NBER WORKING PAPER SERIES

ENTREPRENEURSHIP AND HOUSEHOLD SAVING

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Working Paper 7894
http://www.nber.org/papers/w7894

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 2000

We are grateful to Eric Engstrom and Ann Lombardi for excellent research assistance, and to Andy Abel, Robert Barro, Sudipto Bhattacharya, John Campbell, Shubham Chaudhuri, John Cochrane, Alex Cukierman, David Cutler, Martin Feldstein, Roger Gordon, Kevin Hassett, Marvin Kosters, Gary Libecap, Allan Meltzer, John Muellbauer, Vincenzo Quadrini, Harvey Rosen, Andrew Samwick, Joel Slemrod, and seminar participants at the American Enterprise Institute, the Board of Governors of the Federal Reserve System, the 1998 NBER Summer Institute, the University of Arizona, the University of Bergamo, the University of California at Los Angeles, the University of Chicago, Columbia, Harvard, the London School of Economics, Syracuse, and Tilburg University for comments and suggestions. Hubbard thanks the Harvard Business School for financial support for this research. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

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NBER Working Paper No. 7894
September 2000
JEL No. E2

ABSTRACT

In this paper, we argue that costly external financing for entrepreneurial investments (coupled with potentially high returns on those investments) has important implications for the saving, investment, and entry decisions of continuing and potential entrepreneurs. These effects are similar in spirit to the role played by costly external financing on investment by corporations.

Using data from the 1983 and 1989 Federal Reserve Board Surveys of Consumer Finances, we quantify three findings about entrepreneurial saving decisions and their role in household wealth accumulation. First, entrepreneurial households own a substantial share of household wealth and income, and this share increases throughout the wealth distribution and the income distribution. Second, the portfolios of entrepreneurial households, even wealthy ones, are very undiversified, with the bulk of assets held within active businesses. Third, wealth-income ratios and saving rates are higher for entrepreneurial households even after controlling for age and other demographic variables. Taken together, these findings suggest that studies of household saving decisions in general and of the savings decisions of wealthy or high-income households in particular have paid insufficient attention to the role of entrepreneurial decisions and their role in wealth accumulation.

Our conclusion that entrepreneurial saving and investment decisions are interdependent raises three areas for future research: (1) measuring the role of entrepreneurs in aggregate wealth accumulation; (2) studying implications for portfolio allocation and asset pricing; and (3) analyzing consequences for tax policy toward entrepreneurial saving and investment.

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I. INTRODUCTION

Much of the interest in "entrepreneurs" by economists reflects a curiosity about the role of entrepreneurs in fostering innovation and economic growth (see, *e.g.*, Schumpeter, 1934). The notion of an "entrepreneur" ranges from inventors who create new products or even new industries to local business people starting restaurants and retail stores. A common link across these entrepreneurs is that their business investment plans are likely to influence their saving decisions. In contrast, for households without entrepreneurial ambitions, the life-cycle model of saving augmented with some precautionary saving (see, *e.g.*, Hubbard, Skinner, and Zeldes, 1994, 1995; Aiyagari, 1994; and Huggett, 1996) explains much of the heterogeneity in saving among U.S. households. These models of saving are less successful in describing the saving patterns of wealthier households. Because the wealth distribution is skewed toward wealthier households, the motives for an important portion of aggregate saving remain a puzzle. The link between entrepreneurial business decisions and entrepreneurs' saving decisions may help explain this puzzle since many wealthy households own active business assets.

In this paper, we examine the importance of saving by entrepreneurial households and the possible interdependence between entrepreneurs' investment and saving decisions. Such an interdependence would affect the consumption choices and the portfolio allocation of both current and potential entrepreneurs. Therefore both the amount of capital in closely-held businesses and the number of households with businesses understate the importance of this interdependence for the level and the heterogeneity of household saving. For example, entrepreneurs may increase their nonbusiness liquid assets as possible insurance against business risk; potential entrepreneurs may increase their total saving or allocate more saving to liquid assets in anticipation of future business investment needs.

In theory, entrepreneurs' investment and saving decisions would not necessarily be linked if financial markets allowed closely-held businesses to separate completely their investment decisions from the saving decisions of the owners. However, asymmetric information about the value of the entrepreneur's project, differences between the entrepreneur's perception of the project and the perception of an outsider investor, and moral hazard problems in financing contracts could all cause entrepreneurs to commit substantial equity to their ventures. Recent research (see, *e.g.*, Evans and Jovanovic, 1989; Hubbard and Kashyap, 1992; and King and Levine, 1993) has linked such capital-market imperfections to the investment decisions of entrepreneurs. The potentially high returns available to entrepreneurs – coupled with costly external financing – could also lead to relatively high saving rates for entrepreneurs.[1]

Using data from the 1983 and 1989 Federal Reserve Board Surveys of Consumer Finances, we quantify three findings about entrepreneurial saving decisions and their role in household wealth accumulation. First, entrepreneurial households own a substantial share of household wealth and income, and this share increases throughout the distributions of wealth and income. This concentration of household wealth among active business owners suggests that entrepreneurial selection and investment decisions may have important implications for models of aggregate household consumption

[1] The notion that entrepreneurial shares in income and in saving significantly outweigh entrepreneurs' proportion in the population is not new (see, *e.g.*, Klein, Straus, and Vendome, 1956; Friend and Kravis, 1957; and Klein, 1960); in addition, high savings-income ratios have been noted for business owners by Friend and Kravis (1957) and Hubbard (1986). Klein (1960, page 305) also notes the interdependence of entrepreneurial saving and investment decisions: "Of primary importance is the need and desire of entrepreneurs to reinvest their unspent business earnings in further business expansion." Friedman (1957) highlights a role for economic rents in entrepreneurial investment decisions, arguing that business owners may obtain a higher rate of return from their business than from the capital market.

and saving. Second, the saving patterns of entrepreneurs appear to be quite different than those of non-entrepreneurial households. Wealth-income ratios are higher for entrepreneurial households and saving-income ratios are higher for entrants and continuing entrepreneurs, even after controlling for age and other demographic variables. Third, the portfolios of entrepreneurial households, even wealthy ones, are undiversified, with the bulk of assets held within active businesses; furthermore, the portfolios of continuing entrepreneurs grow less diversified over time suggesting that the lack of diversification is not just related to down-payment constraints for starting a business. Taken together, these findings suggest that studies of household saving decisions in general and of the savings decisions of high-income households in particular have paid insufficient attention to the role of entrepreneurial decisions.

The paper is organized as follows. Section II defines an "entrepreneur" for our analysis, describes the composition of entrepreneurs in the population, and documents the concentration of wealth among entrepreneurs. In section III, we provide a simple model and describe evidence of effects of costly external financing on entrepreneurial decisions. We also present evidence on the portfolio composition of entrepreneurs and portfolio changes during entrepreneurial transitions. Section IV examines the mobility of entrepreneurs in the distribution of wealth and documents the role of entrepreneurs in explaining the heterogeneity in household saving rates. Section V concludes and discusses potential areas of future research.

II. ENTREPRENEURSHIP AMONG WEALTHY HOUSEHOLDS

A. Defining Entrepreneurship

We begin by describing and evaluating alternative definitions of "entrepreneurship" for our

empirical work. We also describe the Survey of Consumer Finances data and present some basic facts about the households meeting our definition of entrepreneurship.

Our focus on "entrepreneurship" raises an important question for empirical work: What does it mean to be an "entrepreneur"? Someone who is self-employed? Someone who has some self-employment income? Someone who makes active business investments? Someone who creates jobs? Many descriptions of entrepreneurship by economists (see, *e.g.*, Schumpeter, 1934, 1942) or by businesspeople are broad, leaving the impression that, perhaps like pornography, one will know it when one sees it. Unfortunately, such a standard is not promising for meaningful empirical work. Moreover, one's choice of a definition of entrepreneurship is linked to the choice of data for tests of links between business ownership and household saving decisions.

Because we are interested in the possible interdependence of saving and investment decisions of business owners, we think of an "entrepreneur" as someone who combines upfront business investments with entrepreneurial skill to obtain the chance of earning economic profits.[2, 3] Specifically, a household meets our definition of an entrepreneur if it reports owning one or more active businesses with a total market value of at least $5000.[5] Because we require information on household

[2] Our emphasis on investment by the entrepreneur is consistent with a Schumpeterian emphasis on innovation. As long as some upfront investment is required, our concept of entrepreneurship is also consistent with the uncertainty-bearing roles stressed early by Cantillon and later by Knight. We are abstracting from the entrepreneur's role as a coordinator – merely hiring and combining factors of production, as suggested initially by Say.

[3] While the model we present in section III emphasizes an unobserved "talent" for entrepreneurship, our saving discussion will require only that an upfront internal investment is important (*i.e.*, a good realization could reflect talent or luck).

[5] Our choice of a precise figure is, of course, inherently arbitrary. Our data description and empirical results are not qualitatively different if we define entrepreneurship based on owning active

characteristics, business ownership and investment, and wealth and its composition, we use the cross-section of households in the 1989 Federal Reserve Board Survey of Consumer Finances and the panel of households spanning the 1983 Survey of Consumer Finances and the 1989 Survey of Consumer Finances.[6] Because the SCF attempts to describe the wealth characteristics of the population, it oversamples higher-income households. The 1989 SCF contains data on 3,143 households. The 1983 to 1989 panel component of the SCF includes a subsample of 1,479 households in the 1983 and 1989 cross-sectional surveys.[7] The data include population weights which allow the calculation of estimates of population statistics. To deal with non-responses to some questions, the SCF data have imputations for missing values and provide replications for each household (5 per household in the cross-section and 3 per household in the panel).

In the 1989 SCF, we classify 8.7 percent of households as entrepreneurs. Other definitions are possible, of course. For example, 9.5 percent of households report active business assets greater than

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business assets (even if they have zero market value net of debt) rather than using a $5000 cutoff. An appendix with these results is available upon request from the authors.

[6] For more information on the SCF, see Kennickell and Shack-Marquez (1992). We did not use the 1992 or 1995 Surveys of Consumer Finances because those surveys did not collect data on the book value of assets invested in active businesses. They also do not have a longitudinal component, which is important for our measures of saving. We use the SCF instead of the Panel Study of Income Dynamics (PSID), because the SCF oversampled higher-income households. Lastly, while using Schedule C filings for federal income tax purposes as an indicator of business ownership (as in Holtz-Eakin, Joulfaian, and Rosen, 1994a, 1994b) has rich longitudinal information, we do not use these data since tax returns contain little information on wealth and Schedule C excludes ownership of incorporated businesses.

[7] Many of the households in the panel were also interviewed in 1986. Unfortunately, the 1986 interviews asked less specific questions regarding asset types and values. In particular, the 1986 survey did not separate active and passive business investments, which is critical for our definition of entrepreneurs. Because the sample is smaller, the data are less reliable, and we cannot consistently define entrepreneurs, we do not use the 1986 data.

$1,000 and 11.5 percent of households report owning active business assets, even though these assets might have zero value. In addition, we did not use reported "self-employment" status in the SCF because that information did not reveal whether such households had made any active business investments. Of the 8.7 percent of households in the 1989 SCF that we classify as entrepreneurs, roughly two-thirds report the head of household as being self-employed. Of the 11.1 percent of households with a self-employed head of household, 52 percent meet our definition of being an entrepreneur.[8]

The entrepreneurs in our sample own a diverse set of businesses.[9] Agriculture is the largest industry, comprising 26 percent of our sample. The other major groups are: retail firms with 16 percent, construction with 13 percent, professional practices with 11 percent, personal and business services with 10 percent, and manufacturing businesses with five percent. Sole proprietorships are the most popular organizational form, with 49 percent of businesses.[10] Corporations are 25 percent of the sample (11 percent are S-corporations, which are taxed as pass-through entities, and 14 percent are C-corporations subject to double taxation); partnerships account for 24 percent.

