by type of enterprise. Unfortunately, the "principal business code" from Schedule C was not included in our data, so we were unable to categorize the firms by line of business.

A final issue concerns the representativeness of the dataset. The sample consists only of individuals who received inheritances from substantial estates. Such individuals tend to have very high preinheritance incomes. The mean 1981 Adjusted Gross Income per return in our sample is $30,782, about $11,500 above the mean for all tax filers. Clearly, such individuals are not typical, and we make no claim that our results apply to the population as a whole. However, the results do allow us, in effect, to bound the importance of liquidity constraints. If anyone has good access to capital markets, it should be such high income individuals. To the extent that their decision making is affected by liquidity constraints, it is likely that capital market constraints will be at least as important for lower income individuals.

Construction of our dataset began with an Internal Revenue Service (IRS) sample of estate tax records and is described in Holtz-Eakin, Joulfaian, and Rosen (1993). We dropped

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[7] Further complications result from using annual data. A "serious" entrepreneur who makes the transition late in the year is likely to resemble a full-year, but "non-serious," entrepreneur.

[8] Blanchflower and Oswald (1990) included a gifts and inheritances variable in their cross-sectional analysis of the incidence of self-employment among young British males. It is not clear whether this variable is exogenous. The Blanchflower–Oswald sample, taken from the National Child Development Study in the United Kingdom, consists entirely of 23 year olds. In the United States, the average age for receiving an inheritance is considerably higher, about 47. (This computation was graciously done for us by Karl Scholz, using the 1986 Survey of Consumer Finances. For further details, see Gale and Scholz, forthcoming.) Assuming a comparable age at inheritance in the United Kingdom, a substantial portion of the transfers in the Blanchflower–Oswald data are probably gifts, and these gifts might have been made specifically to help the donees start businesses. We are grateful to Bruce Meyer for pointing this out to us.

some observations because of the inability to make matches, missing data, etc. As noted above, our focus is on transitions to entrepreneurship between 1981 and 1985.[9] The number of observations with usable information for these two years was 3,620. Of these, 3,023 were wage earners who did not file a Schedule C in 1981; these observations comprise the data used to analyze the transition into sole proprietorship.[10] Thus, about 16% of the initial sample consists of sole proprietors. This is higher than the incidence of entrepreneurship from other samples.[11] For example, according to Meyer (1990), 1980 census data indicate a self-employment rate of 9%, and the Survey of Income and Program Participation suggests a rate of 11.7% (including side businesses). As noted above, our sample has higher mean income than the population as a whole. In light of earlier findings of a positive cross-sectional correlation between income and entrepreneurship, it is no surprise that our sample has a relatively high incidence of entrepreneurship.

□ **Statistical summary of the data.** We now turn to a statistical description of the sample in 1981. The three columns of Table 1 show the means and standard deviations of the key variables for (1) the entire sample, (2) those who filed Schedule C, and (3) those who did not file Schedule C. The table indicates that in 1981, the average age in

TABLE 1   Summary Statistics for 1981

Variable	(1) Entire Sample	(2) Schedule C	(3) No Schedule C
AGE (age in 1981)	37.1	41.3	36.3
	(15.8)	(13.2)	(16.2)
AGE65 (=1 if 65 or over)	.0721	.0821	.0701
	(.259)	(.275)	(.255)
AGE? (=1 if age unknown)	.0414	.0134	.0470
	(.199)	(.115)	(.212)
MARRIED (=1 if married)	.604	.819	.561
	(.489)	(.385)	(.496)
CHILDREN (= number of children under 18)	.854	1.10	.806
	(1.17)	(1.21)	(1.16)
W&S × 10^{-6} (wage and salary income)	.0245	.0256	.0242
	(.0251)	(.0346)	(.0227)
LIQASSTS × 10^{-6} (liquid assets)	.0729	.114	.0647
	(.235)	(.323)	(.213)
HOME (=1 if homeowner)	.487	.665	.452
	(.500)	(.472)	(.498)
INH × 10^{-6} (inheritance)	.0905	.119	.0849
	(.161)	(.196)	(.153)
DC (=1 if decedent filed a Schedule C)	.125	.147	.120
	(.330)	(.355)	(.325)
DC × CHLD (=1 if DC = 1 and the donee is a child of the decedent)	.0453	.0653	.0413
	(.208)	(.247)	(.199)
N (number of observations)	3,620	597	3,023

Note: Table entries are the means. Standard deviations are in parentheses.

