

Liquidity Constraints, Household Wealth, and Entrepreneurship Revisited

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Abstract: Hurst and Lusardi (2004) recently challenged the long-standing belief that liquidity constraints are important causal determinants of entry into self-employment. They demonstrate that the oft-cited positive relationship between entry rates and assets is actually unchanging as assets increase from the 1st to the 95th percentile of the asset distribution, but rise drastically after this point. They also apply a new instrument, unanticipated changes in house prices, for wealth in the entry equation, and show that instrumented wealth is not a significant determinant of entry. We reinterpret these findings: first, we demonstrate that bifurcating the sample into workers who enter self-employment after job loss and those who do not reveals steadily increasing entry rates as assets increase in both subsamples. We argue that these two groups merit a separate analysis, because a careful examination of the entrepreneurial choice model of Evans and Jovanovic (1989) reveals that the two groups face different incentives, and thus have different solutions to the entrepreneurial decision. Second, we use microdata from matched Current Population Surveys (1993-2004) to demonstrate that unanticipated housing appreciation measured at the MSA-level is a significantly positive determinant of entry into self-employment. In addition, we perform a duration analysis to demonstrate that pre-entry assets are an important determinant of entrepreneurial longevity.

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Introduction

The relationship between wealth and business creation is one of the most important and well-studied questions in the rapidly expanding literature on entrepreneurship. Many studies document the positive relationship that exists between personal assets and the propensity to start a business, and interpret this result as providing evidence of the existence and importance of liquidity constraints.¹ The interpretation of the finding is important because of its implications for justifying the provision of government loans and guarantees, the long-standing debate over the nature of entrepreneurship, and the potential economic inefficiencies created by liquidity constraints.²

Recently, work by Hurst and Lusardi (2004), however, challenges the liquidity constraint interpretation. They show that the positive relationship between asset levels and business entry rates is driven almost entirely by extremely wealthy individuals. In particular, estimates from the Panel Study of Income Dynamics (PSID) demonstrate that entry rates are virtually constant for individuals between the 1st and 95th percentiles of the asset distribution, but increase drastically for individuals above the 95th percentile. The constancy of entry rates for the majority of the asset distribution is inconsistent with the emphasis placed in the previous literature on the importance on liquidity constraints. The authors conclude that even if some households are constrained from borrowing, such constraints are not empirically important in deterring the majority of small business formation in the United States.

¹ See Evans and Jovanovic (1989), Evans and Leighton (1989), Meyer (1990), Holtz-Eakin, Joulfaian, and Rosen (1994a), Lindh and Ohlsson (1996), Bates (1997), Blanchflower and Oswald (1998), Dunn and Holtz-Eakin (1999), Fairlie (1999, 2002), Johansson (2000), Taylor (2001), Hurst and Lusardi (2004), and Holtz-Eakin and Rosen (2004).

² Knight (1921) argues that entrepreneurs generally self-finance and bear all of the risks because capital markets provide too little capital, whereas Schumpeter (1934, 1950) argues that modern capital markets generally allow the entrepreneur to find a capitalist to bear the risks (Evans and Jovanovic 1989).

A closer examination of the PSID data, however, reveals a more complicated relationship between assets and business creation, and one that emphasizes the importance of liquidity constraints. Motivated by the finding in Farber (1999) of high entry rates by displaced workers into "alternative" work arrangements such as self-employment, we examine the relationship between wealth and business creation separately for job losers and non-job losers. Although we find that the Hurst and Lusardi result is evident for the pooled sample of individuals, the result is not well-supported for the separate subsamples of job losers and non-job losers. Using the theoretical model of entrepreneurial choice by Evans and Jovanovic (1989), we demonstrate that the two groups face different incentives, and thus have different solutions to the entrepreneurial decision. This is due to the fact that some job losers would not have otherwise become self-employed had they not lost their jobs, opting for self-employment because of a negative shock to their career paths, wages and wealth.³ Alternatively, non-displaced entrants into self-employment were those who planned to ultimately own their own business, and become self-employed at a time that accords with this plan. When we examine these two subsamples separately, we find evidence of increasing rates of entry into self-employment for both groups throughout the asset distribution. The constant business entry rates through most of the asset distribution documented by Hurst and Lusardi are due to the changing proportion of job losers at each asset level. In particular, we find that job losers who have high entry rates are disproportionately located at the bottom of the wealth distribution and non-job losers who have low entry rates are disproportionately located near the top of the wealth distribution.