The fraction of households in the 1989 SCF cross-section that we classify as entrepreneurial

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[8] The correlation between owning active business assets (even with a market value of zero) and self-employment status is slightly stronger than the correlation using the $5,000 cutoff. Again, roughly two-thirds of active business owners report being self employed; however, of the 11.1 percent of households with a self-employed head of household, 68 percent report owning active business assets.

[9] We classify entrepreneurs by the industry listed for their primary business in the SCF.

[10] Organizational form refers to the household's primary business. The second and third businesses of households with multiple businesses are less likely to be sole proprietorships and more likely to be partnerships.

rises and then falls with age. Entrepreneurs are 6.3 percent of households with heads under age 35. This percentage rises to 13.4 percent of households with heads between the ages of 35 and 54 and then falls to 6.0 percent of households with heads over age 54. The panel component of the SCF suggests that there is substantial turnover in which families are entrepreneurs. Of households that were entrepreneurs in the 1983 SCF, 52 percent exited from entrepreneurship by 1989. Similarly, 54 percent of the 1989 entrepreneurs entered entrepreneurship during the six-year period.

B. Are Entrepreneurs Wealthier?

In 1989, only 8.7 percent of U.S. households fit our definition of entrepreneurs. However, this relatively small group of households plays a major role in aggregate household wealth accumulation. Table 1 reports the concentration of assets and net worth among entrepreneurs.[11] Overall, the 8.7 percent of households defined as entrepreneurs own 37.7 percent of assets and 39.0 percent of net worth.[12]

Table 1 also presents the frequency of entrepreneurs and their importance for wealth

[11] Household wealth is a broad measure of net worth. "Assets" include financial assets, the net market value of active and passive business holdings, the value of residential and investment real estate, vehicles, and other miscellaneous financial and nonfinancial assets. Assets include the value in quasi-liquid retirement accounts (*e.g.*, 401(k) plans), but not the value of defined-benefit plans or Social Security wealth. "Net worth" subtracts mortgage and other personal debt from the value of assets.

[12] For the lowest income group and for the overall calculation, our definition's requiring business assets of at least $5000 creates some concentration of assets among entrepreneurs because some households have less than $5000 in total assets and do not satisfy our definition of being an "entrepreneur."

accumulation within income groups.[13] Entrepreneurship is associated with higher income; for example, almost one-third of households in the top five percent of the income distribution are entrepreneurs. However, the correlation between income and entrepreneurship does not eliminate the concentration of wealth among entrepreneurs. Wealth is concentrated, albeit to a lesser degree, within income groups.[14] For example, the 13.4 percent of entrepreneurial households in the ninth income decile own 26.5 percent of that decile's net worth.

Table 2 presents the average and median net worth of entrepreneurs and nonentrepreneurs both overall and within income groups. Both overall and within income groups, entrepreneurs have substantially more wealth per capita than nonentrepreneurs. Tables 1 and 2 indicate that a considerable fraction of household wealth is owned by entrepreneurial households. Thus differences in how households decide on investing in active business assets and other assets may provide important modifications for life-cycle models that focus on saving through financial assets. Because wealthier households are more likely to be entrepreneurs, these modifications may be especially important for understanding the saving decisions of the wealthy.

Another prediction of simple life-cycle models of saving is that the ratio of wealth to permanent

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[13] "Income" includes wages, salaries, business income, distributions from pension plans, interest and dividend income, gains on the sale of stock or other assets, rents and royalties, unemployment insurance, workers' compensation, gifts (including child support and alimony), and transfer payments. While this broad measure of household income includes transitory components, the exclusion of the type of income with arguably the largest transitory component – capital gains – does not affect the inferences from our regression results.

[14] Using current income to rank households raises the issue of how to account for transitory income for entrepreneurs. Entrepreneurs in the bottom income quintile may have temporarily low income (*e.g.*, a startup company), but have high permanent income. An entrepreneur with temporarily low income may have much more wealth than a nonentrepreneur with low, stable income. In using the panel component of the SCF, we use average income from 1982 and 1988 to mitigate these concerns.

income should be constant within an age cohort. Moreover, absent capital- or insurance-market imperfections, the ratio of wealth to permanent income should increase with age as households approach retirement. In this section, we examine more closely how wealth-income ratios vary with household characteristics, especially entrepreneurship. One caveat is in order: While the life-cycle model uses permanent income, we are limited to using annual income (or, in later sections, average income for two years). Because the variance of transitory income may differ across households, our wealth-income ratios are a noisy proxy for wealth-to-permanent-income ratios.

Using information on wealth and income from the cross-section of households in the 1989 SCF, Table 3 shows average and median household wealth-income ratios by age, education, income, and entrepreneurial status. We use three groups for age: "young" (under age 35), "middle-aged" (between 35 and 54), and "old" (55 or older). We use three education groups: less than high school, high school graduate (including people with less than four years of college education), and college graduate (including people with post-college education). We decompose income into quintiles, with five groups in the highest income quintile.[15]

Overall, entrepreneurs have a median wealth-income ratio of 6.0, which is four times larger than

[15] The comparisons of wealth to income ratios restrict the sample to the 3,110 households that have positive income. Using the population weights, these age groups are roughly one-third of the population; however, the SCF has an over-representation of older households so that the young, middle, and older groups are based on 613, 1,209, and 1,288 households respectively. The education groups are based on 662, 1,323, and 1,225 households (from low to high education). The propensity of households to be entrepreneurs increases with education from 3.70 percent of the low education group to 8.82 percent of the middle education group to 13.66 percent of the higher education group. By oversampling wealthier households, the SCF allows us to split the sample into finer ranges at high income levels without relying on small groups of households. The eight income groups are based on 457, 481, 467, 501, 315, 195, 301, and 393 households, respectively.

the median wealth-income ratio of nonentrepreneurs. Similar differences hold for all age and education groups. Furthermore, entrepreneurs have higher wealth-income ratios for all income groups.[16] For the overall population, wealth-income ratios generally rise with income, consistent with the findings of Diamond and Hausman (1984), Hubbard (1986), and Dynan, Skinner, and Zeldes (2000). However, while the wealth-income ratios of nonentrepreneurs rise with income, they are consistently high for entrepreneurs of all income levels. Combining the high wealth-income ratios of entrepreneurs with the positive correlation between entrepreneurship and income suggests that some portion of the pattern that wealth-income ratios rise with income may be related to entrepreneurial selection and investment decisions.

III. INTERDEPENDENCE OF ENTREPRENEURIAL SAVING AND INVESTMENT

To fix ideas regarding the role of costly external financing of entrepreneurial projects for entrepreneurial saving and investment, we begin by presenting a stylized model of entrepreneurial investment and illustrate its implications for entrepreneurial saving decisions. The model builds on work by Lucas (1978), Jovanovic (1982), Evans and Jovanovic (1989), and Holtz-Eakin, Joulfaian, and Rosen (1994a). Rather than construct a complicated model, we a present a parsimonious model that highlights the link between entrepreneurial investment and saving decisions. After presenting the model, we review previous evidence on links between assets and entrepreneurial decisions and present

[16] The relationships among wealth-income ratios, income, and entrepreneurship also hold within the three age groups. Entrepreneurs have higher median wealth-income ratios than nonentrepreneurs of similar age and income. For entrepreneurs, the median wealth-income ratios within an age group are relatively constant across income groups; for nonentrepreneurs, however, the median wealth-income ratios rise gradually with income within an age group.

information on differences in the portfolio allocation of entrepreneurs and nonentrepreneurs.

A. Why Might Costly External Financing Affect Entrepreneurial Saving?

Many models of asymmetric information and incentive problems in financing and investment decisions focus on the decisions of entrepreneurs. Most empirical studies of "costly external financing," however, have focused on the investment decisions of large publicly traded corporations, for which longitudinal data on income-statement and balance-sheet items are available (see, *e.g.*, the review of studies in Hubbard, 1998). Those studies emphasize that, to the extent that information and incentive problems in capital markets raise the cost of external financing relative to internal financing, shifts in internal funds can affect investment, holding constant true underlying investment opportunities. In addition, the anticipation of binding financing constraints can lead firms to accumulate liquid assets to finance future investment (see, *e.g.*, Calomiris, Himmelberg, and Wachtel, 1995; and Fazzari, Hubbard, and Petersen, 2000).

Entrepreneurial ventures are somewhat closer to the underlying models than the more frequently studied large firms. Just as related margins for larger businesses can be influenced by the availability of internal funds, the "saving" and "investment" decisions of entrepreneurs are likely to be related. These linkages can affect both entrepreneurial investment and entrepreneurial selection.

For simplicity, suppose that entrepreneurs have two sources of income: earnings from entrepreneurial activity and returns on capital invested outside the business. Denoting entrepreneurial earnings by y, we let:

$$y = \theta\, k^{\alpha}\, \epsilon, \tag{1}$$

where θ indexes (unobserved) ability for entrepreneurship; k is the amount of fixed capital invested in the business; α is a constant in the unit interval; and ϵ is an independently and identically distributed productivity shock (with a mean of unity and a variance of σ_{ϵ}^{2}). Higher levels of entrepreneurial ability imply greater average and marginal earnings for any given level of capital (as in Lucas, 1978; and Jovanovic, 1982). Net income for an entrepreneur equals the sum of entrepreneurial earnings and investment income, where investment income equals the return on assets, a, less entrepreneurial investment, k. In this static example, investment income equals $R(a-k)$, where R is the gross rate of return. Total net income for an entrepreneur, then, equals $y + R(a-k)$. If talent were perfectly observable, the desired capital stock for entrepreneur i is given by $k_i = (\theta_i \alpha / R_i)^{1/(1-\alpha)}$.

In the presence of a simple borrowing constraint, the capital stock may be less than this first-best level. If one assumes that an entrepreneur may borrow a multiple λ of assets ($\lambda \geq 0$), then $0 \leq k \leq (1 + \lambda) a$. For any given unobserved ability θ, low-net-worth individuals are more likely to have their business capital stock constrained by the requirement that $k \leq (1 + \lambda) a$.[17, 18]

To emphasize the interdependence of entrepreneurial saving and investment decisions, we model costly external financing not by a nonnegativity constraint on net worth, but by an upward-

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[17] In general, an entrepreneur is unconstrained if $\theta \leq (1 + \lambda)^{1-\alpha} (R/\alpha)$. For constrained entrepreneurs, $\partial k / \partial a > 0$ as long as $k < (\theta \alpha / R)^{1/(1-\alpha)}$.

[18] Bhidé's (1999) interviews with 100 entrepreneurs profiled by *Inc.* magazine strongly confirm both the importance of capital-market imperfections as a constraint on growth and the modesty of upfront investments. As Bhidé notes (page 15):

> More than 80 percent of the *Inc.* founders I studied bootstrapped their ventures with modest funds derived from personal savings, credit cards, second mortgages, and so on; the median start-up capital was about $10,000. Only 5 percent raised their initial equity from professional venture capitalists.

sloping supply schedule for uncollateralized external financing.[19] (We take up the effect of costly external financing constraints on entrepreneurial selection below.) When $k > a$, we represent the cost of funds as given by $\overline{R} + \emptyset\left(\frac{k-a}{k}\right)$, where $\emptyset \geq 0$ is the premium in the cost of external financing; $\emptyset'_k > 0$ (higher collateral relative to capital reduces the costs of external financing).[20] If the entrepreneur's assets are at least as large as his or her capital investment, $\emptyset = 0$, and the cost of funds is given simply by $\overline{R}$. Under this representation of costly external financing, the entrepreneur chooses the capital stock to:

$$max \;\; \theta k^{\alpha} - \overline{R}(k - a) - \emptyset k. \tag{2}$$

The equilibrium capital stock for an unconstrained firm remains $k^* = (\alpha\theta / \overline{R})^{(1/(1-\alpha))}$. When $a < k$, the capital stock solves:

$$\alpha\theta k^{\alpha-1} = \overline{R} + \emptyset + \emptyset'_k\left(\frac{a}{k}\right),$$

so that

$$k = \left[a q / \left(\left(\overline{R} + \emptyset + \emptyset'_k\right)\left(\frac{a}{k}\right)\right)\right]^{1/(1-a)} < k^*. \tag{3}$$

As long as $a < k$, $\emptyset$ and $\emptyset'_k$ are positive, and the constrained capital stock is less than the

[19] An alternative approach would be a model of credit rationing in which internal funds may generate high returns (see, *e.g.*, Stiglitz and Weiss, 1981; and Hoff, 1994).

