

# **Liquidity Constraints, Household Wealth, and Self-Employment: The Case of Older Workers**

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## **ABSTRACT**

This paper investigates the relationship between wealth and entrepreneurship of middle- and older-age individuals in the United States, a group whose wealth holdings and rates of self-employment are substantially higher than those of younger individuals. Using longitudinal data from the Health and Retirement Study that span over 14 years, we find entry into self-employment increases with total wealth across the entire wealth distribution. The positive relationship persists with adjustments for health status, risk aversion and for permanent earnings – a proxy for unobserved ability. The positive association holds for liquid assets and is stronger for entry into businesses requiring substantial capital investment than those requiring low initial capital. We also find workers with access to wealth through a lump-sum distribution option of an employer-provided pension plan are 26 percent more likely to become self-employed than workers without this option.

Keywords: entrepreneurship, self-employment, liquidity constraints, pensions

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## 1. INTRODUCTION

Challenging economic times in the past have given birth to new business, many that have gone on to become a Fortune 500 company according to a new report by the Kauffman Foundation (Stangler, 2009). This most recent economic downturn, however, is characterized by a large and long contraction in credit and an efficient credit market is essential for entrepreneurial activities. The existence and importance of liquidity constraints are cited as justification for public intervention in the credit market for new businesses. Federal and state governments in the United States, for example, have implemented various programs to facilitate new business creation with loan provision being one of the primary services provided (Gu, Zissimopoulos, and Karoly 2008). The federally funded Small Business Administration is the largest single financial backer of small businesses in the United States (Craig et al. 2007). Whether liquidity constraints bind and for whom, how important they are, and whether they justify public intervention are important policy questions.

A substantial body of empirical literature has documented the positive relationship between household wealth and business ownership or entry into self-employment, consistent with the hypothesis that liquidity constraints deter entrepreneurship (Evans and Jovanovic 1989; Evans and Leighton 1989; Holtz-Eakin, Joulfaian and Rosen 1994; Dunn and Holtz-Eakin 1995, 2000; Fairlie 1999; Bruce, Holtz-Eakin and Quinn 2000; Zissimopoulos and Karoly 2007, 2009).<sup>1</sup> Interpreting this as evidence as liquidity constraints deterring business start-up is complicated by the fact that households may accumulate assets with the intent to start a business or that high wealth households may be indicative of high ability individuals who, all else equal, may be more entrepreneurial or may be less risk averse. Empirical studies have attempted to

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<sup>1</sup> Some of these studies define entrepreneurship by business ownerships while others define it in terms of self-employment.

address this issue by estimating the effect of unexpected changes in wealth on the likelihood of becoming self-employed. Under the assumption that exogenous changes in wealth relax borrowing constraints, if households receiving this shock are more likely to enter self-employment than those that do not, access to capital limits business start-up.

Various measures of shocks to household wealth have been utilized—under the assumption that the timing of the windfall was largely unexpected—including inheritances, insurance settlements, lottery wins, and local house price movements (Holtz-Eakin, Joulfaian and Rosen 1994; Lindh & Ohlsson, 1996; Taylor, 2001; Hurst and Lusardi, 2004; Henley, 2005; Fairlie and Krashinsky, 2006; Disney and Gathergood, 2009; Zissimopoulos and Karoly, 2009). The study by Hurst and Lusardi (2004), based on a series of empirical tests, challenged the assumption of exogeneity of commonly used instruments for wealth. Analyzing data from the Panel Study of Income Dynamics (PSID), they found a positive relationship between household wealth and becoming a business owner only for households in the highest 5th percentile of the wealth distribution. They showed that both past and future inheritances predict business entry, concluding that inheritance captures more than just liquidity. Housing price movements may reflect improving business conditions, thus invalidating these as instruments for unexpected changes in wealth. This study emphasized the need for new and better tests of the financial constraint hypothesis. Disney and Gathergood (2009) replicated the Hurst and Lusardi findings in the U.K. context.

These recent studies, as well as most of the literature on liquidity constraints and entrepreneurship, are based on samples of all working age individuals ages 16 to 65. Exceptions are Bruce, Holtz-Eakin and Quinn (2000) and Zissimopoulos and Karoly (2007a, 2009) whose investigations of labor force movements of older workers included transitions into self-

employment. These studies documented the positive relationship between wealth and transitions into self-employment among workers over age 50. Zissimopoulos and Karoly (2007), like prior studies, also found receipt of inheritance increased the likelihood of entry into self-employment among older workers.

Older workers are an interesting subsample for studying self-employment entry and wealth as they have much higher rates of self-employment and levels of wealth than younger workers and are also different than younger workers in ways that affect both their likelihood of becoming business owners and their likelihood of facing liquidity constraints. Rates of self-employment increase from under two percent at age 16 to about ten percent at ages 40-44 to just under twenty percent at ages 60 to 64 (Zissimopoulos and Karoly, 2007a). The average wealth of workers over age 50 who become self-employed is about \$382,000 and is 2.5 times the wealth of workers between the ages of 16 and 60 who become self-employed (\$144,800) (Hurst and Lusardi, 2004). Older workers have more housing wealth and different types of wealth than younger workers including pension wealth and stock market wealth. Among individuals over 50, 80 percent are homeowners, about 35 percent hold stock wealth, and over 60 percent of those who are working have an employer provided pension (Zissimopoulos and Karoly, 2007b).

With more wealth and more work experience than younger workers, older workers may have less need for credit and, for those who need to borrow, may have access to higher levels of credit. Older workers may prefer the job flexibility and work conditions of business ownership more than younger workers. Older workers may be more likely than younger workers to be pushed into self-employment following job loss because of hurdles older workers face in the job search (Chan and Stevens, 2001; Maestas and Li, 2006). On the other hand, older workers may be less willing to take on the risk of business ownership given that, compared to younger

workers, they have fewer healthy work years remaining over which to recoup the losses of an unsuccessful business. They may be less willing to leave a wage and salary job that offers health insurance and enter self-employment because of the increased likelihood of experiencing a health shock.

Wealthy older workers are different than non-wealthy older workers in ways that are likely correlated with their propensity to become self-employed. For example, wealthy older workers are healthier than low-wealth older workers. Health is likely correlated with entry into self-employment and exits from the labor market in complex ways. Poor health may increase self-employment if the flexibility allows for better accommodation of a work limiting condition (Zissimopoulos and Karoly, 2007a) or lead to exits from the labor force. On the other hand, as mentioned above, poor health may decrease entry into self-employment for individuals without alternatives to employer-sponsored health insurance although the empirical findings are mixed (Holtz-Eakin et al, 1996; Madrian and Lefgren, 1998; Zissimopoulos and Karoly, 2007a; Fairlie, Kapur and Gates, 2008).

In this paper we investigate the relationship between wealth and transitions into self-employment among middle- and older-age workers utilizing seven waves of panel data covering 1992 to 2004 from the Health and Retirement Study (HRS), a nationally representative sample of individuals over age 50 and their spouses. By comparing job changes over the two-year survey intervals, we identify 684 transitions from wage and salary work to self-employment over the 14-year span covered by the data. These transitions show that, like younger workers, middle- and older-age workers begin businesses in all occupations and industries. Moreover, as about one-half of their businesses have employees, these are not just workers who take up consulting or freelance work as they move toward full retirement.

In our analysis of transitions to self-employment, the HRS provides an extensive set of control variables beyond demographic characteristics—namely measures of health, health insurance, risk aversion, current and permanent income, and job characteristics and benefits—that we include in our models to understand how the effect of wealth changes with the additional control variables. Regardless of the set of covariates in the model, we find a positive relationship between wealth and business start-up for middle- and older-age workers at all wealth levels. The positive relationship also holds for liquid wealth and is stronger for entry into businesses requiring substantial capital investment than for entry into low capital or professional businesses. These results contrast with Hurst and Lusardi (2004) who find that, for a sample of younger workers in the PSID, a positive relationship between wealth and business entry is evident only for households at the top of the wealth distribution. One possible explanation for this difference is that, in contrast to the PSID data where transitions are measured over one year, the transitions in the HRS are measured over two years. Thus, our results capture the effect of wealth on both entry into self-employment and survival of the business for up to two years.