³ Farber (1999) has noted that alternative or contingent work arrangements are quite prevalent among displaced workers. One such "alternative" work arrangement is self-employment, which sees disproportionately high entry rates for many workers after job loss. In fact, Krashinsky (2005) shows that entry rates into self-employment for workers who lost their jobs are two or three times higher than entry rates for non-job losers.

Also, Hurst and Lusardi offer two potential explanations for the spike in entry rates for high-asset individuals: first, high-asset households have been found to adopt a much greater tolerance for risk, and second, that entrepreneurship can be regarded as a luxury good. These explanations may account for part of the spike in entry rates, but we find evidence supporting a third potential explanation. The entry spike is almost entirely due to older job-losers who become self-employed. These older, wealthy workers are likely to face limited options in wage and salary work following involuntary job loss leading to self-employment.

Hurst and Lusardi (2004) also critique the liquidity constraint hypothesis by using a new instrument for household wealth in this context -- regional differences in unanticipated increases in housing equity -- and find a negative and statistically insignificant coefficient estimate on the instrumented level of household wealth in the business entry equation. Estimates from matched Current Population Survey (CPS) data from 1994 to 2004, which include variation in unanticipated housing appreciation across a large number of metropolitan areas over a long period of time, provide a different result, however. Unanticipated housing appreciation is found to be a positive and statistically significant determinant of self-employment entry.

Another fundamental question regarding liquidity constraints is whether they bind for the scale or success of the entrepreneurial venture. Constant returns to scale production implies that liquidity constrained entrepreneurs might start smaller businesses, and liquidity constraints may create undercapitalized businesses. In both cases, the businesses created by liquidity-constrained entrepreneurs might have substantially higher failure rates than those created in the absence of liquidity constraints. Surprisingly, however, the relationship between initial owner assets and business longevity has not been examined previously in the literature. Previous research examines whether current changes in asset levels affect survival probabilities (Holtz-Eakin,

Joulfaian, and Rosen 1994), but does not address the question of whether initial asset levels affect business longevity. Using the PSID, we provide new estimates of this relationship and find a strong positive effect of initial owner asset levels on entrepreneurial survival throughout the wealth distribution, and not just for the wealthiest Americans. Furthermore, this effect is also evident for both job losers and non-job losers entering self-employment.

A Short Discussion of a Model of Self-Employment Entry and Exit

A theoretical analysis of the choice to become self-employed has generally been based upon a comparison of potential earnings from wage and salary work and self-employment. A model by Evans and Jovanovic (1989) relies upon a framework where an individual can obtain the following income, Y^W , from the wage and salary sector: $Y^W = w + rA$, where w is the wage earned in the market, r is the interest rate, and A represents the individual's assets. Earnings in the self-employment sector, Y^{SE} , are defined as: $Y^{SE} = \theta f(k)\varepsilon + r(A-k)$, where θ is entrepreneurial ability, $f(\cdot)$ is a production function whose only input is capital, ε is a random component to the production process, and k is the amount of capital purchased by the worker. Since capital is purchased with assets there are three general solutions to the question of how the individual chooses to buy capital. First, the individual could buy no capital if θ is small (if it is below the interest rate, r). Second, the individual purchases the profit maximizing level of capital, k^* , which satisfies the first-order condition $\theta f'(k^*) = r$, and k^* rises with ability. Third, if k^* is unattainable due to liquidity constraints, instead of choosing k^* the worker chooses k' such that $k' = L(A)$, where $L(\cdot)$ is a function that determines the maximum amount of liquidity the worker can obtain given his or her assets, A . In this case, $k' < k^*$, so Y^{SE} will not be maximized.