[20] In our simple formulation, the premium in the cost of external financing applies only when entrepreneurial investment exceeds assets. However, if entrepreneurs require saving for other reasons (*e.g.*, housing or precautionary saving) or value diversification, these extra costs could apply when $k < a$. For simplicity, our model abstracts from these issues.

desired capital stock. In addition, while $\partial k/\partial a = 0$ when $a \geq k^*$, $\partial k/\partial a > 0$ when $a < k^*$ (because increases in collateralizable a reduce Φ).

For an individual entrepreneur, we can connect the link between net worth and investment to the entrepreneur's saving decision. Letting Π represent expected entrepreneurial income (*i.e.,* $\Pi = \theta k^{\alpha} - \overline{R}(k - a) - \Phi k$), we can analyze the effect of a change in the entrepreneur's assets (a) on entrepreneurial income. When there is no uncollateralized financing (*i.e.*, when $a \geq k^*$), $\partial k/\partial a = 0$, and $\partial \Pi/\partial a = \overline{R}$. An increase in entrepreneurial saving produces a return $\overline{R}$. When the entrepreneur faces costly external financing, however, $\partial k/\partial a > 0$, and highly talented (high-θ) entrepreneurs experience a higher return on saving in business assets than they could earn on financial assets, giving those entrepreneurs a greater incentive to save than nonentrepreneurs. This enhanced substitution effect arises not just because of high expected entrepreneurial returns, but because of the joint effect of those high returns on entrepreneurial saving and investment decisions.

B. Do Assets Influence Entrepreneurial Decisions?

Costly external financing also implies that net worth constraints affect selection into entrepreneurship. In the spirit of Lucas (1978), Jovanovic (1982), and Evans and Jovanovic (1989), we consider the individual's decision about whether to work for someone else (for wage income) or for himself or herself (as an entrepreneur). The individual would enter entrepreneurship if expected entrepreneurial earnings (defined above) exceed expected wage income, w, where $w_{it} = w(x_{it}, e_i) + \eta_{it}$, where x and e denote experience and education, respectively, and η is an independently and identically distributed disturbance term with a mean of zero and a variance of σ_h^2. Under perfect

capital markets, assets of potential entrants are not relevant to the selection problem.

Costly external financing distorts the entry decision for low-net-worth potential entrepreneurs. Holding ability constant, entrepreneurial earnings depend on capital invested, k. When external financing is costly relative to internal financing, $\partial k/\partial a > 0$ and ∂ *prob (entry)*$/\partial a > 0$. Hence one selection problem to analyze is whether, given that a household is not entrepreneurial in one period, initial assets influence the probability of becoming an entrepreneur by the next period, after controlling for household characteristics and work experience.

A number of authors have documented a link between entrepreneurial assets and entrepreneurial entry. Evans and Jovanovic (1989) estimate a model similar to that described above, using data from the National Longitudinal Survey of Young Men for 1976 and 1978. For a sample of wage-earning men between the ages of 24 and 34 in 1976, they estimate the effect of assets on who becomes self-employed. They find that financing constraints bind for most of their sample. Financing constraints reduce the number of men who become self-employed and lead to existing businesses being undercapitalized.

In a pair of papers, Holtz-Eakin, Joulfaian, and Rosen (1994a, 1994b) use a matched sample of income and estate tax returns between 1981 and 1985 to examine how receiving an inheritance affects the probability of entering entrepreneurship (defined as filing a Schedule C for self-employed income), the probability of surviving as an entrepreneur, and the scale of business. For potential entrants, they find that receiving an inheritance increases the probability of entering entrepreneurship and the inheritance increases the level of depreciable assets in the business. For existing entrepreneurs, receiving an inheritance of $150,000 increases the probability of remaining a sole proprietor by 1.3

percentage points and increases the gross receipts of the business by 20 percent.

As we show in the Appendix (Table A1), the SCF data document a pattern similar to that found by other researchers. Higher initial assets raise the probability of entry into entrepreneurship, except for very high levels of initial assets.

For continuing entrepreneurs, costly external financing implies that personal assets should affect the level of business investment. In the spirit of "excess sensitivity" tests in the consumption literature (see, *e.g.*, Zeldes, 1989) and the investment literature (see, *e.g.*, Fazzari, Hubbard, and Petersen, 1988). Such investment tests require panel data in that initial nonbusiness assets should not affect the flow of entrepreneurial investment. Because the SCF lacks data on investment flows, we cannot carry out the direct analogue to these previous studies.

As a substitute for tests of the effects of nonbusiness assets on entrepreneurial investment, we examine the link between nonbusiness assets and entrepreneurial earnings. We describe the underpinnings of this relationship and our results in more detail in the appendix. Under the null hypothesis of no costly external financing, predetermined nonbusiness assets should not affect the growth in business earnings of continuing entrepreneurs. By studying the growth in business earnings, we have differenced out any effects of talent on the level of earnings.[21] Our results for such a test using the SCF data (see the Appendix, Table A2) offer some support for the interdependence of entrepreneurial saving and investment decisions, consistent with previous studies (see Evans and Jovanovic, 1989, and Holtz-Eakin, Joulfaian, and Rosen, 1994a and 1994b). To the extent that

[21] While focusing on business growth removes the possible correlation between talent and the level of assets on the level of business earnings, it is still possible that talent affects the growth rate in earnings and that talent is correlated with nonbusiness assets.

entrepreneurs expect higher returns on funds invested in active businesses than on financial assets, they have an incentive to invest their assets in their business and, if their achievable capital investment is less than the desired capital stock, increase their saving to finance business investment.

C. Do Debt Markets Eliminate Costly External Financing for Entrepreneurs?

The foregoing discussion emphasizes the internal equity contributions of entrepreneurs. It is, of course, possible that business owners face no premium in the cost of external debt financing. This possibility is unlikely for very young businesses for which information and incentive problems likely lead to internal financing before turning to banks and then public borrowers (see Diamond, 1991; and the empirical evidence in Petersen and Rajan, 1994). Using only the SCF, this question is somewhat difficult to address. The dataset does not segregate business debt. In terms of mortgage and personal debt, we show later (Table 4) that business owners are not significantly more leveraged overall than non-business owners.

Even if one observed the level of business debt, it is unclear what it would mean in isolation. A given debt-assets ratio is influenced by both loan demand and loan supply considerations. For example, a low ratio of debt to assets could imply little need for external financing (weak loan demand) or very costly external financing (a constraint from the loan supply side).[22] While the SCF does not provide data on sources of debt financing and their relative costs, other research has shed light on this

[22] Avery, Bostic, and Samolyk (1998) estimate that personal commitments are important for risky small business lending; see also the analysis of the use of collateral in Berger and Udell (1995) and Hubbard, Kuttner, and Palia (1999).

question. Using the National Survey of Small Business Finances[23] conducted in 1988 and 1989 under the auspices of the Small Business Administration and the Board of Governors of the Federal Reserve System, Petersen and Rajan (1994) explore the costs of debt financing for small businesses. They find that, all else being equal, smaller and younger firms pay higher explicit loan interest rates.[24] Moreover, they find that smaller and younger firms are more likely to forego trade credit discounts (or even to pay late). This source of external debt financing is very expensive. As Petersen and Rajan note, for example, if trade credit discounts were offered at two percent if paid within ten days and no discount if paid in 30 days, the foregoing of the discount equivalent to a loan interest rate on an annual basis of 44.6 percent.

Hence, while we cannot directly observe costs of external debt financing in our data, available evidence suggests that it is unlikely that the cost of external debt financing is roughly equivalent to the cost of business owners' internal equity financing. As a consequence, for entrepreneurs with promising investment projects, the rate of return on a marginal dollar of internal equity financing (entrepreneurial saving) might be quite high.

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[23] Petersen and Rajan (1994) report that the median of business assets for the firms in the National Survey of Small Business Finance is $130,000 compared to $100,000 for the firms owned by the entrepreneurs in our sample from the SCF.

[24] Hubbard, Kuttner, and Palia (1999) – using a matched dataset of loan, borrower, and bank characteristics – also find that smaller firms face higher explicit loan interest rates and are more likely to have collateral requirements than larger firms, other things being equal. Research on "switching costs" in borrower-bank relationships is also consistent with capital-market imperfections in bank financing (see, *e.g.*, Petersen and Rajan, 1994; Berger and Udell, 1995; James, 1987; and Slovin, Sushka, and Polonchek, 1993).

D. Are High-Wealth Households Exposed to Costly External Financing?

Because entrepreneurs are more likely to be wealthy, one's intuition suggests that they may not need to worry about costly external financing. However, models of costly external financing depend critically on the household's assets relative to its investment opportunities. A household with $1 million of wealth may easily undertake some projects (*e.g.*, a project that requires $20,000 of capital) but face binding financing constraints for larger projects (*e.g.*, a project requiring $5 million of capital). Unfortunately, investment opportunities are unobservable to outsiders. Nonetheless, the SCF allows comparisons of the distribution of household net worth and the distribution of the size of equity stakes in entrepreneurial ventures. The distribution of net worth serves as a benchmark for household resources; the distribution of the size of existing equity positions proxies for the distribution of possible entrepreneurial investments.[25] Conditional on qualifying as an entrepreneur, the median entrepreneurial equity stake has a market value of $107,000 (the median book value is $60,000) in the 1989 SCF. This venture value easily exceeds the median wealth of $46,960 in the overall sample of households. Indeed, the household at the 75th percentile of the overall wealth distribution would need to invest 73 percent of its wealth ($146,370) in order to own this asset. Obviously, most households would require substantial external financing to start businesses.

The more surprising comparison is the financing needs required by existing entrepreneurs who

[25] The distribution of existing entrepreneurial projects should only be taken as a rough proxy for the distribution of ideas or possible projects. First, entrepreneurs with large projects may select organizational forms (*e.g.*, publicly traded corporations) that would classify them as nonentrepreneurs for our purposes. Second, as suggested by the model, if borrowing constraints are binding, then entrepreneurs may underinvest in their business. In addition, our definition of entrepreneurship abstracts from projects that have equity stakes of less than $5,000.

want to move up in the distribution of projects. To own the median equity stake with a value of $107,000, the entrepreneur with the median wealth of $318,940 in 1989 would need a portfolio share of 34 percent. However, for this same entrepreneur to own the project at the 75th percentile of the distribution of active business assets ($350,000) would require the entrepreneur to invest all of his or her wealth plus borrow ten percent of his or her wealth.[26] This pattern continues at higher wealth levels. For the entrepreneur at the 80th percentile of the wealth distribution ($922,800 of net worth) to own the venture at the 95th percentile of the distribution of active business assets requires an investment of one and one-half times the household's wealth ($1.38 million).[27] Thus costly external financing may play a role for households that want to enter entrepreneurship and for entrepreneurs at all wealth levels that want to expand.

E. Are the Portfolios of Entrepreneurs Poorly Diversified?

The model in section IIIA assumes saving only through the business and a single financial asset. Constrained entrepreneurs invest all of their wealth in their business; unconstrained entrepreneurs invest in their business until the marginal rate of return equals the return on the financial asset. In a more realistic model, capital-market imperfections would affect portfolio composition as well as the level of investment. Constrained entrepreneurs would hold a large fraction of their wealth in their active business assets. Under perfect capital markets, entrepreneurs could diversify the idiosyncratic risk

[26] The 75th percentile of the distribution of book values of equity stakes is $200,000, which would still require almost two-thirds of this household's net worth.

[27] The 95th percentile of the distribution of book values of active business assets is $1.60 million which requires an even larger investment than owning the stake at the 95th percentile of market values.

associated with their business, so net business value need not be large relative to total assets.