Even with rich controls for observable differences between wealthy and non-wealthy households, wealth and business formation may be correlated with other unobserved factors that cause households to accumulate wealth and be more likely to start a new business. We investigate an alternative method for studying the relationship between wealth and business formation, particularly relevant for older workers: namely, using the availability of a lump-sum distribution option (LSO) of an employer-provided pension plan as a proxy for liquidity. An LSO is a proxy for liquidity because it allows for pension wealth to be cashed-out rather than automatically rolled into an annuity. If the availability of this option is associated with higher rates of self-employment entry and is uncorrelated with other unobserved characteristics

associated with self-employment entry, then a finding of higher entry rates from LSO holders is consistent with access to capital as a limiting factor in self-employment entry. Pension plan characteristics change regularly and thus it is unlikely that workers who intend to enter self-employment select jobs with an LSO option.

Indeed, we find that workers with and without an LSO are observationally similar on several key economic measures such as education, wealth, and permanent earnings. Although there are some differences on other observable demographic and job characteristics, the differences are, for the most part, small. Using this proxy in our transition models, we find that workers with an LSO are 26 percent more likely to enter self-employment from wage and salary work over a two-year period than those without access to an LSO. Together these findings indicate that older workers are entering self-employment and some access pension wealth to do so. If start-up costs are non-trivial, then the success of the business venture will have important implications for income security in retirement.

## **2. HRS DATA**

We analyze the relationship between household wealth and transitions into self-employment using data from the HRS, a nationally representative, longitudinal survey of the labor force behavior, health, income and wealth of middle- and older-age Americans. Since its inception, the HRS has surveyed more than 22,000 Americans over age 50 and their spouses every two years. Starting in 1992 with the original HRS cohorts (born 1931-1941) and spouses, several additional birth cohorts have been added in subsequent survey years. This paper uses data from the first seven waves (1992 to 2004) of the 1931 to 1941 birth cohorts (original HRS sample), as well as data from the first four waves (1998 to 2004) of the 1942 to 1947 birth cohorts (War Babies). The HRS is well suited for this study. Along with measures of self-

employment, wealth and current and historical earnings (described below), the HRS is also extremely rich in terms of individual and household characteristics associated with self-employment transitions such as demographic characteristics, risk aversion, health status, health insurance availability, and job characteristics.

*Self-employment.* In each survey wave, currently working respondents are asked if they are self-employed or not in their main job. In this study, we begin with a sample of individuals working at a wage and salary job at time  $T$  and who continue to work at time  $T+2$ . Self-employment entry is defined as being a wage-and-salary worker in the main job in one wave (time  $T$ ) and being self-employed in the main job as of the next wave (time  $T+2$ ).<sup>2</sup> This definition captures entrepreneurship through the class of worker on the main job and does not include other business ownership on the part of individuals who are wage and salary workers in their main job. This definition is consistent with other studies of liquidity constraints in entrepreneurship such as Evans and Jovanovic (1989), Evans and Leighton (1989), and Fairlie and Krashinsky (2006). While Hurst and Lusardi (2004) define entrepreneurship based on entry into business ownership, they report that their results are similar when they define entrepreneurship by entry into self-employment. Our total sample of wage and salary workers age 50 and above at time  $T$  who are working at time  $T+2$  is 21,872 observations (person waves), with 684 transitions to self-employment.

*Wealth.* The HRS provides high-quality information on wealth and its components: real estate, businesses, individual retirement accounts, financial assets, as well as housing and the value of mortgages, other home loans, and debt (Juster and Smith 1997; Hurd, Juster, and Smith 2003). Missing data on wealth are imputed and the methods are described in RAND HRS

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<sup>2</sup> This definition excludes transitions to self-employment for those who are unemployed at time  $T$ . However, including unemployed people at time  $T$  does not change our analytical results.

Version J (St. Clair et al., 2010). We define total net wealth as the sum of the value of the primary residence, other real estate, vehicles, businesses, individual retirement accounts, Keogh accounts, stocks, mutual funds, investment trusts, checking and saving accounts, certificates of deposit, bonds and other savings, less home mortgages and household debt.<sup>3</sup> Liquid wealth excludes the non-financial net assets (i.e., the net value of the primary residence, other real estate, vehicles, and businesses). Information on pension characteristics including the availability of a pension LSO are available in each wave. Details on construction of LSO availability used in this paper are provided in Section 5.

*Lifetime earnings.* The HRS survey data have been linked with respondents' Social Security earnings records. The earnings data for the original 1931 to 1941 birth cohorts are based on historical earnings from 1951 to 1991 reported to the Social Security Administration and are available for 9,539 HRS respondents.<sup>4</sup> Earnings data for the 1942 to 1947 birth cohorts are available for 1,330 respondents for the years 1951 to 1997. The administrative records are accurate and less subject to measurement error than self-reported earnings from household surveys and they cover a long history of earnings. However, they are limited in two ways. First, the level of earnings is reported only up to the Social Security maximum. This maximum changed over time as did the number of individuals whose earnings were above the maximum. Second, individuals employed in a sector not covered by Social Security have no earnings records for the years they are employed in the uncovered sector.<sup>5</sup> That said, the empirical value of historical, administrative earnings records matched to survey data outweighs these drawbacks. Thus, we construct a measure of lifetime labor income as the present discounted value (3 percent

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<sup>3</sup> This definition of wealth is the same as that used by Hurst and Lusardi (2004).

<sup>4</sup> See Haider and Solon (2000) for a discussion of characteristics of individuals with and without matched Social Security records.

<sup>5</sup> In 1996, 92% of non-self-employed wage and salary workers were covered by Social Security.

real interest rate) of real Social Security earnings between ages 25 and 50 adjusted to 2004 dollars using the CPI-U-RS, and we adjust for the upper truncation of Social Security earnings. Methodology for construction of this variable is described in Hurd and Zissimopoulos (2003). This is our measure of permanent income and a proxy for ability in our empirical models.

*Risk Aversion.* Empirical evidence indicates that wealthy households have higher preferences for risk (Charles and Hurst, 2003). Because new business ventures are risky, we would expect higher wealth households to be more likely to own a business because of this risk tolerance, all else equal. Thus, we include a measure of risk aversion in our models of entry into self-employment. The risk aversion measure is based on several questions asking respondents to choose between pairs of jobs, where one guarantees current family income and the other offers a chance to increase income but also carries the risk of a loss of income. The resulting indicator of risk aversion is measured on a 4-point scale, with 1 indicating the least risk averse. We classify individuals who score a 1 or 2 in the “least risk averse” group.

### **3. A BRIEF LOOK AT SELF-EMPLOYMENT AT OLDER AGES**

Before turning to our analysis of the relationship between wealth and transitions to self-employment, we briefly examine the characteristics of those who do and do not enter self-employment and the nature of their self-employment work. First, consider the characteristics of wage and salary workers who become self-employed (self-employment entrants) between survey waves (approximately a two-year period), and those who do not transition to self-employment, the non-entrants (i.e., those who remain wage and salary workers). Table 1 reports this contrast in terms of demographics, job characteristics, and measures of income and wealth. All characteristics are measured at the starting wave (i.e., time  $T$ ). On average, compared to non-entrants, self-employment entrants are about one year older, more likely to be white, male,

married, college educated, and more likely to have a work-limiting health condition. A slightly higher proportion of entrants score on the lower range of the scale of risk aversion, meaning that they are the least risk averse, although the difference is not statistically significant at conventional levels ( $p=0.09$ ). In terms of job characteristics prior to a potential transition, both groups work on average about 39 hours per week but those who subsequently enter self-employment are less likely to have non-pecuniary benefits such as pension benefits and health insurance in their wage and salary job.<sup>6</sup> Both groups are represented in all occupations and industries although entrants are more likely to be in professional/managerial, sales and clerical occupations than non-entrants.