There are two key observations from this model that are relevant to this paper. The first is that because capital is purchased with assets, then the presence of liquidity constraints can discourage low-asset workers from entering self-employment. If liquidity-constrained individuals can only obtain sub-optimal earnings in self-employment, then many of these individuals will not enter self-employment (even though they might do so if their maximized earnings were available to them). Thus, the existence of increasing self-employment entry rates as assets rise is consistent with the existence of liquidity constraints.

The second observation from the model is that because entry is critically dependent upon an individual's relative earnings in both sectors, then job losers and non-job-losers may have different responses. The reason for this is that an individual who has not lost his or her job has the following choice: remain in the wage and salary sector to earn $Y^W = w + rA$, or move to the self-employment sector to earn $Y^{SE} = \theta f(k)\varepsilon + r(A-k)$. Potential earnings in the two sectors are thus dependent upon A and w . An equivalent job loser, though, faces this same decision with altered values of these two variables. Since this worker has lost seniority, firm-specific training and other job-related characteristics that raise his or her wage, job losers face a lower value of w if they seek re-employment in the wage and salary sector.⁴ Also, since job losers are at least temporarily unemployed, displacement will also alter their assets, A . Overall, these two impacts will cause job losers to have a different solution to the Evans and Jovanovic model of entrepreneurial entry.

Specifically, assume that $f(k) = k^\alpha$, so that $Y^{SE} = \theta k^\alpha \varepsilon + r(A-k)$. In this case, a worker will enter self-employment if his or her entrepreneurial θ meets one of two classifications. First, if the individual is not liquidity constrained, then he or she will choose self-employment if:

⁴ The literature on the wage effects of job displacement is large, but an example of some papers which discuss this effect are: Jacobsen, Lalonde and Sullivan (1993) and Farber (2004).

$$w^\alpha(r/\alpha)^\alpha(1-\alpha)^{\alpha-1} \leq \theta \leq (L(A))^{1-\alpha}(r/\alpha).$$

Alternatively, a liquidity constrained individual will enter self-employment if:

$$\theta > \max \{ (L(A))^{1-\alpha}(r/\alpha), w(L(A))^{-\alpha} + r(L(A))^{1-\alpha} \}.$$
⁵

Now consider this solution for workers who are and are not displaced. For a non-displaced worker with a wage of w and assets A , the decision to enter or not enter entrepreneurship is determined by the above conditions. For an equivalent worker with a wage of w and assets A who will be displaced from his job, the decision is more complicated. After displacement, the worker will not be able to obtain a wage of w , but $w' < w$ because of the loss of tenure and firm-specific human capital. Also, a worker who starts with assets A but is displaced before he or she becomes self-employed may lose some of these assets during the period of unemployment replacing lost income. Since the available wage and salary sector wage rate, w , and assets, A , will be different for equivalent workers who are and are not displaced from their jobs, then conditions under which they enter self-employment for a given w and A will be fundamentally different for both groups. The theoretical model, however, does not offer a prediction regarding whether lower wages and lower assets among job losers result in a higher probability of choosing self-employment in the presence or absence of liquidity constraints than among non-job losers.

This model is also useful for providing a framework to consider the impact of assets on business longevity. If an entrepreneur is liquidity constrained, then the purchased amount of capital, k' , is less than the optimal amount of capital, k^* . As such, $f(k') < f(k^*)$, and an undercapitalized firm will produce lower amounts of income for the entrepreneur, relative to opportunities in the wage and salary sector. Given business cycle fluctuations and competition from owners with optimal amounts of capital, an owner of an undercapitalized firm would be

⁵ See Evans and Jovanovic (1989) for a more detailed derivation of this solution.

relatively less likely to remain self-employed. As such, the theory generates the testable prediction that lower levels of A should cause entrepreneurs to exit self-employment relatively sooner than entrepreneurs with higher levels of A if liquidity constraints are important. We test this prediction below.