Table 4 shows that entrepreneurs hold undiversified portfolios. For entrepreneurs and nonentrepreneurs, Table 4A reports the percentage of each group that owns various assets (liquid assets, bonds, equity, retirement accounts, housing, real estate, active and passive businesses, and other assets), the median asset holding conditional on owning the asset, and the overall portfolio share of each asset. The portfolio shares are the weighted (by total assets) average of each asset relative to total assets.[28] Active businesses account for 41.5 percent of entrepreneurs' assets. The share of assets held as a business equity stake varies widely across entrepreneurs but most entrepreneurs hold a substantial portion of their assets in their business. The median portfolio share (relative to assets) is 35.0 percent. The 25th percentile is 14.8 percent, and the 75th percentile is 61.2 percent. Relative to nonentrepreneurs, entrepreneurs hold less of their wealth in liquid assets, bonds, equity, and, especially housing; they hold more of their portfolios in passive business assets and real estate suggesting that assets might be complements to active business assets. These differences remain (though they are smaller) if one uses entrepreneurs' portfolio shares in nonbusiness assets in the comparison.

While active business assets play a large role in the portfolios of entrepreneurs, the portfolios of nonentrepreneurs (and, to a lesser degree, entrepreneurs) are undiversified along another dimension – housing. For nonentrepreneurs, principal residences comprise over 40 percent of the assets in their portfolio. This finding is consistent with Engelhardt and Mayer's (1998) finding that the median percentage of wealth in housing at the time of first home purchase is 90.6 percent; they ascribe this lack

[28] For active business assets, the data report the net active business value – the market value of the business after paying any debts. Thus the asset is the household's equity stake in the business. In contrast, for housing, the asset value and outstanding mortgage liability are reported separately.

of diversification to downpayment constraints. Gustman and Steinmeier (1999) report that even among households near retirement age, house value is 16.0 percent of total wealth (including Social Security and defined benefit pension wealth).

These capital-market frictions could be relatively less important for the wealthiest entrepreneurs. For wealthy households, a $5000 business investment is a small fraction of their wealth. To examine how portfolio diversification varies with wealth, Table 4B repeats the statistics in Table 4A for households in the top five percent of the wealth distribution (households with 1989 net worth exceeding $687,000).[29] The results are strikingly similar to those for the overall population. The entrepreneurs in the high-wealth sample hold 42.7 percent of their wealth in their active business. The distribution of this portfolio share confirms that even wealthy entrepreneurs are undiversified. The 25th percentile, median, and 75th percentile of the distribution are 19.1 percent, 44.8 percent, and 60.8 percent, respectively. Since the majority of wealthy entrepreneurs are not well-diversified, our sample of entrepreneurs has relatively few rich households that simply have a small, sideline business.

With this simple control for wealth, several other features of the portfolio allocation of entrepreneurs and nonentrepreneurs are noteworthy. First, while housing accounts for a large fraction of the overall difference in the portfolios of entrepreneurs and nonentrepreneurs, the share of housing for wealthier entrepreneurs (15.2 percent of nonbusiness assets) is closer to the share of housing for wealthier nonentrepreneurs (19.5 percent of assets). Second, the differences between the two groups in bond and equity holdings are larger for the wealthier sample. As a percentage of their nonbusiness

[29] Because the SCF oversamples wealthy households, this comparison still uses a relatively large number of households – 327 nonentrepreneurs and 419 entrepreneurs (which is over one-quarter of the households in the sample).

assets, wealthy entrepreneurs have a portfolio share in bonds and equity that is roughly half the share of these assets for wealthy nonentrepreneurs, suggesting that wealthy entrepreneurs do not increase their holdings of liquid assets as insurance against poor business performance. Third, wealthier entrepreneurs borrow more heavily than wealthier nonentrepreneurs. For example, the entrepreneurs have larger mortgages, larger mortgage-to-value ratios, and are more likely to incur non-mortgage debt.

The patterns in Table 4 are consistent with costly external financing leading entrepreneurs to hold undiversified portfolios. Again, in frictionless capital markets, entrepreneurial selection need not have a very significant impact on portfolio allocation. Business owners could own a small share of their business, selling claims to others and diversifying with the proceeds. It is also possible that such a lack of diversification reflects entrepreneurs' preference for control.

Because entrepreneurs hold undiversified portfolios, one would expect that becoming an entrepreneur entails either converting existing assets into business assets or considerable saving around the time of entry. That is, when entering entrepreneurship, a household either changes the composition of its portfolio (for a portfolio of a given scale), increases the size of their portfolio (with the increase in assets primarily going into the active business), or combines these two changes. Likewise, exit from entrepreneurship for an undiversified entrepreneur involves either a change in the scale of the portfolio or a change in portfolio composition. Large decreases in portfolio size could be associated with businesses that fail while shifts in portfolio composition would characterize entrepreneurs who retire.

We use the 1983-1989 panel of households in the SCF to examine the portfolio changes associated with different entrepreneurial transitions. We define four entrepreneurial transition groups: entrants (households with more than $5,000 of active business assets in 1988 but not in 1982);

continuing entrepreneurs (households with more than $5,000 of active business assets in both years); exiting households (households with more than $5,000 of active business assets in 1982 but not in 1988); and nonentrepreneurial households.

Before examining the portfolio changes associated with entrepreneurial transitions, it is useful to have some idea of the change in portfolio scale associated with these transitions. For entrants, median asset holdings (in 1989 dollars) increase by $77,960 from $130,540 to $208,500. This increase in assets closely mirrors the median 1989 active business assets of entrants of $88,000. Continuing entrepreneurs have a much smaller increase in median assets, increasing by $26,093 from $359,007 to $385,100. The median active business assets of continuing entrepreneurs actually falls from $125,518 to $100,000.[30] Households that exit entrepreneurship experience a sharp decline in assets, with the median falling from $379,315 to $171,000; this decline exceeds the median 1983 active business asset value for these households of $138,070. Thus, especially for households entering and exiting entrepreneurship, the change in portfolio scale appears linked to the change in business assets. We return to these issues when we analyze saving patterns and entrepreneurial transitions in section IV.

If costly external financing associated with entry were responsible for the entrants' higher level of assets before entry, then one would expect considerable asset substitution upon entry. Alternatively, the lack of diversification in entrepreneurs' portfolios could arise because successful entrepreneurs find it difficult to diversify their positions (because of illiquidity); under this scenario, entrepreneurs would start businesses with net assets that are a small portion of their portfolio but their portfolio would grow

[30] The changes in mean assets and business value suggest that some continuing entrepreneurs are quite successful. Mean assets increase by $426,879 from $943,587 to $1,370,466 and mean active business assets increase by $262,370 from $394,745 to $657,115.

more undiversified over time.[31] Furthermore, the prospect of starting a business might lead potential entrepreneurs to hold different types of assets than households that are not contemplating entrepreneurship. Conversely, among entrepreneurial households, portfolios may differ between entrepreneurs who continue (successful, ongoing enterprises) and those who exit (either failed ventures or retirements).

The first columns of Table 5 present data on the portfolios of entrants in 1983 (pre-entry) and 1989 (post-entry). The most striking feature of these portfolios is that the active business assets are, on average, 45.3 percent of the entrants' 1989 portfolios. Thus entrepreneurs with relatively young businesses hold undiversified portfolios. For entrants, the median active business holdings in 1989 are $88,000 compared to $100,000 for continuing entrepreneurs. Relative to households that did not become entrepreneurs, the entrants were more likely to hold real estate and passive business assets and a had a larger share of their total assets in these assets in 1983. Lastly, entrants held more personal debt relative to their assets that other households.[32]

The second set of columns in Table 5 compares the 1983 and 1989 portfolios of continuing entrepreneurs. The propensity to hold most assets rises over the six-year period suggesting some effort

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[31] If the entrepreneur is able to borrow heavily upon starting the business, then the initial net asset value will be small and the business will appear as a small portion of the entrepreneur's portfolio since the SCF data report net asset value of the business. However, this highly levered position in an active business could contribute considerable risk to the entrepreneur's portfolio. Unfortunately, the SCF data do not report business debt separately from net asset value.

[32] Because entrants, on average, have higher initial assets than households that do not enter and have fewer assets than 1983 entrepreneurs, these comparisons may just reflect wealth differences. However, these portfolio differences between entrants and other households also hold within the sample of households in the top wealth quintile of 1983.

to diversify. However, the average portfolio share in active businesses rises from 41.8 percent to 47.9 percent indicating that, on average, entrepreneurs grow less diversified over time. Personal debt relative to assets increases over the six-year period for continuing entrepreneurs. These patterns also hold for continuing entrepreneurs in the top wealth quintile in 1983.

The third set of columns in Table 5 compares the 1983 and 1989 portfolios of households that exit entrepreneurship. In 1983, compared to the continuing entrepreneurs, these households' assets were slightly more heavily concentrated in their active businesses. As one might expect given the adding up constraint, their portfolio shares in all asset classes (other than active businesses) increased. The largest increases were in passive businesses, housing, real estate, and retirement assets. Similar patterns exist for households in the top wealth quintile in 1983.

To summarize, the lack of diversification of entrepreneurs appears to occur early in the life of the business (entrants) and to persist as the business ages. Thus limited opportunities for external financing may play a role for entrepreneurial selection and continuing business growth.

IV. ENTREPRENEURSHIP, WEALTH, AND SAVING: A CLOSER EXAMINATION

The central question raised by our emphasis on the interdependence of households' decisions about entrepreneurship and saving is whether, all else being equal, a decision to enter or expand business ownership requires an upfront equity commitment by the entrepreneur. If so, saving may be higher for business owners (and prospective business owners) than for similarly situated workers solving a conventional life-cycle consumption-smoothing problem.

In principle, this difference is straightforward to investigate. Consider, for example, an

individual not considering business ownership who faces an upward-sloping age-earnings profile and perfect capital markets. All other things being equal, that individual's consumption smoothing in a life-cycle problem would lead to low saving prior to the period of earnings growth. An individual considering business ownership must make an internal equity investment in the business in order to have access to expected future earnings growth, leading to greater current saving. Such intuition is difficult to take to data, however, because of the lack of long panel data on asset holdings and labor earnings. The SCF, for example, has an available panel of only two periods.

Using the SCF panel, we investigate two links between entrepreneurship and saving. First, we consider the relationship between entrepreneurial participation and mobility in the wealth distribution. Second, we study whether business entrants and continuing entrepreneurs have higher saving rates than nonbusiness households.

A. Are Entrepreneurs More Upwardly Mobile?

Thus far, we have emphasized cross-sectional differences in wealth-income ratios between entrepreneurs and nonentrepreneurs. However, these cross-sectional differences only tell part of the story of the relationship between entrepreneurship and wealth accumulation. Entry and exit play an important role in defining who is an entrepreneur. As noted earlier, 54 percent of the 1989 entrepreneurs enter entrepreneurship in the previous six years and 5 percent of the 1983 entrepreneurs exit by 1989. Furthermore, cross-sectional comparisons cannot distinguish the possibility that wealth levels affect entrepreneurial selection from the possibility that entrepreneurship (or a desire to become an entrepreneur) increases saving. Panel data help disentangle the different roles of entrepreneurship in

wealth accumulation.

As mentioned above, entrants have a larger increase in their wealth than other entrepreneurial transition groups. To further examine the relationship between entrepreneurial transitions and mobility in the wealth distribution, we calculate transition probabilities across wealth-income ratio quintiles. Before turning to these transition probabilities, it is useful to have a rough idea of the wealth-income ratios of the different entrepreneurial transition groups in the two years. The median wealth-income ratio for continuing entrepreneurs increased from 6.11 in 1982 to 7.91 in 1988. Entrants experienced a relatively large percentage increase in their median wealth-income ratio which increased from 2.50 in 1982 to 3.95 in 1988. Households that exited entrepreneurship experienced a downward shift in the distribution of their wealth-income ratios with the median falling from 6.45 in 1982 to 3.98 in 1988.[33] Households that stayed out of entrepreneurship experienced modest increases in their wealth-income ratios with the median rising from 1.30 in 1982 to 1.72 in 1988. These shifts in the median wealth-income ratios foreshadow the upward mobility of continuing entrepreneurs and entrants in the wealth distribution.