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[9] A potential problem is that an individual may have become a sole proprietor in (say) 1984 and then gone back to wage and salary employment in 1985. While we doubt that such a phenomenon is important enough to bias our results, it does suggest that it would be useful in future research to trace the year-by-year histories of new enterprises, if the appropriate data become available.

[10] Excluded from the sample are returns that reported partnership or rental income. Such entities are commonly tax shelters; hence, one cannot use the (often negative) income flows to impute the underlying value of assets. Also excluded are returns with neither wage nor Schedule C income in 1985.

[11] Recall, however, that the definition of "entrepreneur" differs.

the sample was 37.1 years.[12] Those who filed a Schedule C in 1981 are about five years older than their wage-earner counterparts, consistent with the cross-sectional results of Meyer (1990) and Rees and Shah (1986), who found a positive relationship between entrepreneurship and age. Entrepreneurs are more likely than wage earners to be married and to have children, again consistent with cross-sectional correlations from some earlier studies. (See Meyer, 1990 and Evans and Jovanovic, 1989.)

Liquid assets were estimated by capitalizing interest receipts using a rate of return of 10%, and dividends were estimated using a rate of return of 5%. (See Skinner and Feenberg, 1990.) Clearly, such a measure of liquid assets is only a rough approximation to the true value. In contrast, the inheritance variable is based on administrative records and quite accurately measured. Hence, in the econometric analysis, it is the variable upon which we focus when trying to gauge the impact of assets on various decisions.

The mean inheritance in the sample is $90,500. The range of this variable is wide; some donees received bequests of as little as $100, while the maximum was $1.9 million. The inheritances received by those filing Schedule C are higher than those who are wage earners, a phenomenon that may be linked to the findings at the bottom of Table 1. Specifically, the means of DC (which equals one if the donor filed a Schedule C), and DC's interaction with the kinship variable, suggest that Schedule C filers are more likely to receive bequests from decedents who themselves filed Schedule C. To the extent that donors who filed Schedule C had larger lifetime incomes and estates, it then follows that the donees with Schedule C will have larger inheritances, *ceteris paribus*.

As stressed above, our goal is not to explain cross-sectional differences of the kind summarized in Table 1. Rather, we seek to explain why some of those who were not entrepreneurs in 1981 (those in column 3) made the transition into entrepreneurship. In our data, 20.1% (standard deviation = 40.1%) of wage earners made the transition to entrepreneurship between 1981 and 1985. For a crude comparison to previously reported annual transition rates, we divide this figure by four to obtain 5%, which is higher than the 1.9% transition rate from 1984 to 1985 in the SIPP data reported by Meyer (1990). This is not surprising, given that our sample is wealthier than the population as a whole, and previous studies have generally shown that the probability of a transition into self-employment increases with wealth. As an additional check on the data, we computed the 1981–1985 transition rate to Schedule C for a sample drawn from all tax returns, not just those of donees. The rate was 6.8%. Dividing by four gives us 1.7%, which is about the same as the SIPP figure. Thus, at least on an aggregate basis, our tax return–based criterion for entrepreneurship does not differ markedly from that used in previous studies.

The proportion of wage earners who became entrepreneurs *and* who established enterprises with some depreciable assets was 8.2% (standard deviation = 27.4%), considerably smaller than the 20% who became entrepreneurs. Depreciable assets in the new firms are computed as the lesser of the depreciation deduction reported on Schedule C and $5,000, plus 7.8 times the depreciation deduction in excess of $5,000. The $5,000 figure is the maximum that can be expensed; hence, up to this amount, it is reasonable to assume that every dollar of depreciation is equivalent to a dollar of capital investment. Capital expenditures above $5,000 must be depreciated; the multiplier of 7.8 is consistent with the depreciation schedules in effect in 1985.[13] In 1985, the average level of depreciable assets (conditional on having positive assets) was $14,930 (standard deviation = $60,185). We stress, however, that this is the conditional mean; only 41% of the new

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[12] The age variable refers to the age of the beneficiary. On a joint return, the beneficiary may not be the person who becomes an entrepreneur. The possible measurement error is attenuated to the extent that spouses' ages are close to each other. On single returns, the age of the relevant agent is measured without error.