Data Description for the PSID

Our analysis of entry rates will use data from the Panel Study of Income Dynamics (PSID). This survey is particularly useful for our analysis for a number of reasons: first, the fact that it is a panel allows us to track entrants into self-employment. Second, it is the same data used in Hurst and Lusardi's work, so any differences in our findings will not be due to differences in survey design.⁶ In addition to collecting very detailed asset information in five year intervals (the 1984, 1989, 1994 and 1999 waves), the 1984, 1989 and 1999 waves of the PSID also contain information on job loss.⁷ Since we will analyze the subsamples of respondents who enter self-employment after a job loss and not after a job loss, the 1984 and 1989 waves are well-suited for our work. Unfortunately, we could not incorporate the 1999 wave of the survey into our analysis of one-year transitions into self-employment, since the PSID did not survey its respondents in 2000.⁸

Table 1 displays some summary statistics for our sample. As previously mentioned, we use the 1984 and 1989 waves of the PSID, and we consider two types of individuals not self-

⁶ The only difference between the two analyses is the waves of the PSID that we use because of the availability of information on job loss. Hurst and Lusardi use the 1989 and 1994 waves of the PSID, whereas we use the 1984 and 1989 waves. The only difference between the 1984 and 1989 waves is the way in which uncertainty over precise values of assets is approximated. In both the 1984 and 1989 wave, if the value of a particular asset (such as a house, or other real estate, or the value of a savings account) is unknown to the respondent, the survey then asks "...would it be worth more than \$X?", where X was an arbitrary amount. This amount changed during the two surveys (it was adjusted upwards for 1989), but this change does not have an impact on our results.

⁷ Hurst and Lusardi use the 1989 and 1994 waves of the PSID. We could not use the 1994 wave because it did not contain any information on job loss.

⁸ The PSID began collecting its information in two-year intervals starting in 1997.

employed in 1984 and 1989: those who become self-employed in the following year, and those who do not become self-employed. We begin by pooling the entire sample in the first two columns of the Table, and the results attest to the general differences between the two groups. Clearly, the age and a general measure of education for the two sub-samples are quite similar, but they differ in their net worth. We also consider two different measures for net worth: the first is the household's total assets, defined as sum of savings and checking accounts, bonds, stocks, IRAs, housing equity (defined as the reported house value minus the remaining mortgage), other real estate, and vehicles minus all debt.⁹ The second measure considers only housing equity (defined, as before, as the difference between the self-reported house value and the remaining principal on the mortgage). Unlike the other asset measures, this variable is collected every year by the PSID, and is useful because it constitutes a large proportion of the respondent's net worth,¹⁰ so it permits the analysis of the relationship between entry rates and a rough proxy for overall wealth in a larger sample. Both measures are significantly higher for the sample who enter self-employment, which is a standard finding that leads researchers to suggest that entry is dependent upon assets and liquidity constraints matter. In the next four columns, we make the same comparison for the two sub-samples discussed earlier: columns three and four compare entrants and non-entrants who did not experience job loss prior to entry, and columns five and six examine workers who experienced a job loss before entry. When comparing entrants to non-entrants, both subsamples demonstrate that entrants into self-employment have higher assets than non-entrants, and the job loss sample's entrants tend to be slightly older and better-educated than non-entrants. But, there are other important issues to note when examining the two subsamples. A primary point is that each subsample contains a significant number of

⁹ This is the same definition of net worth used by Hurst and Lusardi.