Table 1 also shows that entrants have higher current family labor income but permanent earnings of both groups are not significantly different. The two subsamples differ most strikingly in the level of mean and median household total net wealth (or net worth), net housing wealth (based as the primary residence) and liquid wealth, all measured in 1996 dollars.<sup>7</sup> For example, average net worth for entrants into self-employment (\$381,751) is higher than for non-entrants (\$219,103), as is median net worth. Notably, the median net worth of self-employment entrants over age 50 in the HRS is approximately three times the value reported by Hurst and Lusardi (2004) for the PSID sample of self-employment entrants aged 22 to 60. Likewise, HRS non-entrants have four times the median net worth of the PSID non-entrants. This large difference in the wealth distribution between the HRS and PSID is expected given the age difference in the two samples and would suggest that capital constraints may be less binding in a

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<sup>6</sup> The measure of any health insurance shown in Table 1 includes insurance from any source: government, employer, or other. Coverage rates by source are also shown in non-mutually exclusive categories. Because of dual coverage, the percentage of entrants or non-entrants covered by each source will sum to a total that exceeds the percentage covered by any health insurance.

<sup>7</sup> Dollar amounts are converted using the Consumer Price Index and are in 1996 dollars for comparability to Hurst and Lusardi (2004).

sample of older workers, assuming a non-trivial level of starting capital for a transition to self-employment. All wealth measures, including business wealth, are higher among entrants and non-entrants (Table 1). Nineteen percent of entrants have business wealth prior to self-employment entry compared to only five percent of non-entrants. We test the sensitivity of our estimation results from multivariate models reported in Sections 4 and 5 to the exclusion of workers with prior business wealth.

Data reported in Table 2 describe the type of businesses formed and intensity of work at these businesses for all entrants (Column 1) and by entrant's age (Columns 2 to 5). Just under one-half of older business owners have employees (other than a spouse). Part time work is common. About one-half of the newly self-employed work 35 hours or more per week, 30 percent work part-time, between 16 and 34 hours, and just under one-quarter work on average 15 hours or less per week.

The businesses are represented in all industries and equally in low starting capital businesses of services and finance, insurance, real estate and in high starting capital industries of construction, manufacturing, transportation and wholesale/retail sales (38 percent each). Professional services account for 18 percent of new business and agriculture for 4 percent. The distribution across industries is similar to that of business started among all ages groups as described in Hurst and Lusardi (2004) with the exception that older self-employed workers are less likely to start businesses in agriculture than younger workers and 4 percentage points more likely to start them in high starting capital industries.

About one-quarter of business owners have business wealth suggesting that for many, liquidity constraints may not bind but the existence of them may hinder the size of the business. However, self-employed workers with employees (about half of new entrants as noted above)

may still need access to capital to pay employees wages. Average business wealth is just under \$28,000 and among those with positive business wealth, average wealth is just over \$112,000 and median business wealth is \$56,000.

A notable difference by age of entrant is a decline in mean hours worked per week with age. Entrants over age 66 are more likely start businesses in professional services and less likely to start business in other types of services and more likely to report agriculture, forestry and fishery businesses. The likelihood of having business wealth declines with age but conditional on having positive business wealth, average and median business wealth is lowest for the youngest age group (ages 51-56) and highest for the oldest (ages 66 and over).

#### **4. HOUSEHOLD WEALTH AND THE TRANSITION TO SELF-EMPLOYMENT**

In this section, we investigate the relationship between household wealth and transitions into self-employment from wage and salary work. We estimate multivariate probit regression models of becoming self-employed in the main job at time  $T+2$ , conditional upon being a wage and salary worker at time  $T$ , as a function of household net wealth measured at time  $T$ .<sup>8</sup> The analysis abstracts from decisions of retirement by conditioning on work in both waves.<sup>9</sup> Unlike many prior studies, we have an extensive set of control variables, also measured at time  $T$ , that we include sequentially to understand how the effect of wealth changes with the additional control variables.

The first model includes only demographic controls: a quadratic in age and indicators that sex is female and race is non-white. The second model adds other individual and job characteristics associated with self-employment transitions: indicators for married, low risk-aversion, a work-limiting health condition, types of health insurance coverage, a pension in the

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<sup>8</sup> We exclude the net value of secondary residence because it is not available for all waves of the HRS.

<sup>9</sup> Zissimopoulos and Karoly (2007) and Bruce et al. (2000) jointly model choices between self-employment, retirement and wage and salary work.

wage and salary job at time  $T$ , and the industry and occupation on the wage and salary job. The third model adds measures of economic status: categories for the highest education degree received, the logarithm of current family labor income, and the logarithm of permanent income. We use two non-linear specifications for total net wealth to account for the fact that a few households have very large wealth values and a few have very low values. In the first set of specifications (Models 1 to 3), total net wealth enters as a series of wealth quintile dummies, with a separate category for the highest 5 percent, for a total of six categories. In the second specification (Models 4 to 6), we use a fifth-order polynomial in wealth.

### ***Baseline Results***

The first three columns in Table 3 report the estimates from a probit model of the probability of entry into self-employment for the specification with wealth entering the model in quintiles plus a separate category for the 95<sup>th</sup> percentile.<sup>10</sup> The baseline results (Model 1), with only demographic controls, reveal small effects of wealth on self-employment entry except at high levels of wealth (above the 80<sup>th</sup> percentile). The addition to the specification of covariates measuring marital status, risk aversion, health, health insurance, pension benefits, industry and occupation (Model 2) increase the effect of wealth on entry at all levels of wealth and particularly at low levels of wealth. The inclusion of additional covariates measuring economic status and permanent income (Model 3) do not substantially change the marginal effects from the levels reported in Model 2.

Based on Model 3, compared to the lowest 20<sup>th</sup> percentile wealth group, each successively higher wealth group is more likely to transition into self-employment between waves. The magnitude of the estimate for the 20<sup>th</sup>-40<sup>th</sup> is relatively small (increases entry

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<sup>10</sup> We report robust standard errors with clustering.

probability by 16 percent) and not statistically different than the reference group. Relative to the workers in the lowest wealth quintile, wage and salary workers in the 40<sup>th</sup>-60<sup>th</sup> and 60<sup>th</sup>-80<sup>th</sup> percentile of wealth are 29 percent and 48 percent more likely to become self-employed respectively (a 0.9 and 1.5 percentage point increase, respectively, over the baseline transition rate of 3.1 percent). Workers in the 80<sup>th</sup>-95<sup>th</sup> percentile of wealth are 87 percent more likely than the reference group to become self-employed (a 2.7 percentage-point increase) and, for those in the highest 5<sup>th</sup> percentile of the wealth distribution, the figure is 135 percent (a 4.2 percentage-point increase).

The specifications for Models 4, 5 and 6 (Table 3) are the same as Models 1, 2 and 3 respectively with the exception that wealth enters as a fifth-order polynomial. The wealth estimates of Model 6, the model that includes the full set of covariates, confirms the finding of an increasing probability of becoming self-employed over the entire wealth distribution. All wealth terms in the polynomial model are statistically different from zero at the 5 percent significance level (and jointly significant at the 1 percent level). The marginal effect of wealth/100,000 is 0.003 indicating that a \$100,000 increase in household net wealth increases the probability of transitioning into self-employment by a 0.4 percentage-points or by 10 percent. The inclusion of other individual and job covariates in moving from Model 4 to Model 5 increases the size of the wealth effect, but the additional covariates in Model 6 for education, current income, and permanent income again reduce the size of the wealth effect. The results from the models confirm that economic status is positively correlated with both wealth and the likelihood of self-employment entry. Particularly, there is a positive correlation between education and entry.

To illustrate the relationship between wealth and self-employment transitions, Figure 1 plots the predicted probability of entry into self-employment against wealth levels for the two full model specifications (Models 3 and 6).<sup>11</sup> The first dotted vertical line indicates the location of the 80<sup>th</sup> percentile and the second line marks the 95<sup>th</sup> percentile. The graph clearly indicates the positive relationship between wealth and self-employment transitions across the entire wealth distribution. Although the increase in the self-employment transition probability in moving from the lowest wealth level to the 80<sup>th</sup> percentile in wealth is not as substantial as the increase thereafter, since the wealth distribution is highly skewed, a one percentile-point increase in wealth at higher wealth levels represents a substantially higher absolute change in wealth than a one percentile-point increase at lower wealth levels. The slope of the positive relationship between self-employment entry and wealth based on the fifth-order polynomial specification is nearly linear from the starting wealth level to the 95<sup>th</sup> percentile of the wealth distribution. After the 95<sup>th</sup> percentile, the probability of entry increases only modestly and at a decreasing rate. The shape of the function is consistent with capital constraints, although even including extensive control measures such as permanent income and risk aversion does not preclude the existence of other important unobserved factors.