Table 6 documents the mobility of the four groups of households in terms of wealth-income ratios between 1982 and 1988. In particular, the table presents transition probabilities within the distribution of wealth-income ratios for continuing entrepreneurs (Table 6A), entrepreneurial entrants (Table 6B), exiting entrepreneurs (Table 6C), and nonentrepreneurs (Table 6D). Households continuing as entrepreneurs or entering as entrepreneurs are more likely to move up in the overall

[33] Retirement and business failure can have quite different effects on the wealth-income ratio. Retirement probably decreases income but does not necessarily change wealth. Entrepreneurial failure has an ambiguous effect on income but probably lowers wealth.

wealth-income distribution. Moreover, the link between entrepreneurship and wealth-income ratios is not simply driven by unusual changes in current income associated with entry into or maintenance of entrepreneurship. In addition to their mobility in terms of wealth-income ratios, households continuing as entrepreneurs or entering as entrepreneurs are more likely to move up in both the overall wealth distribution and the overall income distribution (not reported in a table).

Our explanation emphasizes the interaction of capital-market imperfections and entrepreneurship in explaining differential wealth accumulation by business owners. An alternative explanation for an increase in the wealth-income ratio for entering and continuing entrepreneurs is that income falls upon entrepreneurial entry. Gordon (1998) argues, for example, that entrepreneurs have lower reported income for tax purposes and when shifting to an incorporated business accrue capital gains by leaving funds in the firm. There are two problems with this explanation in our setting. First, as noted above, though not shown in Table 6, entrepreneurship is associated with greater upward mobility in the distributions of wealth and income (as well as wealth relative to income). Second, unlike studies classifying entrepreneurs by Schedule C filing status, shifts in organizational form pose no problem; entrepreneurs are asked in the Survey of Consumer Finances about their business income, irrespective of whether they withdrew income for tax purposes (as would be the case in an incorporated business).

B. Do Entrepreneurs Save More?

The upward mobility in the distribution of wealth (and wealth-income ratios) of continuing entrepreneurs and entrants, along with the downward mobility of households that exit entrepreneurship, suggests that entrepreneurship is related to household saving. In this section, we examine the saving

patterns of households with different entrepreneurial experiences. In defining saving, we take a broad definition of household net worth to capture the association of entrepreneurial activity with both business and nonbusiness saving. Specifically, we define the saving rate as the change in net worth (as defined earlier) divided by the average income in the two years divided by six (the number of years between the two surveys). We use average income over the two years to get a better measure of permanent household income.[34] As Table 7 shows, entrants and continuing entrepreneurs have substantially higher saving rates than nonentrepreneurs.[35] These higher saving rates persist for most age, income, and wealth groups.

The persistence in the differences in saving rates of entrepreneurial transition groups across subgroups in the population suggests that the differences are related to entrepreneurship rather than differences in the observable characteristics of the different entrepreneurial transition groups. Nonetheless, regression analysis helps summarize these differences across households with different entrepreneurial experiences. We regress the annualized saving rate on dichotomous variables for entrepreneurial transitions and various household characteristics. The entrepreneurial transition

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[34] As an alternative method of estimating "permanent" income, we could estimate income as a function of household demographics and use predicted income as a measure of permanent income. This method suffers two problems for the evaluating the effects of entrepreneurship on saving. First, entrepreneurship almost certainly entails unobservable differences in talent that would not be captured by an estimating regression for "permanent" income. By using predicted income for the household, we would be ignoring the unobservable talent that is captured by current income. Second, many of the variables that would be likely candidates to predict permanent income (*e.g.*, age, experience, and education) may have independent effects on saving decisions.

[35] One possible explanation for a difference in saving rates between entrepreneurs and nonentrepreneurs is that some nonentrepreneurs may be covered by defined-benefit pension plans, while entrepreneurs must save for their retirement in their personal assets. The differences in saving rates documented in Table 7 are quite large, however, relative to reasonable estimates of contribution rates for pensions. We return to this issue in our empirical work below.

variables represent entry (*ENTRY* = 1 if the household is entrepreneurial in 1988, but not in 1982, and zero otherwise), continuing (*CONTINUE* = 1 if the household is entrepreneurial both in 1982 and 1988), and exiting (*EXIT* = 1 if the household is entrepreneurial in 1982, but not in 1988); the omitted category in the regressions is nonentrepreneurial households. The demographic variables are: marital status in 1982 (*MARRIED* = 1 for married couples in 1982, and zero otherwise); marital transitions between 1982 and 1988 (*GOT DIVORCED* = 1 for households that got divorced during the six-year period, and zero otherwise; *BECAME WIDOWED* = 1 for households in which one spouse died during the six-year period, and zero otherwise; and *GOT MARRIED* = 1 for households that got married during the six-year period, and zero otherwise); the number of people in the household in 1982 (*FAMILY SIZE*); dummy variables for the age of the head of household (*AGE2* = 1 if the head is between 35 and 54 years old in 1982; *AGE3* = 1 if the head is over 54 years old in 1982; employment status (*UNEMPLOYED* = 1 if the household head is unemployed in 1982, and zero otherwise); and education of the head (*EDUC* = number of years of education of the head of household in 1982). To control for differences in saving rates due to the presence of defined benefit pension plans (the value of which are not available to include in our wealth measure), we include a dummy variable for the presence of a defined benefit pension in 1982 (*DEFBIN*). Because inheritances can raise household wealth, we include a dummy variable for whether the household received an inheritance between the two survey years (*INHERIT*). Table 8 provides summary statistics for these variables by entrepreneurial transition groups.

We also include income variables to address the extent to which links between entrepreneurship and wealth accumulation reflect a nonlinear relationship between income and wealth

(as in Diamond and Hausman, 1984; or Hubbard, 1986) or between income and saving (as in Dynan, Skinner, and Zeldes, 2000).[36] To capture this influence we add variables, based on 1982 income, corresponding to whether the household is in the: second income quintile (between the 21st and 40th percentile, *INC 21-40*), third income quintile (between the 41st and 60th percentile, *INC 41-60*), fourth income quintile (between the 61st and 80th percentile, *INC 61-80*), ninth income decile (between the 81st and 90th percentile, *INC 81-90*), 91st through 95th percentile (*INC 91-95*), the 96th through 99th percentile (*INC 96-99*), or top one percent (*INC 99+*).

Table 9 presents OLS and median regression results for the relationship between saving rates and entrepreneurial transitions controlling for household characteristics. Table 9 shows that entrants into entrepreneurship have substantially higher saving rates than nonentrepreneurs, controlling for other determinants of saving. Continuing entrepreneurs also have higher saving rates than nonentrepreneurs (but not as high as entrants) but this difference is statistically significant at the 95 percent confidence level only in the median regressions. Saving rates are lower for households exiting entrepreneurship than for nonentrepreneurs.[37] Moreover, because continuing entrepreneurs and entrants are upwardly mobile in the wealth distribution (as well as the wealth-income distribution reported in Table 6), this finding does not appear to reflect simply changes in income upon entry into entrepreneurship.

Among the control variables, marital status and transitions affect saving rates with married households having higher saving rates and divorce leading (not surprisingly) to dissaving; however, the

[36] Excluding the income variables yields similar regression results.

[37] Though not reported here, the pattern of coefficients for entrepreneurial transitions is robust to the exclusion of "professional practices" from the entrepreneurial sample.

magnitudes of the effects of these marital transitions is smaller than the magnitude of the effects of the entrepreneurial transitions. As expected, receiving an inheritance between the survey years leads to a substantially higher saving rate during the period. With the exception of the highest income groups in the median regressions, the income variables do not exhibit a strong association with saving rates.

In section IIIE, we observed that nonentrepreneurs hold a considerable fraction of their assets in their homes. As a benchmark for the effects of entrepreneurial transitions on saving, we include a set of housing transition variables on saving rates in the second and fourth columns of Table 9. These dummy variables are for households that: (1) are homeowners in 1982 and 1988; (2) are homeowners in 1982 and 1998 but moved between surveys; (3) changed from renting (or not owning) in 1982 to owning in 1988; and (4) changed from owning in 1982 to renting in 1988. The omitted category is households that own in neither period.

The inclusion of these housing transition variables has very little effect on the magnitude of the coefficients on the entrepreneurial transition variables. Homeowners (except for those who move) have higher saving rates than renters. Consistent with the importance of downpayment constraints, homebuyers have high saving rates around the time of purchase. The effects of continuing as a homeowner or entering homeownership have smaller effects on saving rates than the equivalent entrepreneurial transitions. However, exiting from homeownership is associated with dissaving at a similar rate to exiting entrepreneurship.

How important is *business saving* for the wealth accumulation of entrepreneurs? For both entering and continuing entrepreneurs, the majority of the change in wealth over our sample period is accounted for by changes in business wealth; that is, business saving accounts for much of the saving of

entrepreneurs. For entrants as a whole, their increase in business value is 84.7 percent of their total increase in wealth. Among entrants whose real wealth increases by at least 25 percent over the six-year period, the change in business value accounts for 70.8 percent of the increase in real wealth and the median ratio of the change in business value to the change in wealth is 68.7 percent. Among continuing entrepreneurs, the aggregate change in business value over the period was 66.8 percent of the change in aggregate wealth. Because either business value or wealth could fall in value, again we condition on households that experience a greater than 25 percent increase in wealth (49.3 percent of the continuing entrepreneurs). For this sample, the change in business value accounts for 61.6 percent of the change in wealth and the median ratio of the change in business value to the change in wealth is 43.0 percent. Again, these statistics highlight that entrepreneurs do not grow more diversified as their business grows older. Taken together, these patterns suggest a link between capital-market imperfections for entrepreneurial selection and investment opportunities and the saving decisions of entrepreneurs.

How much of the increase in business wealth required new upfront saving by the entrepreneur? One possibility, of course, is that entrants acquire significant wealth from ideas or luck with little upfront investment. A related possibility is that continuing entrepreneurs become wealthier with little additional investment and, perhaps, do not diversify because of the illiquidity of business assets. While we lack data on investment *per se*, we investigate these possibilities by examining *ex post* (*i.e.*, 1988) data on average *"Q"* for entrepreneurs – that is, the market value of the assets relative to replacement cost. To the extent that a business's value is near unity for an entrant, the change in business value (which, as we saw above, is on average substantial) reflects an upfront investment. Likewise, for a continuing

entrepreneur, *Q* values not too much greater than unity suggest the presence of investment.

We construct average *Q* proxies for active business holdings by households in the 1989 SCF. The survey asks detailed questions on up to three active businesses for each household; remaining active business assets are lumped together. In order to have data on both the market value and book value of assets, we are limited to using only the separately listed businesses for each household. To calculate average *Q*, we divide the sum of the households' market value of different active businesses by its share of these firm's book value.

The median *Q* value for entrants is 1.01, suggesting the significance of upfront investment; the interquartile range is 0.99 to 2.5, suggesting further the significance of upfront investment. The median *Q* value for continuing entrepreneurs is somewhat higher (1.47) than that for entrants, as one might expect, but it is still suggestive of the importance of investment in generating business wealth. Finally, even among entrepreneurial households with annual saving rates over the 1982-1988 period in excess of 25 percent, *Q* values indicate the importance of investment (*i.e.*, the median *Q* for entrants is 1.03 and the median *Q* for continuing entrepreneurs is 1.71). Hence one may reasonably conclude that changes in business value reflect a substantial commitment of funds as well as returns to ideas or luck.

V. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Studies of household saving decisions in general and of the saving decisions of wealthy or high-income households in particular have paid relatively little attention to entrepreneurial saving decisions and their role in wealth accumulation. Nevertheless, active business owners figure prominently among high-wealth households. Using data from the 1983 and 1989 Federal Reserve Board Surveys of

Consumer Finances, we quantify three findings about entrepreneurial saving decisions and their role in household wealth accumulation. First, entrepreneurial households own a substantial share of household wealth and income, and this share increases throughout the wealth distribution and the income distribution. Second, the portfolios of entrepreneurial households, even wealthy ones, are very undiversified, with the bulk of assets held within active businesses. Third, wealth-income ratios and saving rates are higher for entrepreneurial households even controlling for age and other demographic variables.

We suggest that costly external financing for entrepreneurial investments (coupled with potentially high returns on those investments) has important implications for the saving behavior of wealthy households. While our analysis cannot rule out a role for unobserved heterogeneity in talent for entrepreneurship in explaining links between entrepreneurship and wealth accumulation, an alternative explanation that nonbusiness assets are simply a proxy for unobserved entrepreneurial talent must, however, confront the fact that would-be entrepreneurs have higher saving rates prior to and during entrepreneurship than do nonentrepreneurs and the challenge of explaining why unconstrained entrepreneurs would have higher saving rates. Another possible source of unobserved heterogeneity is a preference for "internal control," which might induce links among assets, entrepreneurial selection, and entrepreneurial investment. Unobserved heterogeneity in willingness to take risk is also possible, of course. To the extent that it is a "downpayment constraint" that links the saving and investment decisions of entrepreneurs, it is still the case that entrepreneurs would save more (in this case to participate in a risky business venture).

Our conclusion that entrepreneurial saving and investment decisions are interdependent raises

four areas for future research: (1) measuring the role of entrepreneurs in aggregate wealth accumulation; (2) dissaving decisions of business owners; (3) studying implications for portfolio allocation and asset pricing; and (4) analyzing consequences for tax policy toward entrepreneurial saving and investment.

First, recent adaptations of the life-cycle model emphasize the importance of uninsured idiosyncratic risk (of earnings, lifespan, or medical expenses) and lending-market imperfections (or borrowing constraints); see, *e.g.*, Hubbard, Skinner, and Zeldes (1994, 1995). While such models can explain many aggregate and distributional features of U.S. wealth accumulation, they are not well suited to explain saving related to business ownership. That is, though models incorporate decisions about labor supply and investment in financial assets, they do not incorporate decisions about entrepreneurial entry, saving, and investment. The inclusion of such margins is likely to be useful for explaining wealth accumulation, given the observed concentration of household wealth[38] and the empirical significance for total wealth of business owners' household wealth accumulation decisions.[39]

Quadrini (2000) has embarked on one research program in this area. He nests a formalization of entrepreneurial choice within an intertemporal general equilibrium model of an economy of infinitely-lived households. The production sector has both large firms and small firms, the latter being "financially

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[38] The top one percent of households in 1989 owned about 36 percent of household wealth (based on SCF) or about 29 percent (based on the PSID).

[39] The wealthy may save more for a number of reasons. Alternatives to the life-cycle model that may help explain the saving patterns of wealthy households include: (1) differences in the importance of pensions and Social Security across income groups (see Hubbard, Skinner, and Zeldes, 1994, 1995); (2) bequest motives; (3) precautionary savings (see Hubbard, Skinner, and Zeldes, 1994, 1995); (4) differences in rates of time preference (see Lawrance, 1991, and Dynan, 1994); (5) differences in attitudes towards risk; (6) nonhomothetic preferences (see Attanasio and Browning, 1995, and Atkeson and Ogaki, 1996); and (7) differences in whether households derive direct utility from holding wealth (see Carroll, 1997).

constrained." Potential entrepreneurs face higher costs of external financing than for internal financing (their own saving). Calibrating the model using data from the PSID, Quadrini does relatively well in matching the variation on wealth-income ratios by income class for entrepreneurs and nonentrepreneurs and the distribution of wealth and income for the model economy and the PSID data. Moreover, he finds that eliminating the entrepreneurial selection and investment margins significantly reduces the model's ability to explain the observed concentration of wealth and income. Our empirical findings suggest that further research along these lines may be fruitful.

Second, a link between entrepreneurship and saving may imply a link between entrepreneurial transitions and old-age dissaving. We have focused our attention on the pre-retirement saving decisions of entrepreneurs. Higher saving rates for higher-income households are principally a feature of entrepreneurs. We have not explicitly considered the dissaving decisions of the very affluent (see, *e.g.*, the discussion in Carroll, 1997). Our emphasis on business ownership may, however, shed light on the "slow" dissaving of the elderly (relative to the conventional life-cycle predictions) observed by some researchers (see, *e.g.*, King and Dicks-Mireaux, 1982; Diamond and Hausman, 1984; Hubbard, 1986; and Bernheim, 1987).

Three potential channels could account for slow dissaving by business owners even in the absence of a bequest motive. The first is the possibility of continuing economic profits for older business owners. In this case, the relevant "interest rate" in the life-cycle consumption decision is not the expected return on financial assets, but the higher expected returns on business assets; in effect, the price of old-age consumption is higher for business owners than for workers. Second, just as information and incentive problems make it costly to obtain external financing, selling off portions of an

active business is likely to prove difficult. Third, the capital gains tax acts in part as a transactions tax on exit from business ownership.

Third, most empirical studies of household portfolio allocation and asset pricing abstract from business ownership as a "portfolio allocation" decision, as it is in the presence of illiquid business assets and internally financed business ownership. While the influence of nonmarketable labor income, pensions, or Social Security on household portfolio allocation has been considered (see, *e.g*. Mayers, 1973; and Hubbard, 1985), relatively little attention has been paid to links among business ownership, portfolio allocation, and asset pricing. In one study consistent with our findings, Heaton and Lucas (2000) find that households with high and variable private business income hold less of their assets in equities than do other wealthy households and that the variability of wage income has relatively little explanatory power for portfolio allocation. To the extent that undiversifiable business risk is more important than undiversifiable labor income risk for the wealthy, some entrepreneurial risk factor may contribute to explaining such asset-pricing anomalies as the equity premium puzzle or the small firm premium. Heaton and Lucas (2000) extend the augmented CAPM asset-pricing model of Jagannathan and Wang (1996), in which they separate components of human capital into the value of future wage income and the value of future proprietary business income; they conclude that proprietary income is more important than wage income in determining asset returns.

Fourth, tax policy has potentially large effects on entrepreneurial saving and investment. From a positive perspective, to the extent that the "rich" are business owners whose high rates of wealth accumulation are stimulated by the combination of high returns on saving and investment, high "success tax rates" can discourage entrepreneurial entry, saving, and investment (see, *e.g.*, King and

Levine,1993; Carroll, Holtz-Eakin, Rider, and Rosen, 1997; and Gentry and Hubbard, 2000). Even if one believed that the entrepreneurial rich have different rates of time preference, high marginal tax rates would redistribute resources based on tastes rather than on ability. In addition, binding financing constraints can imply a link between the average tax rates on entrepreneurs' profits and entrepreneurial investment.

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Table 1: Concentration of Population, Assets and Net Worth, By Income			
	Entrepreneurs' Percentage of:		
	Population	Assets	Net Worth
Overall	8.7	37.7	39.0
Income Quintile:			
Bottom	0.9	6.0	6.3
Second	4.9	17.8	18.3
Third	7.3	22.4	23.9
Fourth	11.2	28.1	30.9
80 - 90	13.4	25.2	26.5
90 - 95	16.9	30.0	29.4
95 - 99	26.7	43.9	44.7
99 - 100	56.3	68.6	68.0

Source: Authors' calculations based on data representing 3,143 households from the 1989 Survey of Consumer Finances. The calculations use population weights.

Table 2: Average and Median Net Worth of Entrepreneurial Status, By Income (Dollars)				
	Entrepreneurs		Nonentrepreneurs	
	Average	Median	Average	Median
Overall	854,800	307,000	126,228	38,250
Income Group:				
Bottom Quint	186,341	53,060	25,834	2170
2nd Quint	236,805	141,500	54,851	19,850
3rd Quint	321,465	151,430	80,325	36,700
4th Quint	384,543	198,800	108,698	57,352
80 - 90th percentile	437,828	306,449	188,716	131,500
90 - 95th percentile	738,285	767,000	361,625	207,160
95 - 99th percentile	1,600,083	970,500	723,126	429,500
99 - 100th percentile	5,164,994	2,713,000	3,130,220	1,685,300

Source: Authors' calculations based on data representing 3,143 households from the 1989 Survey of Consumer Finances. The calculations use population weights.

Table 3: Wealth-Income Ratios, By Age, By Income, and Entrepreneurial Status						
	Average W/Y			Median W/Y		
	All	Entre-preneurs	Nonentre-preneur	All	Entre-preneurs	Nonentre-preneur
Overall:	4.6	8.1	3.6	1.8	6.0	1.5
By Age:						
Young	1.8	6.5	1.2	0.4	4.3	0.3
Middle	3.8	6.6	2.9	1.8	5.8	1.4
Old	7.6	11.0	6.5	4.4	11.2	4.1
By Education:						
Low	3.9	11.8	3.2	1.6	7.5	1.5
Middle	4.1	8.8	3.1	1.5	5.7	1.2
High	5.4	7.5	4.4	2.5	6.0	2.2
By Income:						
1st Quintile	4.5	41.1*	4.2	0.4	14.7*	0.4
2nd Quintile	4.3	15.4	3.7	1.5	10.1	1.3
3rd Quintile	3.8	11.8	3.1	1.6	5.9	1.4
4th Quintile	3.4	9.4	2.6	1.6	4.9	1.4
9th Decile	3.7	7.3	3.1	2.4	5.0	2.1
90 - 95th percentile	4.8	8.3	4.1	2.9	7.6	2.5
95 - 99th percentile	6.3	10.2	4.8	3.7	5.9	3.3
99 - 100th percentile	6.1	6.7	5.3	4.5	4.7	4.4

Source: Authors' calculations based on data on the 3,110 households with positive income from the 1989 Survey of Consumer Finances. * denotes cells with fewer than 10 households. The average ratios are the ratio of average wealth to average income for each group.

Table 4A: Portfolio Allocation of Entrepreneurs and Nonentrepreneurs, 1989							
	Entrepreneurs				Nonentrepreneurs		
Asset:	% with asset	Conditional median	Portfolio share	Portfolio share*	% with asset	Conditional median	Portfolio share
Liquid	98.2	8000	5.2	8.8	84.3	2880	10.5
Bonds	40.7	1000	2.2	3.7	27.4	1000	5.2
Equity	32.9	14000	3.3	5.7	17.7	8000	6.3
Retirement	52.0	18000	3.1	5.3	34.0	10000	6.7
Other Fin.	63.8	10000	3.1	5.2	44.0	3000	6.1
Home	85.0	85000	12.6	21.5	61.9	70000	41.1
Real Estate	42.7	100000	17.7	30.2	18.1	40000	15.1
Act Bus	100.0	107000	41.5	N/A	1.4	2000	0.01
Pass Bus	36.4	40000	7.4	12.6	2.1	15000	1.7
Other Non-financial	96.0	16000	4.1	6.9	83.4	7000	7.3
Mortgage	59.7	43000	3.8	6.4	37.5	32000	10.8
Other Debt	79.3	15000	8.1	13.8	65.4	5000	6.3
All Debt	87.0	56000	11.9	20.3	71.2	14000	17.1
Mortgage to Value		48.0	30.1	N/A		41.0	26.2

Source: Authors' calculations using 3,143 households from the 1989 Survey of Consumer Finances.

Note: The second portfolio share column for entrepreneurs excludes the value of active business assets in total assets in order to measure the allocation of non-business assets. Mortgage-to-value refers to the ratio of outstanding mortgage debt to house value. The conditional median reflects the median among households with mortgages. The number in the portfolio share column is the ratio of total mortgage debt for the group to total house value for the group.