¹⁰ Specifically, 60% of the average homeowner's (and 64% of the median homeowner's) assets are captured by net housing equity.

entrants into self-employment, so both groups represent large constituencies in this sector. Also, there are significant differences in the characteristics of the two groups: job-losers tend to be younger, less-educated and less wealthy in comparison with non-job-losers. Lastly, the entry rate for job losers is approximately 7%, whereas only 3% for the non-job loser sample enters self-employment. These facts suggest that an analysis of the relationship between assets and entry into self-employment may require a separate consideration of each group.

Assets and Self-Employment

Numerous previous studies using various methodologies, measures of assets and international microdata explore the relationship between assets and entrepreneurship. Most of these studies estimate the relationship by modeling the decision of non-business owners to switch into self-employment over a fixed period of time and generally find that asset levels (e.g. net worth or asset income) measured in a given year will increase the probability of entering self-employment by the following year.¹¹ We start by presenting some preliminary evidence from the PSID on the relationship between assets and business entry following this approach. Table 2 reports average entry rates for each asset category for the pooled sample, and both subsamples of workers. The first column of the Table uses the pooled sample, and is very similar to Hurst and Lusardi's evidence, which finds that entry into self-employment is almost identical across asset categories, except for individuals whose assets are in the 95th percentile or above. We see a jump of nearly 3 percentage points in entry rates when we compare this category to the 80th to 95th percentile group (which has virtually the same entry rate as any of the lower percentile groups). But, different patterns emerge when we consider the two sub-samples independently in columns

¹¹ For example, see Evans and Jovanovic (1989), Evans and Leighton (1989), Meyer (1990), Holtz-Eakin, Joulfaian, and Rosen (1994), Bates (1997), Dunn and Holtz-Eakin (1999), Fairlie (1999, 2002), Johansson (2000), Hurst and Lusardi (2004), and Holtz-Eakin and Rosen (2004).

two and three. The non-job-loss sample in column three exhibits gradually increasing entry rates as assets increase, and there is no spike in entry rates for individuals with the highest level of assets. In column two, the job-loss sample also exhibits increasing entry rates as assets increase, but the spike in entry rates at the 95th percentile and above is only exhibited in this sub-sample. Thus, the Hurst and Lusardi finding is not as evident in these two sub-groups.

Further, it is also interesting to note that the unchanging entry rates for individuals at or below the 95th percentile in the pooled sample is due to the changing frequencies of job losers as assets increase. The first row of this table includes individuals whose assets are at or below the 40th percentile in the distribution for the pooled sample. But almost 60% of the job-loss sample falls into this category; this is not surprising, since Table 1 showed that the job-loss group had lower assets overall. However, this shows the relative preponderance of job losers in this asset category. Also, in rows 2 through 4, the relative frequency of job-losers in comparison with non-job-losers decreases significantly. This is important because it is this changing relative frequency between the two samples that causes the pooled sample to exhibit a constant entry rate over this asset range, even though each sub-sample exhibits increasing entry rates as assets rise. Since entry rates are much higher for the job-loss sample than for the non-job-loss sample, and since both samples exhibit increasing entry rates, then a relative decrease in the frequency of job losers as assets rise causes the pooled entry rate to remain constant as assets increase. Overall, this evidence has important implications for an interpretation of the entry rate dynamics in the pooled sample. Although it is clear that there are unchanging entry rates in the pooled sample for most of the asset distribution, this is not true for the two sub-samples we analyze. As such, it may not be appropriate to suggest that unchanging entry rates in the pooled sample are evidence

against the significance of liquidity constraints, since the underlying sub-samples suggest otherwise.

As supporting evidence, Table 2A also presents evidence on entry rates, but instead of using assets as the determinant of wealth, we use net house values. This is a reasonably good measure of wealth, since net house values accounts for 60% of total assets, on average, for homeowners. The advantage of this measure is that this information is collected in almost all years of the PSID before 1993 (when job loss information is no longer collected), but it is somewhat imprecise, since there are wealthy non-home-owners in the sample. Nevertheless, this table exhibits findings that are quite similar to those in Table 2. For the pooled sample, the propensity to become self-employed rises only somewhat with this measure of wealth, and has a noticeably larger entry rate at the 95th percentile (though not as large as in Table 2). As was the case with total assets, this result is driven by the job-loss sub-sample, and both sub-samples exhibit increasing entry rates as net house value rises.