The estimated marginal effects of all covariates in Model 6 of Table 3 are reported in Column 1 of Appendix Table A. The results are consistent with estimates from previous studies. For example, the likelihood of becoming self-employed is higher for men, for workers with a work limiting health condition, and for those without health insurance or a pension. There is no effect on self-employment transitions of age or of being non-white, married, or less risk-averse. Occupation is a significant determinant of self-employment entry. Compared with professionals

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<sup>11</sup> When computing predicted probabilities, all covariates except the wealth variables are set to their sample mean.

and managers, workers in sales at time  $T$  are more likely to be self-employed in time  $T+2$  and all other occupational groups are associated with a lower likelihood of entry. Entry increases with the level of education, but household income has a small, negative effect on entry and our measure of permanent income has no additional effect.

Net wealth and self-employment entry may be higher and more likely for workers with current business wealth even though our net wealth measure excludes business wealth because having business wealth may proxy for other unobservable factors such as attachment to the labor force or entrepreneurial skill. About eight percent of wage and salary workers report business wealth. We test the sensitivity of our wealth results to the exclusion of this group and find the results are robust to this change in the sample. We also test the sensitivity of wealth effects to the exclusion of workers above normal retirement age (i.e., those over age 65) and again find the results are not sensitive to this variant. The estimates of these models are given in Table 4.

### ***Liquid Wealth and Starting Capital Costs***

The amount of liquid wealth rather than total net wealth may be a more appropriate measure for assessing the relationship between wealth and self-employment entry. Recall that liquid wealth includes individual retirement accounts, Keogh accounts, stocks, mutual funds, investment trusts, checking and saving accounts, certificates of deposit, bonds and other savings.<sup>12</sup> We re-estimate the models in Table 3 using liquid wealth instead of total net wealth and illustrate our estimates in Figure 2. Again we find a positive and significant relationship

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<sup>12</sup> We did not subtract household debt from the liquid wealth because people are not required to pay off any of their debts before using their liquid wealth.

between liquid wealth and the probability of becoming self-employed, a relationship that becomes flatter only at the highest wealth levels.<sup>13</sup>

We further investigate the relationship between wealth and self-employment transitions by the industry type of the self-employment job. If liquidity constraints are binding, then wealth should matter more for transitions to businesses with high capital start-up requirements. Following Hurst and Lusardi (2004), we designate industries in our sample into three groups: low-starting capital industries (namely services), high-starting capital industries (namely manufacturing; transportation, communication, and other public utilities; wholesale and retail trade; and finance, insurance and real estate and the professionals industry.<sup>14</sup> In our sample, 29 percent of older wage and salary workers that transition to self-employment start a business in a low-starting capital industry, 38 percent in a high-starting capital industry, and 18 percent in the professionals industry. The remaining workers start a business in agriculture or mining and construction, a group that is excluded for purposes of this analysis.<sup>15</sup>

Again, we estimate multivariate models of self-employment entry on a fifth-order polynomial of total household wealth and the full set of covariates, now with the outcomes defined as a transition to self-employment in a low-starting capital, high-starting capital, or professionals industry. The fifth-order polynomial of wealth is jointly significant at the 5

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<sup>13</sup> In the first model specification, there is a negative and insignificant coefficient on the dummy for the 20<sup>th</sup> to 40<sup>th</sup> percentile of the liquid wealth distribution relative to the reference group (0 to 20<sup>th</sup> percentile), hence the pattern plotted in Figure 2.

<sup>14</sup> Hurst and Lusardi (2004) determined the industry type using median starting capital of various industries from the 1987 National Survey of Small Business Finances (NSSBF). For the group of low-starting capital industries, the median and 75<sup>th</sup> percentile of start-up capital are \$20,000 and \$63,000, respectively. The comparable figures for the high-starting capital industries are \$45,000 and \$120,000. The professionals industry group is treated as a separate group because no information on required starting capital for professionals is available in the 1987 NSSBF (Hurst and Lusardi 2004).

<sup>15</sup> As with Hurst and Lusardi (2004), the agriculture industry is not included in our analysis. In addition the HRS data combine construction and mining industries which are classified respectively by Hurst and Lusardi (2004) in the low-starting and high-starting capital groups. For our main results, we exclude this combined industry group from the analysis. However, in a sensitivity analysis, we estimated models where the combined mining and construction sectors are assigned to either the high- or low-starting capital group. Our main results do not change with this assignment to either group.

percent level for both high- and low-starting capital industry groups but not for the professionals industry. Figure 3 plots the predicted probability of self-employment entry against total household net wealth separately for low- and high-starting capital industries and the professionals industry. For both low- and high-starting capital industries, compared with Figure 2, there is a positive but smaller relationship between wealth and self-employment entry at least to the 80<sup>th</sup> percentile of the wealth distribution. After this point, entry into low-starting capital and high capital industries by wealth diverge with the probability of entry into low capital industries eventually declining. As noted above, we find no relationship between wealth and self-employment transitions into professional businesses (see Figure 3).

These findings of wealth effects by the industry of business entry contrast with the results of Hurst and Lusardi (2004). They show for a their sample of younger workers, a negative (not statistically significant) relationship between wealth and business entry for low and high start-up capital business through the 90<sup>th</sup> percentile and then entry increases with wealth for the top 5<sup>th</sup> of the wealth distribution. They also find a strictly increasing relationship between entry into a professional industry and wealth at younger ages, while we find no relationship at older ages. The positive relationship at younger ages is consistent with an interpretation that successful professionals earn more, accumulate more wealth, and assume ownership positions in the firm. While this may be true at younger ages, this is less likely to be true at older ages (e.g. most successful lawyers become partners before age 55).

## **5. SELF-EMPLOYMENT ENTRY AND PENSION CASH-OUT**

Interpreting the relationship between wealth and movements into self-employment is complicated by the fact that the amount of household wealth may be influenced by unobservable factors that may also be correlated with the likelihood of becoming self-employed. Although the

richness of the HRS data allows us to control for many of these confounding factors, such as permanent income and the degree of risk aversion, we cannot rule out the possibility that wealth levels are endogenous. Results from Hurst and Lusardi (2004) and Disney and Gathergood (2009) reveal the difficulties inherent in finding a suitable instrument and the weakness of the most commonly used instruments.

Rather than seeking to resolve this potential endogeneity problem by estimating the impact of financial windfalls on the probability of becoming self-employed as in prior studies, we take a different approach to shed light on the relationship between wealth and entry into self-employment for middle- and older-age households. We utilize a proxy for liquidity particularly relevant for older workers: the availability of a pension cash-out or LSO. Although not all pension plans have the option to cash out the entire or partial balance, those with an LSO have access to a source of liquid wealth that could be used to finance a start-up business. Among older workers, pension wealth is substantial. Based on data from the HRS, Gustman, Steinmeier and Tabatabai (2010) report that average pension values for the 1931 to 1941 birth cohorts at ages 51 to 56 was about \$50,000 for defined contribution plans and \$97,000 for defined benefit plans. They also report average pension cash settlements for workers in this birth cohort leaving a job over the years 1996 to 2004 to be between \$32,000 and \$86,000 for defined benefit pension holders and between \$13,000 and \$19,000 for defined contribution plan holders.