Table 4B: Portfolio Allocation of Entrepreneurs and Nonentrepreneurs, 1989 Top 5 Percent of the Wealth Distribution							
	Entrepreneurs				Nonentrepreneurs		
Asset:	% with asset	Conditional median	Portfolio share	Portfolio share*	% with asset	Conditional median	Portfolio share
Liquid	100	45300	5.2	9.1	100	62000	10.3
Bonds	55.2	15000	2.5	4.3	68.2	87000	10.4
Equity	63.8	47000	3.9	6.9	81.3	85000	12.5
Retirement	71.5	50000	3.2	5.6	70.9	75000	5.6
Other Fin.	78.9	22000	3.1	5.3	72.1	38000	8.0
Home	88.1	225000	8.8	15.2	96.4	275000	19.5
Real Estate	70.4	220000	19.2	33.9	68.8	310000	24.5
Act Bus	100.0	650000	42.7	N/A	1.5	1000	0.00
Pass Bus	55.9	130000	8.3	14.5	21.1	83000	3.8
Other Non-financial	93.5	24000	3.2	5.6	98.5	21000	5.3
Mortgage	54.1	59000	2.0	3.4	40.9	38000	2.0
Other Debt	82.0	43000	7.1	12.4	58.5	41610	4.7
All Debt	87.4	93000	9.0	15.8	64.9	74332	6.7
Mortgage to Value		37.0	22.3	N/A		14.4	10.2

Source: Authors' calculations using data for 846 households from the 1989 Survey of Consumer Finances.

Note: The second portfolio share column for entrepreneurs excludes the value of active business assets in total assets in order to measure the allocation of non-business assets. Mortgage-to-value refers to the ratio of outstanding mortgage debt to house value. The conditional median reflects the median among households with mortgages. The number in the portfolio share column is the ratio of total mortgage debt for the group to total house value for the group.

Table 5: Changes in Portfolio Allocation by Entrepreneurial Transition, 1983 and 1989								
	Entrants				Continuing Entrepreneurs			
	1983		1989		1983		1989	
Asset:	% with asset	Portfolio share	% with asset	Portfolio share	% with asset	Portfolio share	% with asset	Portfolio share
Liquid	99.0	8.3	99.0	4.2	100.0	3.5	95.6	3.4
Bonds	37.0	1.4	33.0	1.7	27.2	2.4	32.3	3.8
Equity	28.9	7.1	29.4	2.8	34.3	9.5	38.7	4.1
Retirement	34.2	4.0	47.9	3.8	55.8	1.8	59.7	3.0
Other Fin.	52.5	7.6	66.3	2.4	56.3	4.7	63.1	2.8
Home	76.5	37.0	82.2	22.9	93.2	15.9	96.2	11.7
Real Estate	41.2	21.6	48.5	9.8	34.8	11.9	40.2	12.5
Act Bus	0.016	0.02	100.0	45.3	100.0	41.8	100.0	47.9
Pass Bus	11.2	7.6	22.7	2.5	15.1	6.3	22.7	8.5
Other Non-financial	99.9	5.3	97.0	4.7	97.1	2.1	93.7	2.3
Mortgage	58.3	12.2	61.1	9.1	71.0	3.7	71.3	3.2
Other Debt	83.2	8.8	79.7	3.4	85.6	3.0	78.3	4.1
All Debt	89.1	21.0	83.9	12.5	89.4	6.7	89.9	7.3
Mortgage to Value		32.9		40.0		23.3		27.6

Table 5:(continued) Changes in Portfolio Allocation by Entrepreneurial Transition, 1983 and 1989								
	Households that Exit Entrepreneurship				Nonentrepreneurial Households			
	1983		1989		1983		1989	
Asset:	% with asset	Portfolio share	% with asset	Portfolio share	% with asset	Portfolio share	% with asset	Portfolio share
Liquid	97.5	4.4	98.9	8.5	86.2	11.0	87.1	11.6
Bonds	25.0	3.0	21.7	5.3	25.6	4.3	25.0	4.7
Equity	27.4	4.5	32.3	5.8	14.6	10.3	16.2	7.5
Retirement	36.3	2.7	51.2	7.1	19.1	2.9	34.0	7.6
Other Fin.	45.9	2.7	58.6	6.2	37.7	4.5	45.5	4.7
Home	80.8	16.8	86.9	25.9	59.5	42.0	66.1	44.5
Real Estate	50.9	13.3	25.4	19.7	16.3	11.5	20.6	11.2
Act Bus	100.0	47.7	2.8	0.008	0.8	0.0	0.2	0.0
Pass Bus	5.4	2.1	5.0	13.7	2.4	7.3	0.9	0.8
Other Non-financial	98.6	2.7	98.6	7.8	84.5	6.3	85.8	7.3
Mortgage	58.4	4.4	57.3	5.4	35.5	9.8	39.6	11.6
Other Debt	84.5	4.7	69.5	5.1	67.4	5.4	65.1	4.9
All Debt	91.2	9.1	84.1	10.5	72.9	15.1	71.5	16.4
Mortgage to Value		26.3		21.0		23.3		26.0

Source: Authors' calculations from the 1983 and 1989 Surveys of Consumer Finances. In the sample, 85 households entered entrepreneurship, 186 households continued as entrepreneurs, 151 households exited from entrepreneurship, and 1,057 households were not entrepreneurs in either year.

Table 6A: Wealth-Income Ratio Transition Probability Matrix, Households that Remain Entrepreneurs					
	Wealth-Income Ratio Quintile in 1988				
Wealth-Income Ratio Quintile in 1982:	Bottom	2nd	3rd	4th	Top
Bottom	0.0	0.0	0.0	1.83	0.0
2nd	0.0	1.73	0.06	0.0	4.82
3rd	0.0	1.36	3.68	1.92	5.48
4th	0.0	1.23	5.69	5.94	7.05
Top	0.0	0.35	2.13	14.99	41.75

Table 6B: Wealth-Income Ratio Transition Probability Matrix, Households that Enter Entrepreneurship					
	Wealth-Income Ratio Quintile in 1988				
Wealth-Income Ratio Quintile in 1982:	Bottom	2nd	3rd	4th	Top
Bottom	0.0	0.44	2.26	1.62	0.0
2nd	0.79	13.75	1.09	2.97	9.77
3rd	0.0	0.0	3.53	4.03	6.04
4th	0.0	2.58	3.91	12.84	11.41
Top	0.0	0.0	7.05	7.19	8.74

Table 6C: Wealth-Income Ratio Transition Probability Matrix, Households that Exit Entrepreneurship					
	Wealth-Income Ratio Quintile in 1988				
Wealth-Income Ratio Quintile in 1982:	Bottom	2nd	3rd	4th	Top
Bottom	0.0	0.0	0.0	0.0	0.0
2nd	0.0	0.58	0.48	0.0	0.01
3rd	0.32	4.03	4.13	2.07	1.98
4th	1.05	7.70	10.66	5.91	7.06
Top	1.09	2.40	11.84	14.21	24.48

Table 6D: Wealth-Income Ratio Transition Probability Matrix, Nonentrepreneurial Households					
	Wealth-Income Ratio Quintile in 1988				
Wealth-Income Ratio Quintile in 1982:	Bottom	2nd	3rd	4th	Top
Bottom	13.82	6.90	1.17	1.01	0.24
2nd	6.42	7.09	5.88	1.44	0.45
3rd	2.34	4.97	6.67	5.38	1.85
4th	0.68	1.23	4.86	7.28	4.61
Top	0.19	0.99	1.54	3.99	8.99

Source: Authors' calculations based on data from the 1983-1989 Panel of the Survey of Consumer Finances. In the sample, 85 households entered entrepreneurship, 186 households continued as entrepreneurs, 151 households exited from entrepreneurship, and 1,057 households were not entrepreneurs in either year.

Note: Entries in each panel of the table sum to 100 percent.

Table 7: Median Saving-Income Ratio for 1983 to 1989, By Entrepreneurial Behavior					
	Stay In	Enter	Exit	Stay Out	Overall
Overall S/Y	0.165	0.361	-0.483	0.042	0.045
Overall S	9,998	13,547	-27,875	1,041	1,246
Overall Y	61,666	42,001	46,455	24,727	27,619
Median S/Y, By age in 1986					
Young	0.219*	0.387	0.0679*	0.0617	0.072
Middle	0.153	0.358	-0.558	0.0600	0.062
Old	0.244	0.487	-0.431	0.0060	0.0035
Median S/Y, By income in 1982					
1st quintile	-0.622*	1.34*	-1.79*	0.0041	0.0034
2nd quintile	-0.167*	0.128*	-1.88*	0.0203	0.020
3rd quintile	0.352*	0.209	-0.429	0.0664	0.069
4th quintile	0.156	0.387	-0.692	0.103	0.102
9th decile	0.191	0.450	0.0692*	0.0938	0.126
10th decile	0.257	0.454	-0.475	0.113	0.113
Median S/Y, By wealth in 1982					
1st quintile	0.357*	0.423*	n/a*	0.0336	0.0341
2nd quintile	n/a*	0.344	n/a*	0.0609	0.0718
3rd quintile	0.257*	0.445*	-0.0294*	0.0347	0.0445
4th quintile	0.144	0.439	0.0679	0.0953	0.118
9th decile	0.165	-0.182	-0.510	-0.00033	-0.0086
10th decile	0.212	0.407	-0.815	-0.196	-0.330

Source: Authors' calculations based on data from 1,479 households from the 1983-1989 Panel of the Survey of Consumer Finances. * denotes cells with fewer than 10 households.

Note: Income is measured as the average income (in 1988 dollars) using household income from 1982 and 1988. Saving is measured as the change in the real value of wealth over the six-year period divided by six.

Table 8: Summary Statistics of Household Characteristics, By Entrepreneurial Behavior					
	Stay In	Enter	Exit	Stay Out	Overall
MARRIED	0.82 (0.39)	0.72 (0.45)	0.83 (0.38)	0.58 (0.49)	0.61 (0.49)
GOT DIVORCED	0.035 (0.18)	0.075 (0.26)	0.17 (0.37)	0.084 (0.28)	0.085 (0.28)
BECAME WIDOWED	0.0046 (0.068)	0.0096 (0.098)	0.031 (0.17)	0.056 (0.23)	0.050 (0.22)
GOT MARRIED	0.035 (0.18)	0.19 (0.40)	0.12 (0.33)	0.094 (0.29)	0.098 (0.30)
FAMILY SIZE	2.76 (1.12)	2.62 (1.01)	2.70 (1.05)	2.36 (1.25)	2.41 (1.23)
AGE2	0.54 (0.50)	0.29 (0.45)	0.43 (0.50)	0.32 (0.47)	0.33 (0.47)
AGE3	0.15 (0.35)	0.15 (0.36)	0.36 (0.48)	0.32 (0.47)	0.31 (0.46)
UNEMPLOYED	0.00 (0.00)	0.050 (0.22)	0.00 (0.00)	0.074 (0.26)	0.066 (0.25)
EDUC	13.67 (2.74)	13.67 (2.56)	13.57 (2.29)	12.11 (3.26)	12.33 (3.22)
DEFBEN	0.26 (0.44)	0.29 (0.46)	0.21 (0.41)	0.39 (0.49)	0.37 (0.48)
INHERIT	0.14 (0.35)	0.031 (0.17)	0.10 (0.30)	0.084 (0.28)	0.085 (0.28)
Homeowner in 1982 & 1988	0.92 (0.27)	0.66 (0.47)	0.68 (0.47)	0.53 (0.50)	0.56 (0.50)
Homeowner both years but moved	0.16 (0.36)	0.17 (0.38)	0.14 (0.35)	0.081 (0.27)	0.092 (0.29)
Renter in 1982, Owner in 1988	0.037 (0.19)	0.15 (0.36)	0.18 (0.39)	0.14 (0.34)	0.13 (0.34)
Owner in 1982, Renter in 1988	0.024 (0.15)	0.094 (0.29)	0.11 (0.31)	0.70 (0.26)	0.071 (0.26)

Source: The entries are the means for each sample with standard deviations in parentheses. Authors' calculations based on data from 1,479 households from the 1983-1989 Panel of the Survey of Consumer Finances.