[13] We used the *Statistics of Income* sole-proprietorship file for 1985 to compute the average cost to deduction ratio for each type of property and then took a weighted average across types of property.

enterprises had any depreciable assets at all. The absence of capital from a substantial proportion of new enterprises is consistent with the results from Meyer's (1990) analysis of SIPP data. He examined the portfolios of people who made the transition from salary work to self-employment between 1984 and 1985 and found that 56% of them reported no change in business equity upon entering self-employment. Similarly, Meyer noted that about 60% of new enterprises in the Characteristics of Business Owners Survey report zero equity capital.[14]

5. Results

■   Our empirical strategy is to estimate two reduced form equations. The first is a probit for the probability of making a transition from wage earning into entrepreneurship. The second is an ordinary least-squares regression of the determinants of the amount of investment in depreciable assets, conditional on making the transition and having depreciable assets.[15] To begin, we report the probit results for the transition into entrepreneurship, which are shown in column 1 of Table 2. Of the demographic variables, the only ones that are significant at conventional levels are age and number of children.[16] Their coefficients suggest that the probability of becoming an entrepreneur generally decreases with age (the negative quadratic term begins to dominate at age 20) and decreases with the number of children.[17] Turning now to the variables relevant to the individual's asset position, the most noteworthy result is that the probability of making a transition to self-employment varies positively with inheritance, and the coefficient exceeds its standard error by about 6.5. Further, the greater the magnitude of the individual's initial liquid assets, the smaller the incremental effect of inheritance—the coefficient on the interaction term, $INH \times LIQASSTS$, is negative and exceeds its standard error by a factor of 2.1.

To assess the quantitative significance of the inheritance coefficient, we used the probit coefficients to calculate the probability of making the transition to entrepreneurship with all right-hand-side variables evaluated at the sample means. We then recalculated the probability after increasing inheritance by $100,000. The results suggest that a $100,000 inheritance increases the probability of a transition from 19.3% to 22.6%, or 3.3 percentage points. As usual, it is difficult to say whether such a change should be characterized as "large," but it is clearly not trivial.

Turning now to the remaining variables relating to the individual's asset position, the positive signs on the liquid assets and homeownership variables are consistent with the presence of liquidity constraints, but one cannot make too much of this because of their relatively large standard errors.[18] As noted above, these two variables are much more likely to be subject to measurement error than the inheritance variable.

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[14] Interestingly, some theoretical treatments of the entrepreneurship decision predict that new enterprises will have zero capital. For example, Shorrocks (1988) provides a model in which the first stage of an entrepreneurial enterprise requires taking "low-budget risks" that involve no capital.

[15] An alternative approach is to use Heckman's (1976) procedure. The first stage requires estimating the reduced form probit model. In the second stage, the capital demand equation is written as a function of the asset variables and the inverse Mills ratio and is estimated by OLS with the required correction to the standard errors. This approach gave substantively the same results as those reported below.

[16] The chi-squared test statistic (with 2 degrees of freedom) for the joint hypothesis that age and age squared have zero coefficients is 36.4, which easily rejects the null.

[17] The pattern of a positive linear term and a negative quadratic term in age is consistent with Meyer's (1990) logit analysis of the transition to self-employment in the 1984 wave of the SIPP data. Meyer also finds a positive sign for the marriage variable and a negative effect for the number of children.

[18] A test of the joint hypothesis that the coefficients on $LIQASSTS$ and $INH \times LIQASSTS$ are zero leads to a chi-squared statistic (with 2 degrees of freedom) of 4.75, which is significant only at the .093 level. Thus, although the derivative of the probability of making a transition with respect to liquid assets has the "correct" sign from the perspective of the liquidity constraints hypothesis, it is not statistically significant.