We employ all seven waves (1992-2004) of the HRS to determine for each worker the availability of an LSO on their current wage and salary job. In each wave, pension holders are asked a set of questions regarding the characteristics of their pension plan that vary by whether the pension is a defined benefit plan (DB), a defined contribution plan (DC) or a plan with both features (DB-DC). Depending on the pension type, separate questions about LSO status are

asked. For example, in survey wave 6 (year 2002), workers with a DB plan or a DB-DC plan were asked “Rather than regular retirement benefits, could you choose to receive a lump-sum settlement from this plan when you retire?” Respondents with a DC plan were asked, “Does this plan allow you to receive benefits in the form of a lump sum payment?” The answer to these questions could be: “Yes,” “Yes, partial,” or “No.” We construct an LSO indicator that equals 1 if the answer is “Yes” or “Yes, partial” and 0 otherwise.<sup>16</sup> Respondents may have multiple pension plans on the current job. For the first 4 waves of the HRS, respondents are queried about up to 3 pension plans and up to 4 pension plans in subsequent waves. We determine the LSO status of each pension plan in each wave.

Pooling all waves together, the percentage of LSO availability in our sample of wage and salary workers at time  $T$  is 46 percent for DB plan participants, 81 percent for DC plan participants, and 62 percent for participants in DB-DC plans.<sup>17</sup> By way of comparison, only a few studies report the rate of LSO availability by pension type. Using the Employee Benefit Supplements (EBS) to the Current Population Survey (CPS), Burman et al. (1999) found that LSO availability, as reported by individual workers, was 58 percent for DB plan holders and 79 percent for DC plan holders as of 1993 (excluding respondents who do not know whether they have such an option). Blostin (2003), based on the 2000 National Compensation Survey administered to employers in the private sector only, reported that 44 percent of people with a

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<sup>16</sup> Not all respondents answer these questions in each wave. The LSO questions are asked for all new respondents to the HRS survey and those respondents that changed jobs between waves. Respondents who have the same job as the prior wave are asked whether the rules governing their pension plan on the current job have changed. If the rules change, respondents are asked the LSO questions. If the rules do not change, however, only a limited number of questions are asked about their pension plan and the LSO questions are skipped. In these cases, we carry over the LSO status in previous waves to the current wave. The exceptions are wave 1 and wave 7 when all respondents answered the same pension questions, including those pertaining to an LSO.

<sup>17</sup> These percentage calculations are based on the primary pension plan only. Those with missing LSO status are excluded from the calculations.

DB plan and 83 percent of people with a DC plan have an LSO.<sup>18</sup> Our estimates for the HRS sample fall in the middle of the range reported by these two studies.

Pension holders with either DC plans or DB-DC plans can cash out the pension balance any time if the LSO is allowed, although cashing out before a certain age (specifically age 59 ½) is subject to a penalty. DB plans, however, typically do not allow cashing out before the early or normal retirement age even if an LSO is allowed. If the age of the respondent is at or above the normal retirement age and the plan allows for an LSO, we characterize the respondent as having access to an LSO. In sum, those whom we define as having no LSO access—in other words, they cannot cash out any part of their pension balance during the transition window—includes workers that have no LSO of any type on their primary pension plan, as well as those DB plan holders with an LSO on their primary pension but who are not yet eligible for pension benefits as of time  $T+2$  (the end point of the transition window). Thus, workers that have the option to cash out pension balances are those who have an LSO on a primary DC or DB-DC plan and those retirement age-eligible DB plan holders with an LSO. We use LSO availability and eligibility based on the primary pension plan from the current job under the assumption that most pension wealth from the current job is associated with the primary plan. The majority of respondents (77 percent) in our sample have only one pension plan on their current job (the primary plan).

### ***Characteristics of Workers with and without an LSO***

We examine the observable characteristics of workers with and without an LSO and results are shown in Table 5. Some differences are that workers with an LSO are one year older, less likely to be white and less risk averse and have about \$4,000 more in family labor income. They are alike in many key ways: years of education, marital status, average weekly hours of

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<sup>18</sup> Cases with a missing LSO value were not excluded in the reported rates of LSO access. If missing cases are excluded, the corresponding percentages are 46 percent for DB plan holders and 94 percent for DC plan holders.

work, covered by health insurance, lifetime earnings, and most measures of wealth including business wealth. They are equally likely to be professionals, clerical workers and operators but 8 percentage point more likely to be in sales and 2 percentage point less likely to in a service occupation. They are equally likely to be in a service industry (41 percent and 39 percent) with the most significant difference being LSO holders are 6 percentage points more likely to be in manufacturing and retail.

Although by all accounts these workers are similar, particularly with respect to economic variables, to be a valid proxy, we must assume that the availability of a pension plan with an LSO is not correlated with the error term in the regression model after controlling for any observable differences. That is, being in a job with an LSO on the pension plan is uncorrelated with the propensity to start a business after controlling for observable differences. Because pension plans are altered fairly regularly, an assumption of exogeneity of a LSO with respect to entry may be supportable. A similar exogeneity assumption is made in the retirement literature: because pension plans are altered fairly regularly, pension plan characteristics are assumed to be exogenous to the retirement decision i.e. workers with a strong taste for leisure do not sort themselves into firms offering generous early retirement benefits (Gustman and Steinmeier, 1993, 1995). Moreover, Zissimopoulos and Karoly (2009) find that the actual receipt of a pension cash-out is associated with a 50 percent increase in the probability of entry into self-employment from wage and salary work, demonstrating the relationship between the realization of a LSO and actual behavior.

### ***LSO and Self-employment Entry***

As with the earlier models, we use a probit specification to estimate the effect of having an LSO on self-employment entry. The model specification includes an LSO dummy, an

indicator variable for more than one pension, a fifth-order polynomial in total net household wealth and all other covariates included in the previous regression models (estimated marginal effects for all covariates are provided in Appendix Table A). As reported in Table 6, the estimates indicate that, compared to those with no LSO, workers with an LSO are 0.8 percentage points more likely to enter self-employment in the next wave than pension holders without an LSO, an effect that is significant at the 5 percent level. The effect represents a 26 percent increase from the base probability of transitioning to self-employment of 3.1 percent.

The LSO estimate is largest in Model 1, when only demographic characteristics are included. The estimated relationship of self-employment transitions and household wealth remains virtually unchanged from previous models. We test the sensitivity of our LSO estimates to the exclusion of workers over age 65 and the exclusion of workers with business wealth and report the estimation results in Table 7. LSO estimates are virtually unchanged. The significant and substantial marginal effect of an LSO among pension holders is consistent with the interpretation that an LSO relaxes capital constraints. However, as noted earlier, we can not rule out the possibility that there remain unobservable differences between workers with and without LSO that may be correlated with the propensity to enter self-employment.

## **6. CONCLUSION**

Insufficient starting capital to fund new businesses can be a significant obstacle for nascent entrepreneurs. Thus, a substantial research literature has emerged to investigate whether liquidity constraints bind and if they do, whether the existence of liquidity constraints is important enough to justify public intervention. Although a large literature has founded evidence consistent with access to finance as a barrier to self-employment entry, the results of Hurst and Lusardi (2004), and more recently replicated in the U.K. by Disney and Gathergood (2009) have

called into question the strength of this evidence given the weakness of many of the instruments used in prior studies purported to solve the problem of endogenous wealth. While Disney and Gathergood (2009) find some evidence of a relationship between ‘shocks’ to house value and subsequent entry, no other windfalls that they study are consistent predictors of entry. We add to this literature a study of middle- and older-age workers and a new approach to identifying liquidity constraints. Older workers are known to have higher rates of self-employment than younger workers, more accumulated wealth and different types of wealth including pension and stock wealth. Moreover, longitudinal data available on workers over age 50 through the HRS provide rich measures of control variables including measures of permanent income and risk aversion.

We show that the businesses started by middle- and older-age workers are diverse and one-half are employer firms. We show that the non-linear and convex relationship between wealth and business start-up found in Hurst and Lusardi (2004) and replicated in Disney and Gathergood (2009) in the U.K. does not hold for a group of middle- and older-age households in the United States. We find a positive relationship between wealth and transitions to self-employment over the entire wealth distribution, one that weakens only at the highest wealth levels. This pattern holds whether we use a measure of total net worth or of liquid wealth. One possible reason that we find a different relationship between wealth and business entry than found by Hurst and Lusardi is that in contrast to the annual PSID data, HRS data is collected biennial so entry is measured over two-years and thus our results are the effect of wealth on both entry into self-employment and survival for up to two-years. In fact Hurst and Lusardi find a small effect of wealth on business survival over three and five years.