Table 9: Entrepreneurial Decisions and Saving-Income Ratios				
Variable	OLS Regressions		Median Regressions	
Constant	-0.0231 (0.165)	-0.0211 (0.154)	-0.0589 (0.0541)	-0.0803 (0.0430)
ENTRY	0.710 (0.274)	0.723 (0.271)	0.351 (0.0371)	0.352 (0.0288)
EXIT	-0.934 (0.206)	-0.933 (0.209)	-0.276 (0.0302)	-0.285 (0.0234)
CONTINUE	0.133 (0.190)	0.0973 (0.191)	0.191 (0.0290)	0.169 (0.0226)
MARRIED	0.149 (0.0986)	0.107 (0.0979)	0.0618 (0.0267)	0.0471 (0.0211)
GOT DIVORCED	-0.192 (0.0944)	-0.0945 (0.0979)	-0.131 (0.0403)	-0.105 (0.0316)
BECAME WIDOWED	0.0191 (0.287)	0.0728 (0.293)	-0.0852 (0.0399)	-0.0507 (0.0312)
GOT MARRIED	0.113 (0.109)	0.0702 (0.114)	0.0745 (0.0396)	0.00592 (0.0313)
FAMILY SIZE	-0.0346 (0.0286)	-0.0295 (0.0281)	0.00109 (0.00875)	0.00351 (0.00683)
AGE2	0.100 (0.0775)	0.118 (0.0622)	0.0113 (0.0256)	0.0253 (0.0202)
AGE3	0.000228 (0.102)	-0.0211 (0.0988)	0.00828 (0.0281)	0.0210 (0.0225)
UNEMPLOYED	0.0566 (0.0791)	0.0693 (0.0751)	-0.0232 (0.0511)	-0.00497 (0.0404)
EDUC	0.00706 (0.0126)	0.00652 (0.0124)	0.00565 (0.00336)	0.00521 (0.00261)
DEFBEN	0.0955 (0.0715)	0.0765 (0.0738)	0.0527 (0.0190)	0.0522 (0.0147)
INHERIT	0.202 (0.0970)	0.190 (0.0948)	0.142 (0.0274)	0.157 (0.0211)
INC21_40	-0.210 (0.123)	-0.216 (0.126)	-0.0317 (0.0346)	-0.0354 (0.0270)
INC41_60	-0.314 (0.157)	-0.0690 (0.164)	-0.00583 (0.0356)	-0.0191 (0.0282)

Table 9: Entrepreneurial Decisions and Saving-Income Ratios				
Variable	OLS Regressions		Median Regressions	
INC61_80	-0.137 (0.158)	-0.164 (0.174)	-0.00185 (0.0382)	-0.0323 (0.0303)
INC81_90	0.00500 (0.159)	0.00743 (0.173)	0.0429 (0.0439)	0.0236 (0.0349)
INC91_95	-0.000392 (0.198)	-0.0382 (0.211)	0.0125 (0.0506)	-0.0213 (0.0398)
INC96_99	-0.0440 (0.242)	-0.0476 (0.256)	0.182 (0.0456)	0.158 (0.0364)
INC99+	0.306 (0.242)	0.319 (0.246)	0.312 (0.0451)	0.270 (0.0360)
Homeowner in 1982 & 1988		0.0993 (0.0901)		0.0566 (0.0215)
Homeowner both years but moved		-0.0806 (0.0894)		-0.0591 (0.0217)
Renter in 1982, Owner in 1988		0.0992 (0.103)		0.195 (0.0324)
Owner in 1982, Renter in 1988		-0.358 (0.156)		-0.254 (0.0364)
Adj. R^2	0.059	0.067	0.056	0.065

Source: Estimates using panel data from the 1983-1989 Survey of Consumer Finances.

Note: Standard errors are in parentheses. Regressions use 4,434 observations, representing approximately 1,478 households. Standard errors are multiplied by the square root of three to adjust for the replications. Income in the saving-income ratio is measured as the average income (in 1988 dollars) using household income from 1982 and 1988. Saving is measured as the change in the real value of wealth over the six-year period divided by six. OLS regressions use population weights; median regressions are unweighted.

Appendix: Assets and Entrepreneurial Decisions

I. Entrepreneurial Selection

We estimate in Table A1 a probit model for entry into entrepreneurship (as we defined earlier). We include as explanatory variables 1982 wages (*WAGES*), education (*EDUC* = number of years of schooling), labor market experience (*EXPERIENCE*), and age and demographic controls. In these last categories, we include dummy variables for the age of the head of household (*AGE2* = 1 if the head is between 35 and 54; *AGE3* = 1 if the head is over 54), marital status (*MARRIED* = 1 if the household head is married in 1982, and zero otherwise; and proxies for changes in marital status -- *GOT MARRIED, GOT DIVORCED,* and *BECAME WIDOWED*), number of people in the household (*FAMILY SIZE*), and homeownership (*OWNHOME* = 1 if the household owns its home in 1982, and zero otherwise). We add household assets and household assets squared to investigate whether a household's net worth influences the propensity toward entrepreneurship, holding constant other determinants. Labor market and demographic variables have intuitive effects on entry and exit (*e.g.*, wages are negatively correlated with the likelihood of entry).

As the estimates reported in the first column of Table A1 show, higher initial assets raise the probability of entry into entrepreneurship,[40] except for very high levels of initial assets. Such a pattern is consistent both with a "costly external financing" explanation and an "entrepreneurial ability" explanation (in which unobserved heterogeneity in entrepreneurial ability is positively correlated with initial assets), a point to which we return later. Arguably some assets, such as vehicles and retirement accounts, are less relevant for entrepreneurial decisions than other assets. We obtain similar results to those in Tables A1 and A2 if we exclude vehicles and retirement accounts from the measure of assets (not reported in the tables but available upon request from the authors).

II. Entrepreneurial Investment

Previous studies of capital-market imperfections have focused on indirect tests of constraints on investment. For example, letting *i* and *t* index entrepreneurs and time, respectively, we can return to equation (3) for the choice of the capital stock; taking logs, the log of the entrepreneur's capital stock as a function of entrepreneurial ability (θ), technology (α), and the "cost of capital" (*R*) is:

[40] Moreover, there is no evidence that wealthy entrepreneurs are less talented. Indeed, Gentry and Hubbard (1997), using data from the 1989 SCF, show that *"Q"* ratios for entrepreneurs rise with both household income and net worth.

$$\ell nk_{it} = (1/(1-a))\ell nq_i + (1/(1-a))\ell na - (1/(1-a))\ell n\hat{R}_{it} + w_{it} \quad , \qquad \text{(A1)}$$

where $\hat{R} = \overline{R} + \emptyset + \emptyset' \left(\frac{a}{k}\right)$, and ω is a white-noise optimization error.

After controlling for θ ,α, and $\overline{R}$, there should be no predictive power for the capital stock of beginning-of-period nonbusiness assets, a^n. That is, if we add nonbusiness assets as a regressor in equation (A1), its estimated coefficient should be zero under the null hypothesis of perfect capital markets. Unfortunately, cross-sectional tests using the level of assets across entrepreneurs are likely to confound the effects of unobserved talent and assets. A positive correlation between unobserved talent and assets would upwardly bias the estimated coefficient on nonbusiness assets in the regression for the capital stock. These biases would be less severe with panel data on investment flows; however, such data are not available in the SCF.

It is possible, however, to examine the link between net worth and investment by studying the relationship between net worth and entrepreneurial earnings. Under the null hypothesis of perfect markets, one can substitute the optimal capital stock for k from equation (A1) into the definition of entrepreneurial earnings in equation (1), so that $y_{it} = \theta_i^{1/(1-\alpha)} (\alpha / \overline{R}_{it})^{\alpha/(1-\alpha)} \epsilon_{it}$, or

$$\ell ny_{it} = (1/(1-\alpha))\,\ell n\theta_i + (\alpha/(1-\alpha))\ell n\alpha + (\alpha/(1-\alpha))\ell n\,\overline{R}_{it} + \ell n\epsilon_{it} . \qquad \text{(A2)}$$

Here, one can test whether predetermined assets affect entrepreneurial earnings. First-differencing equation (A2) removes the entrepreneurial-ability term. If one adds an initial nonbusiness assets variable to that model, its estimated coefficient should be zero under the null hypothesis of perfect capital markets. The model of costly external financing presented earlier suggests an alternative role for assets and internally generated funds. Higher initial assets decrease the external financing premium, reducing the cost of capital and increasing business investment, k, and business income, y.

Using data on continuing entrepreneurs, we report estimates for two specifications of equation (A2) in Appendix Table A2. In both, we include household variables (marital status, number of children, age, and education), and business industry dummy variables. We first estimate equation (A2) in log differences; because some observations have zero or negative business income in one or both years, we also estimate (A2) in level differences. In the change in levels specification, the estimated coefficient on initial nonbusiness assets is marginally statistically significantly different from zero, inconsistent with the null hypothesis of frictionless financing for entrepreneurs.

Table A1: Assets and Entrepreneurial Entry		
Variable	Probit Coefficients	Marginal Effects
Constant	-2.65 (0.480)	
MARRIED	0.512 (0.369)	0.0389 (0.0241)
GOT MARRIED	0.776 (0.380)	0.105 (0.0687)
GOT DIVORCED	-0.273 (0.330)	-0.0177 (0.0171)
FAMILY SIZE	-0.0948 (0.0826)	-0.00748 (0.00618)
AGE2	-0.482 (0.203)	-0.0335 (0.0117)
AGE3	-0.693 (0.254)	-0.0435 (0.0158)
OWNHOME	0.531 (0.220)	0.0392 (0.0172)
EXPERIENCE	0.0117 (0.00669)	0.000925 (0.000524)
EDUC	0.0509 (0.0301)	0.00401 (0.00249)
"WAGES"	-0.000000905 (0.00000244)	-7.14e-8 (1.96e-7)
ASSETS	0.00000118 (0.000000491)	9.29e-8 (3.98e-8)
$ASSETS^2$	-2.68e-13 (1.38e-13)	-2.11e-14 (1.10e-14)
Pseudo R^2	0.13	

Source: Probit estimates using panel data from the 1983-1989 Survey of Consumer Finances.

Note: Standard errors are in parentheses. The regression uses 3,434 observations, representing approximately 1,145 households. The standard errors are multiplied by the square root of three to adjust for replicated data. "*WAGES*"equals the sum of 1982 wage and business income. None of the households that "Became widowed" entered entrepreneurship. Marginal effects are calculated at the means of the variables. For discrete variables, the marginal effect is the effect of changing the value of the variable from zero to one.

Table A2: Assets and Business Income Growth		
Variable	Change in Log of Business Income	Change in Level of Business Income ($000)
Constant	-5.01 (5.42)	3.88 (122.3)
MARRIED	-0.952 (0.585)	3.56 (33.4)
GOT MARRIED	-0.639 (0.654)	182.9 (153.8)
GOT DIVORCED	-4.93 (0.736)	-155.8 (118.9)
BECAME WIDOWED	1.17 (1.25)	85.4 (156.3)
FAMILY SIZE	-0.180 (0.243)	-13.8 (15.7)
AGE2	-0.431 (0.608)	-51.4 (38.6)
AGE3	-0.146 (0.857)	-70.5 (68.7)
EDUC	0.145 (0.111)	-0.276 (4.95)
DEFBEN	-0.779 (0.431)	-5.44 (40.0)
Log of other assets in 1982	0.390 (0.346)	
Other assets in 1982 ($000)		0.0694 (0.0470)
Other assets in 1982, squared ($000)		-5.99e-10 (1.17e-09)
Adj. R^2	0.47	0.14

Source: OLS estimates using panel data from the 1983-1989 Survey of Consumer Finances.

Note: Standard errors are in parentheses. Regressions include dummy variables for the business industry. The sample includes only households that were entrepreneurs in both years. The log regression uses 240 observations, representing approximately 80 households. The level regression uses 556 observations, or approximately 185 households. The standard errors are multiplied by the square root of three to adjust for replications in the data.