TABLE 2   **Parameter Estimates**

Variable	All Observations		Decedent with No Schedule C	
	(1) Transition to Schedule C	(2) Depreciable Assets	(3) Transition to Schedule C	(4) Depreciable Assets
CONSTANT	−1.048	21,930	−.9403	19,360
	(.2757)	(49,113)	(.2917)	(57,090)
AGE	.01702	−1,184	.009826	−1,251
	(.01603)	(2,827)	(.01689)	(3,281)
$AGE^2 \times 10^{-3}$	−.4109	20,300	−.3036	21,960
	(.2035)	(35,913)	(.2137)	(41,940)
AGE65	.1590	−49,730	−.08036	—
	(.1872)	(70,630)	(.1981)	
AGE?	−.02181	−27,608	−.1852	−29,390
	(.3087)	(54,705)	(.3300)	(64,220)
MARRIED	.1163	5,261	.1271	6,594
	(.07080)	(10,191)	(.07559)	(12,010)
CHILDREN	−.06917	4,166	−0.06544	4,594
	(.02851)	(4,352)	(0.02991)	(4,904)
W&S	1.516	32,370	1.768	43,650
	(1.362)	(196,500)	(1.399)	(226,200)
DC	.05386	−8,905	—	—
	(.09932)	(14,280)		
DC × CHLD	.1732	−9,051	—	—
	(.1531)	(19,970)		
LIQASSTS	.1678	−7,919	.1537	−4,006
	(.1297)	(30,260)	(.1334)	(35,000)
HOME	.08351	−7,768	.05508	−7,987
	(.06731)	(10,150)	(.07146)	(12,010)
INH	1.219	74,350	1.211	89,520
	(.189)	(33,050)	(.2047)	(38,078)
INH × LIQASSTS	−1.124	−45,710	−1.208	−75,033
	(.5297)	(120,800)	(.5674)	(134,300)
Log-likelihood	−1,463.7	−3,086	−1,276	−2,608
N	3,023	249	2,660	209

Note: Numbers in parentheses are standard errors. Variables are defined in Table 1. Columns 1 and 3 are probit equations for making a transition from wage earning to self-employment between 1981 and 1985. Columns 2 and 4 are ordinary least-squares equations for the value of depreciable assets in the new enterprise, conditional on assets being positive.

Recall from the discussion above that the potential effects of inheritance on entrepreneurial decision making go beyond transition probabilities. To capture the full effect we must also look at the capital purchases of entrepreneurs. Column 2 in Table 2 shows the results when we use ordinary least squares to estimate a reduced form regression for the level of depreciable assets (conditional on the level being positive). The results indicate that the size of the inheritance has a positive effect on the amount of capital in the new enterprise, and the coefficient exceeds its estimated standard error by a factor of about 2.2. Again, this is consistent with the presence of liquidity constraints. However, the evidence is a bit less strong than in column 1, because the interaction term, although negative, is statistically insignificant.[19] The implied marginal propensity to purchase assets out of inheritances, conditional on having positive assets and evaluated at the mean value of *LIQASSTS*, is only 7.1%. However, because capital investment in new enterprises tends

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[19] The liquid assets variable continues to be statistically insignificant. As emphasized earlier, this variable is likely to be subject to substantial mismeasurement.

to be small, this represents a substantial percentage increase in the level of assets. The elasticity, conditional on making the transition to a sole proprietorship with depreciable capital, is about .52 when evaluated at the means of the variables.

A potential problem with the results discussed so far relates to the observations in which the decedent filed a Schedule C (i.e., $DC = 1$). Our data allow us to determine whether an estate contained business assets, but not precisely to whom these assets were left. Some individuals may have become entrepreneurs because they inherited the family business, not because the inheritance relaxed a liquidity constraint. We have no satisfactory way of determining just whom these individuals might be. Therefore, we deleted from the sample those observations for which $DC = 1$ (about 360 observations) and reestimated the models. These results are reported in columns 3 and 4 of Table 2, and they are very close to those reported in columns 1 and 2, respectively.[20] Hence, our results are not driven by the fact that people who inherit businesses are likely to continue running them.