Although the results we present are consistent with the existence of liquidity constraints impeding self-employment entry, it is not evidence of capital constraints because of the well-discussed issue of endogeneity of wealth. We use a different method than prior studies to further investigate the relationship between wealth and business formation, particularly relevant for older workers: we estimate the relationship between the availability of a lump-sum distribution option (LSO) of an employer-provided pension plan and entry into self-employment. We argue an LSO feature of a pension plan may be a proxy for liquidity because it allows for pension wealth to be cashed-out rather than automatically rolled into an annuity. If the availability of this option relaxes capital constraints impeding entrance to self-employment then access to finance is a limiting factor in self-employment entry. If on the other hand, LSO is associated with other factors associated with entry that we do not observe, then a relationship between LSO and entry is not clear evidence of binding liquidity constraints. We discussed evidence for and against the exogeneity of LSO in models of self-employment entry. We find that workers with an LSO are 26 percent more likely to transition from wage and salary work to self-employment over a two-year period.

The debate over the importance of liquidity constraints for business start-up is clearly unsettled. Policy makers need to know whether constraints continue to hinder business start-up in the presence of public program or if they currently do not, would they in the absence public programs to finance small business start-up? If credit constraints are binding only for certain groups, for example, older workers, why might that be? Do lenders view older worker nearing retirement as poor risks and discriminate against them? Data collection on whether a worker applied for credit, from whom and did or did not receive it or if they chose not to apply why they did not apply may help answer some of these questions. Finally, the analysis points to a different

dimensions of the relationship between wealth and entrepreneurship at older ages that are relevant for policy analysis: if start-up costs are non-trivial, what are the implications of starting a new business for income security at older ages? If older workers are investing pension wealth, risking reduced consumption in retirement, are they receiving a return on their investment?

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Figure 1

Figure 2

Figure 3

**Table 1: Descriptive Statistics of Self-Employment Entrants and Non-Entrants**

Characteristic (measured at time <i>T</i> )	Entrants	Non-Entrants	P-Value
<b>Demographics and Other Personal Characteristics</b>			
Age (mean)	58.7	57.6	0.00
Female	0.38	0.52	0.00
Non-White	0.13	0.19	0.00
Married	0.83	0.78	0.00
Education Level			
Less Than High School	0.19	0.22	0.03
High School Graduate	0.26	0.33	0.00
Some College	0.24	0.22	0.20
College and Above	0.31	0.23	0.00
Has Work-Limiting Health Condition	0.12	0.08	0.00
Least Risk Averse	0.25	0.22	0.09
<b>Job Characteristics</b>			
Hours/week (mean)	38.5	39.3	0.15
Hours/week (% distribution)			
0-15	0.09	0.05	0.00
16-34	0.19	0.16	0.03
35+	0.72	0.80	0.00
Covered by Any Health Insurance	0.86	0.93	0.00
Health Insurance Coverage Type:			
Government	0.15	0.11	0.00
Employer Provided	0.55	0.70	0.00
Spouse's Employer	0.19	0.17	0.12
Other	0.13	0.09	0.00
Has Pension Plan on Wage & Salary Job	0.43	0.64	0.00
Occupation of Wage & Salary Job			
Professional and Managerial	0.37	0.32	0.00
Sales	0.14	0.08	0.00
Clerical and Administrative Support	0.10	0.19	0.00
Services	0.15	0.16	0.73
Farming, Forestry, Fisheries	0.02	0.02	0.68
Mechanic, Construction, Operator	0.21	0.24	0.05
Industry of Wage & Salary Job			
Agriculture, Forestry, Fishery	0.02	0.02	0.88
Mining and Construction	0.08	0.04	0.00
Manufacturing	0.14	0.18	0.00
Transportation	0.07	0.07	0.90
Wholesale and Retail	0.17	0.15	0.18
Finance, Insurance, Real Estate	0.08	0.06	0.10
Business/Repair Services	0.08	0.05	0.01
Personal Services	0.05	0.03	0.01
Entertainment/Recreation	0.02	0.02	0.92
Professional/Related Services	0.26	0.32	0.00
Public Administration	0.04	0.06	0.03

All indicator variables except when noted as mean value.

**Table 1: Descriptive Statistics of Self-Employment Entrants and Non-Entrants, Continued**

Characteristic (measured at time <i>T</i> )	Entrants	Non-Entrants	P-Value
<b>Income and Wealth (1996 dollars)</b>			
Mean Family Labor Income	\$56,590	\$47,665	0.00
Mean Permanent Income (PDV earnings for ages 25-50)	\$443,299	\$431,043	0.21
Mean Total Net Wealth	\$381,751	\$219,103	0.00
Median Total Net Wealth	\$169,390	\$111,840	0.00
Mean Net Value of Primary Residence	\$93,284	\$74,868	0.00
Median Net Value of Primary Residence	\$61,649	\$55,000	0.03
Mean Liquid Assets	\$158,255	\$85,389	0.00
Median Liquid Assets	\$31,800	\$19,200	0.00
Mean Business Wealth	\$22,573	\$4,156	0.00
Number of Observations	684	21,188	

SOURCE: Authors' calculations using the HRS 1992-2004.

NOTE: The sample includes all respondents in the HRS who had a wage-and-salary job at time *T* and subsequently remain in the HRS and continue to work at time *T*+2, using the first seven wave of the HRS. P-values of difference between entrants and non-entrants are listed in the last column. The top and bottom 2% of business wealth is trimmed.

**Table 2. Characteristics of Self-employment Entrant's Businesses**

Characteristic (measured at time $T+2$ )	All Entrants	Age 51-56	Age 57-61	Age 62-65	Age 66+
Has Employees (other than spouse)	0.47	0.49	0.48	0.38	0.50
Hours/week (mean)	32.2	37.8	30.1	28.8	23.1
Hours/week (% distribution)					
1-15	0.22	0.12	0.24	0.30	0.40
16-34	0.29	0.29	0.30	0.27	0.31
35+	0.49	0.59	0.46	0.43	0.29
Industry					
Agriculture, Forestry, Fishery	0.04	0.03	0.04	0.02	0.06
Mining and Construction	0.09	0.11	0.08	0.12	0.05
Manufacturing	0.07	0.07	0.07	0.06	0.13
Transportation	0.06	0.08	0.03	0.05	0.05
Wholesale and Retail	0.16	0.16	0.20	0.10	0.15
Finance, Insurance, Real Estate	0.09	0.09	0.10	0.10	0.10
Business/Repair Services	0.16	0.17	0.18	0.14	0.08
Personal Services	0.12	0.15	0.10	0.14	0.05
Entertainment/Recreation	0.01	0.004	0.02	0.03	0.02
Professional/Related Services	0.18	0.12	0.18	0.22	0.32
Public Administration	0.01	0.02	0.004	0.02	0.00
Has Business Wealth	0.25	0.31	0.25	0.17	0.15
Mean Business Wealth*	\$27,906	\$26,178	\$34,299	\$18,711	\$29,691
Mean Business Wealth Conditional	\$112,481	\$84,656	\$138,422	\$108,702	\$197,939
Median Business Wealth Conditional	\$56,000	\$53,000	\$62,925	\$53,000	\$87,000
Number of Observations	684	261	237	124	62

SOURCE: Authors' calculations using the HRS 1992-2004.

NOTE: The sample includes all respondents in the HRS who had a wage-and-salary job at time  $T$  and subsequently became self-employed at time  $T+2$ , using the first seven wave of the HRS. \*The top and bottom 2% of business wealth is trimmed. Untrimmed mean, mean conditional and median conditional for all entrants respectively are: \$49,541, \$185,169, \$73,950. All indicator variables except when noted as mean value.

**Table 3: Probit Estimates of Self-employment Entry: Quintiles and 5th Order Polynomial Wealth**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Categorical Wealth			Polynomial in Wealth		
<b>Included Covariates:</b>						
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Other Characteristics		Yes	Yes		Yes	Yes
Educ., Income, Permanent Income			Yes			Yes
<b>Probit Coefficients</b>						
Total Net Wealth						
Wealth/100,000				0.053***	0.079***	0.069***
				(0.014)	(0.015)	(0.015)
(Wealth/100,000) <sup>2</sup>				-0.002*	-0.004***	-0.003***
				(0.001)	(0.001)	(0.001)
(Wealth/100,000) <sup>3</sup>				4.31E-5	8.51E-5***	7.58E-5**
				(2.94E-5)	(3.27E-5)	(3.31E-5)
(Wealth/100,000) <sup>4</sup>				-3.32E-7	-6.54E-7**	-5.92E-7**
				(2.45E-7)	(2.76E-7)	(2.82E-7)
(Wealth/100,000) <sup>5</sup>				6.26E-10	1.23E-9**	1.12E-9**
				(4.75E-10)	(5.38E-10)	(5.51E-10)
Total Net Wealth						
[0-20th Percentile]						
20 <sup>th</sup> -40 <sup>th</sup> Percentile	-0.018	0.091	0.089			
	(0.060)	(0.063)	(0.063)			
40 <sup>th</sup> -60 <sup>th</sup> Percentile	0.005	0.161**	0.149**			
	(0.060)	(0.064)	(0.065)			
60 <sup>th</sup> -80 <sup>th</sup> Percentile	0.099*	0.259***	0.235***			
	(0.057)	(0.064)	(0.065)			
80 <sup>th</sup> -95 <sup>th</sup> Percentile	0.232***	0.401***	0.369***			
	(0.060)	(0.068)	(0.070)			
Above 95 <sup>th</sup> Percentile	0.386***	0.541***	0.489***			
	(0.076)	(0.084)	(0.086)			
<b>Marginal Effects</b>						
[0th-20th Percentile]						
20th-40th Percentile	-0.001	0.005	0.005			
40th-60th Percentile	0.0003	0.010	0.009			
60th-80th Percentile	0.007	0.017	0.015			
80th-95th Percentile	0.018	0.030	0.027			
Above 95th Percentile	0.035	0.049	0.042			
Increase Wealth/100,000				0.003	0.004	0.003
P-value of Joint Significance	0.000	0.000	0.000	0.000	0.000	0.000
Probability of Entry	0.031	0.031	0.031	0.031	0.031	0.031
Pseudo R <sup>2</sup>	0.026	0.070	0.073	0.028	0.071	0.075
Number of Observations	21,872	21,872	21,872	21,872	21,872	21,872

SOURCE: Authors' calculations using the HRS 1992-2004.

NOTE: The sample includes respondents who had a wage-and-salary job at time  $T$  and subsequently remain in the HRS and continue to work at time  $T+2$ . Robust standard errors are listed in parentheses. Demographics are age, sex, and race. Other characteristics are marital status, risk aversion, health, health insurance, pension, industry of job, and occupation. See text for details on measurement of and how covariates are specified. See Appendix Table A for estimated marginal effects of all covariates for Model 6. Marginal effect of the fifth-order polynomial is calculated for each observation and averaged across observations. Reference groups for categorical covariates are shown in brackets. Statistically significant at the \* 10 percent level, \*\* 5 percent level, \*\*\* 1 percent level.

**Table 4. Probit Estimates of Wealth Effects on Self-Employment Entry with Polynomial in Wealth: Sample with No Prior Business Assets or Under age 65**

All Covariates Included <sup>1</sup>	Sample:	Sample:
	No Business Wealth	Under Age 65
	Yes	Yes
<b>Probit Coefficients</b>		
Total Net Wealth		
Wealth/100,000	0.063***	0.077***
	(0.019)	(0.017)
(Wealth/100,000) <sup>2</sup>	-0.003*	-0.004***
	(0.002)	(0.001)
(Wealth/100,000) <sup>3</sup>	5.70E-5	8.02E-5**
	(3.83E-5)	(3.64E-5)
(Wealth/100,000) <sup>4</sup>	-3.88E-7	-6.20E-7**
	(2.94E-7)	(3.06E-7)
(Wealth/100,000) <sup>5</sup>	6.92E-10	1.17E-9**
	(5.51E-10)	(5.95E-10)
<b>Marginal Effects</b>		
Increase Wealth/100,000	0.003	0.003
P-value of Joint Significance	0.000	0.000
Observed Probability of Entrance	0.027	0.030
Pseudo R <sup>2</sup>	0.078	0.079
Number of Observations	20,134	20,098

SOURCE: Authors' calculations using the HRS 1992-2004.

NOTES: The sample includes respondents who had a wage-and-salary job at time  $T$  and subsequently remain in the HRS and continue to work at time  $T+2$ . Robust standard errors are listed in parentheses.

<sup>1</sup>All covariates are included: age, sex, race, marital status, risk aversion, health, health insurance, pension, industry of job, occupation, education, current family income, and permanent income. Marginal effect of the fifth-order polynomial is calculated for each observation and averaged across observations. Statistically significant at the \* 10 percent level, \*\* 5 percent level, \*\*\* 1 percent level.

**Table 5. Characteristics of Workers with and without a Lump Sum Pension Distribution Option**

Characteristic (measured at time <i>T</i> )	Without LSO	With LSO	P value
<b>Demographics and Other Personal Characteristics</b>			
Age (mean)	56.38	57.30	0.00
Female	0.49	0.47	0.03
Non-White	0.18	0.15	0.00
Married	0.80	0.80	0.90
Education Level (mean years)	13.36	13.34	0.69
Has Work-Limiting Health Condition	0.07	0.06	0.02
Least Risk Averse	0.19	0.23	0.00
<b>Job Characteristics</b>			
Hours/week (mean)	42.03	42.15	0.50
Covered by Any Health Insurance	0.98	0.98	0.14
Occupation of Wage & Salary Job			
Professional and Managerial	0.39	0.39	0.61
Sales	0.04	0.08	0.00
Clerical, Administrative Support Services	0.19	0.19	0.32
Farming, Forestry, Fisheries	0.11	0.09	0.01
Mechanic, Construction, Operator	0.004	0.004	0.94
0.26	0.26	0.24	0.00
Industry of Wage & Salary Job			
Agriculture, Forestry, Fishery	0.005	0.005	0.68
Mining and Construction	0.03	0.05	0.00
Manufacturing	0.22	0.21	0.03
Transportation	0.09	0.07	0.00
Wholesale and Retail	0.08	0.14	0.00
Finance, Insurance, Real Estate	0.05	0.07	0.00
Services (total)	0.41	0.39	
Business/Repair Services	0.02	0.04	0.00
Personal Services	0.01	0.02	0.01
Entertainment/Recreation	0.01	0.01	0.00
Professional/Related Services	0.37	0.32	0.00
Public Administration	0.09	0.06	0.00
<b>Income and Wealth (1996 dollars)</b>			
Mean Family Labor Income	\$55,585	\$59,489	0.00
Mean Permanent Income	\$484,974	\$477,535	0.17
Mean Total Net Wealth	\$228,918	\$266,416	0.00
Median Total Net Wealth	\$129,675	\$135,520	0.07
Mean Net Value of Primary Residence	\$80,391	\$86,492	0.20
Median Net Value of Primary Residence	\$60,480	\$62,000	0.31
Mean Liquid Assets	\$89,963	\$104,732	0.00
Median Liquid Assets	\$26,006	\$30,450	0.00
Has Business Wealth	0.08	0.09	0.02
Mean Business Wealth	\$14,662	\$21,627	0.07
Number of Observations	5,827	5,453	

SOURCE: Authors' calculations using the HRS waves 1992-2004.

NOTE: The sample includes all respondents in the HRS who had a wage-and-salary job at time *T* and subsequently remain in the HRS and continue to work at time *T*+2, using the first seven wave of the HRS. P-values of difference between those with and without an LSO are listed in the last column. The top and bottom 2% of business wealth is trimmed. All indicator variables except when noted as mean value.