□   **Alternative specifications.** We tested a number of variations on the specifications in Table 2 to assess the robustness of the results. As noted above, one potentially troubling possibility is that some of the people who file Schedule C are not serious entrepreneurs. We therefore reestimated the models using four alternative criteria for defining an entrepreneur: (1) gross receipts reported on Schedule C were greater than zero; (2) gross receipts exceeded $2,000; (3) gross receipts exceeded $5,000; and (4) while making a transition to Schedule C in 1985, the individual simultaneously experienced a decrease in wage and salary income of at least 25% between 1981 and 1985.

To conserve space, we report in Table 3 only the coefficients on the inheritance variables for each specification. The first column shows the coefficients on inheritance and the interaction of inheritance with liquid assets in the probit equation, along with their standard errors. Also shown, in brackets, is the simulated impact of a $100,000 increase in inheritance (evaluated at the means) on the probability of becoming an entrepreneur. In all four cases, the coefficient on inheritance is positive and exceeds its standard error by at least a factor of three. The coefficients on the interaction terms are negative and insignificant, but joint tests on both coefficients indicate that inheritance is significant in each instance. Hence, the finding from Table 2 that transitions to entrepreneurship are positively affected by inheritance is quite robust with respect to reasonable changes in the criteria for determining who is an entrepreneur. With respect to the quantitative significance of inheritance, the figures in brackets indicate noticeable effects, although somewhat smaller than the 3.3 percentage point increase from Table 2. Of course, this is not surprising, given that we are applying more stringent criteria for defining entrepreneurship.

The second column of Table 3 shows the impact of inheritance on depreciable assets, conditional on being an entrepreneur. A comparison of these coefficients to their counterparts in Table 2 suggests that pretty much the same story is being told.

As another variation on the basic model, we divided the sample into individuals with "high" initial liquid assets (income from liquid assets greater than $10,000) and "low" initial assets.[21] We expect that individuals with substantial initial wealth are less likely to be liquidity constrained, and hence, the incremental effect of inheritance on their decision should be smaller than that on their low-asset counterparts. The results, reported at the bottom of Table 3, are consistent with this expectation. In the low-asset sample, a $100,000 inheritance increases the probability of making a transition to entrepreneurship by 3.3 percentage points. In the high-asset sample, the same inheritance leads to an increase of

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[20] In this sample, there were no individuals aged 65 or older who become entrepreneurs and purchased depreciable assets, which is why no coefficient is reported for $AGE65$.

[21] In effect, this specification interacts liquid assets with every variable, unlike the specification in Table 2, where the only interaction is with inheritance.

TABLE 3   **Inheritance Effects in Alternative Specifications**

	Transition to Schedule C	Depreciable Assets
1. Positive receipts on Schedule C		
INH	.8116	96,730
	(.2100)	(39,480)
INH × LIQASSTS	−.7849	−240,600
	(.5943)	(160,700)
	[1.98]	
2. Receipts on Schedule C ≥ $2,000		
INH	.7586	126,500
	(.2242)	(48,650)
INH × LIQASSTS	−.7794	−311,600
	(.6877)	(188,100)
	[1.50]	
3. Receipts on Schedule C ≥ $5,000		
INH	.7834	159,400
	(.2409)	(59,041)
INH × LIQASSTS	−1.013	−385,200
	(.8909)	(229,800)
	[1.19]	
4. Wages fall by 25%		
INH	1.246	147,400
	(.2268)	(68,860)
INH × LIQASSTS	−1.053	−156,900
	(.5982)	(210,500)
	[1.95]	
5. High vs. Low initial liquid assets		
High assets: *INH*	.7850	
	(.2139)	25,785
	[2.33]	(32,840)
Low assets: *INH*	1.223	
	(.3232)	186,460
	[3.27]	(58,630)