**Table 6. Probit Estimates of Self-employment Entry with Polynomial in Wealth:  
Lump Sum Distribution Option**

	Model 1	Model 2	Model 3
<b>Included Covariates:</b>			
Demographics	Yes	Yes	Yes
Other Characteristics		Yes	Yes
Educ., Income, Permanent Income			Yes
<b>Probit Coefficients</b>			
LSO Available on Primary Pension	0.154*** (0.054)	0.126** (0.055)	0.133** (0.055)
<b>Marginal Effects</b>			
LSO Available on Primary Pension	0.010	0.007	0.008
Increase Wealth/100,000	0.004	0.004	0.003
P-value of Joint Significance	0.000	0.000	0.000
Observed Probability of Entrance	0.031	0.031	0.031
Pseudo R <sup>2</sup>	0.054	0.073	0.076
Number of Observations	21,872	21,872	21,872

SOURCE: Authors' calculations using the HRS 1992-2004.

NOTES: The sample includes respondents who had a wage-and-salary job at time T and subsequently remain in the HRS and continue to work at time T+2. Robust standard errors are listed in parentheses. Demographics are: age, race, sex; other characteristics are: marital status, risk aversion, health, pension, health insurance, industry of job, occupation. See text for details on measurement of and how covariates are specified. See Table A for estimated marginal effects of all covariates. Marginal effect of the fifth-order polynomial is calculated for each observation and averaged across observations. Reference groups for categorical covariates are shown in brackets. Statistically significant at the \* 10 percent level, \*\* 5 percent level, \*\*\* 1 percent level.

**Table 7. Probit Estimates of LSO on Self-Employment Entry with Polynomial in Wealth: Workers with No Prior Business Assets or Workers Under Age 65**

	Sample: No Business Wealth	Sample: Under Age 65
All Covariates Included <sup>1</sup>	Yes	Yes
<b>Probit Coefficients</b>		
Total Net Wealth		
Wealth/100,000	0.064*** (0.019)	0.077*** (0.017)
(Wealth/100,000) <sup>2</sup>	-0.003* (0.002)	-0.004*** (0.001)
(Wealth/100,000) <sup>3</sup>	5.93E-5 (3.83E-5)	8.18E-5** (3.64E-5)
(Wealth/100,000) <sup>4</sup>	-4.07E-7 (2.94E-7)	-6.34E-7** (3.05E-07)
(Wealth/100,000) <sup>5</sup>	7.28E-10 (5.52E-10)	1.19E-9** (5.94E-10)
LSO Available on Primary Pension	0.115* (0.061)	0.123** (0.058)
<b>Marginal Effects</b>		
LSO Available on Primary Pension	0.006	0.007
Increase Wealth/100,000	0.002	0.002
P-value of Joint Significance	0.000	0.000
Observed Probability of Entrance	0.027	0.030
Pseudo R <sup>2</sup>	0.079	0.080
Number of Observations	20,134	20,098

SOURCE: Authors' calculations using the HRS 1992-2004.

NOTES: The sample includes respondents who had a wage-and-salary job at time  $T$  and subsequently remain in the HRS and continue to work at time  $T+2$ . Robust standard errors are listed in parentheses.

<sup>1</sup>All covariates are included: age, race, sex; marital status, risk aversion, health, pension, health insurance, industry of job, occupation; education, current family income, permanent income from ages 25 to 50. See text for details on measurement of and how covariates are specified. See Table A for estimated marginal effects of all covariates. Marginal effect of the fifth-order polynomial is calculated for each observation and averaged across observations. Reference groups for categorical covariates are shown in brackets. Statistically significant at the \* 10 percent level, \*\* 5 percent level, \*\*\* 1 percent level.

**Appendix Table A: Marginal Effects of all Covariate for Probit Models in Tables 3 and 6**

Covariate (measured at time <i>T</i> )	Model 6 (Table 3)	Model 3 (Table 6)
Age	0.003 (0.004)	0.003 (0.004)
Age Squared	-2.49E-5 (3.57E-5)	-2.16E-5 (3.54E-5)
Female	-0.014*** (0.003)	-0.014*** (0.003)
Non-White	-0.005* (0.003)	-0.005* (0.003)
Married	2.24E-4 (0.003)	1.89E-4 (0.003)
Education Level [Less Than High School]		
High School Graduate	0.003 (0.003)	0.003 (0.003)
Some College	0.010*** (0.004)	0.010*** (0.004)
College and More	0.013*** (0.005)	0.013*** (0.005)
Less Risk Averse	0.002 (0.002)	0.002 (0.002)
Has Working-Limiting Health Condition	0.013*** (0.004)	0.013*** (0.004)
Covered by Any Health Insurance	-0.018*** (0.007)	-0.018*** (0.007)
Covered by Government Health Insurance	-0.004 (0.003)	-0.004 (0.003)
Covered by EHI	-0.005 (0.004)	-0.004 (0.004)
Covered by Spouse's EHI	0.003 (0.004)	0.003 (0.004)
Covered by Other Health Insurance	0.005 (0.004)	0.005 (0.004)
Has Pension Plan on Wage and Salary Job	-0.018*** (0.003)	-0.022*** (0.004)
Industry [Agriculture, Forestry, Fishery]		
Mining and Construction	0.035** (0.024)	0.035** (0.024)
Manufacturing	0.007 (0.014)	0.007 (0.013)
Transportation	0.014 (0.017)	0.014 (0.017)
Whole Sale and Retail	0.004 (0.013)	0.004 (0.013)
Finance, Insurance, Real Estate	0.015 (0.017)	0.015 (0.017)
Business/Repair Services	0.017 (0.018)	0.017 (0.018)
Personal Services	0.026 (0.022)	0.025 (0.022)
Recreation/Entertainment Services	0.003 (0.014)	0.003 (0.014)
Professional Services	0.005 (0.012)	0.005 (0.012)
Public Administration	0.002 (0.013)	0.003 (0.013)

**Appendix Table A: Marginal Effects of all Covariate for Probit Models in Tables 3 and 6, Continued**

Covariate (measured at time <i>T</i> )	Model 6 (Table 3)	Model 3 (Table 6)
Occupation [Professional/Managerial]		
Sales	0.012** (0.006)	0.012** (0.006)
Administrative Support	-0.009*** (0.003)	-0.009*** (0.003)
Services	-0.002 (0.003)	-0.001 (0.003)
Farming, Forestry, Fisheries	-0.005 (0.010)	-0.004 (0.010)
Mechanic, Construction, Operator	-0.007** (0.003)	-0.006** (0.003)
Log of Family Labor Income	-0.001** (4.95E-4)	-0.001** (4.89E-4)
Log of Permanent Income	-1.65E-4 (0.001)	-1.93E-4 (0.001)
Missing Permanent Income	0.003 (0.002)	0.003 (0.002)
Net Total Wealth		
Wealth/100,000	0.004*** (0.001)	0.004*** (0.001)
(Wealth/100,000) <sup>2</sup>	-1.86E-4*** (6.82E-5)	-1.87E-4*** (6.75E-5)
(Wealth/100,000) <sup>3</sup>	4.10E-6** (1.73E-6)	4.17E-6** (1.71E-6)
(Wealth/100,000) <sup>4</sup>	-3.20E-8** (1.47E-8)	-3.26E-8** (1.45E-8)
(Wealth/100,000) <sup>5</sup>	6.05E-11 ** (2.88E-11)	6.16E-11** (2.84E-11)
LSO Available on Primary Pension Plan		0.008** (0.003)
More Than One Pension on Wage and Salary Job		2.47E-4 (0.003)
Wave [Year 2000]		
Wave 1 (Year 1992)	-1.48E-4 (0.003)	-2.25E-4 (0.003)
Wave 2 (Year 1994)	0.001 (0.003)	0.001 (0.003)
Wave 3 (Year 1996)	-0.006* (0.003)	-0.006* (0.003)
Wave 4 (Year 1998)	-0.008*** (0.003)	-0.008*** (0.003)
Wave 6 (Year 2002)	0.002 (0.003)	0.002 (0.003)
Pseudo R2	0.075	0.076
Base Probability	0.031	0.031
Number of Observations	21,872	21,872

SOURCE: Authors' calculations using the HRS 1992-2004.

NOTES: The sample includes respondents who had a wage-and-salary job at time *T* and subsequently remain in the HRS and continue to work at time *T*+2. Robust standard errors are listed in parentheses. Reference groups for categorical covariates are shown in brackets. EHI=employer-provided health insurance. Statistically significant at the \* 10 percent level, \*\* 5 percent level, \*\*\* 1 percent level.