Note: The figures in each cell are the respective coefficients on inheritance and inheritance times liquid assets from equations whose other right-hand side variables are the same as those in Table 2. The figures in parentheses are standard errors. The figures in brackets (reported for probit equations only) are the effects of a $100,000 increase in inheritance on the probability of making a transition (in percentage points), evaluated at the sample means. The estimates are based on the sample that excludes observations in which the decedent filed a Schedule C, i.e., the sample used in columns 3 and 4 of Table 2.

only 2.3 percentage points. The second column tells us that in the low-asset sample, each dollar of inheritance induces about 18 cents of investment in depreciable assets. In the high-asset sample, the corresponding figure is only 2.5 cents and is not statistically different from zero.

We conclude that the substantive results in Table 2 do not appear to be sensitive to reasonable variations in the criteria for classification as an entrepreneur, or to differences in specification that allow for asset levels to interact with inheritance.

A final issue arises from the fact that we cannot distinguish between anticipated and unanticipated inheritances. Of course, there is no direct way to decompose an inheritance into its anticipated and unanticipated components. However, it is possible that children of a decedent are more likely to anticipate their inheritances than are other relatives. Hence, comparing the responses of children with other recipients might shed some light on this issue. We therefore defined a dichotomous variable equal to one if the donee was a child of the decedent and zero otherwise, interacted it with both *INH* and *INH × LIQASSTS*, and augmented the equations in the third and fourth columns of Table 2 with the two new variables.

The two interaction terms were jointly insignificant in both equations. The significance level in the probit was .82, and that in the depreciable assets equation was .14. Moreover, the other coefficients were essentially unchanged. If we take the interaction terms seriously as proxies for the extent to which the inheritance is anticipated, these results suggest that anticipated and unanticipated inheritances have the same impact on the decisions we are examining. Such a phenomenon is consistent with the presence of liquidity constraints that prevent prospective donees from borrowing against their future inheritances. However, one must take this observation with a grain of salt, since we have no evidence that the interaction variables adequately reflect the extent to which inheritance is anticipated.[22]

6. Summary

■ In this article we analyze the role of liquidity constraints in the formation of new entrepreneurial enterprises. The basic empirical strategy is to determine whether the probability of becoming an entrepreneur and the conditional amounts of depreciable capital are affected by an individual's level of assets, *ceteris paribus*. If so, this is consistent with the presence of liquidity constraints. The success of such a research strategy requires a measure of asset variation that is both precisely measured and exogenous to the entrepreneurial decision. Our data are uniquely well suited for these purposes. The sample consists of the 1981 and 1985 federal income tax returns of a group of people who received inheritances in 1982 and 1983, along with information on the size of their inheritances from a matched set of estate tax returns. Hence, we can examine how the exogenous receipt of capital affects the decision to become an entrepreneur and important financial characteristics of new entrepreneurial enterprises. This is as close to a natural experiment as one can get when dealing with this subject.

Our results suggest that the probability of becoming an entrepreneur and the amount of capital employed in the new enterprise are both affected by the size of the inheritance. The finding that the behavior of sole proprietorships is consistent with the presence of liquidity constraints echoes the results of Fazzari, Hubbard, and Petersen (1988) and others, which suggest that even corporations are constrained in capital markets.

In light of our finding that new sole proprietorships are undercapitalized, a natural question is whether an enterprise's initial amount of capital affects its ultimate success. Do new enterprises with substantial capital survive longer, earn higher profits, etc.? If so, then liquidity constraints might also exert an indirect effect on the long-run number of entrepreneurial enterprises, working through the initial level of capital. This is an important topic for future research.[23]

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[22] A similar exercise based on the age of the decedent—inheritances from younger decedents may be less anticipated—yielded the same outcome.

[23] Some interesting preliminary evidence along these lines is provided by Holmes and Schmitz (1991). Their tabulations from the Characteristics of Business Owners Survey suggest that only 2% of entrepreneurs whose businesses were discontinued list "inability to obtain required financing" as a reason. See also Holtz-Eakin, Joulfaian, and Rosen (1994), who examine whether the growth of already existing enterprises is limited by lack of access to capital markets.

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