To consider the findings in Tables 2 and 2A in a regression context, Table 3 estimates logit entry regressions and uses different approaches to document the relationship between asset income and the entry rates in the pooled sample and both subsamples. First, in columns one, four and seven, we regress an entry indicator variable on overall asset wealth for the pooled sample, and both sub-samples. In all three cases, there is a significant linear relationship between asset wealth and propensity to become self-employed (the p-values for these coefficients are displayed in the second-last row of the table), which is a well-established empirical fact. In columns two, five and eight, the same entry indicator is regressed on a set of indicator variables that account for the asset percentile categories used in Table 2. Column two demonstrates that in the pooled sample, there is a statistically significant difference between the

entry rates for respondents whose assets equal or exceed the 95th percentile in the overall distribution, and those whose assets are between the 80th and 95th percentiles, as demonstrated by the F-test in the last row of the table, which tests the equality of the coefficients on these two indicator variables. But as with Tables 2 and 2A, findings from the job-loss and non-job-loss subsamples temper this result. Column five demonstrates that regression-adjusted entry rates increase as assets rise for the non-job-loss sample, and there is a significantly higher probability of entry for individuals whose assets exceed the 95th percentile of the distribution. But there is not a significant difference in entry rates for respondents in this category or the 80th to 95th percentile category. All of these results are loosely consistent with the findings in Table 2. In addition, the results in column eight are also consistent with the findings in Table 2 – in comparison with respondents in the 80th to 95th percentile category, entry rates are significantly higher for job-losers whose assets exceed the 95th percentile.

Instead of using assets in columns three, six and nine, we provide additional and related evidence by using net house value, and a similar finding is evident. In the pooled sample, the entry rate for homeowners whose net house value is at or above the 95th percentile is significantly higher than those between the 80th to 95th percentiles, although the larger sample size demonstrates that the probability of becoming self-employed is significantly higher than the excluded category (1st to 40th percentile) for every asset category displayed in the table. However, columns six and nine demonstrate that the significant entry spike above the 95th percentile is due to the job-loss subsample. In addition, both columns six and nine exhibit gradually increasing entry rates as net house values rise, and in column six, entry rates are significantly higher than the excluded group (net house value is below the 40th percentile) for all categories. Although entry rates are not significantly higher than the excluded group for every

category in column nine, the magnitudes of the coefficients are reasonably similar for columns six and nine for respondents in the 40th to 95th percentiles. The lack of significance for the coefficients in the second and third rows in column nine is mainly attributable to the smaller sample size in this column.¹² And remarkably, the coefficient magnitudes are quite similar between the asset and net house columns, which demonstrates the robustness of our findings.

A significant finding in the results that we have not directly addressed is the sharp rise in entry rates above the 95th percentile in the asset distribution. Hurst and Lusardi suggested two potential reasons to account for this entry spike: first, they cited findings in Carroll (2002) and Charles and Hurst (2003) suggesting that extremely wealthy households have a much higher tolerance for risk than lower asset households, far more so than respondents in lower asset categories. Since self-employment is riskier than employment in the wage and salary sector, then high-asset households should be more likely to become self-employed. They also suggest that self-employment can be regarded as a kind of luxury good; therefore, as assets rise, there should be a corresponding (and disproportionately higher) increase in the propensity to become self-employed.

We offer an alternative explanation for this finding. Our evidence has demonstrated that only the job-loss subsample exhibits a sharp increase in entry rates, so we further develop this result by comparing the average age of each subsample by asset category in Table 4 to determine the characteristics of these wealthier job losers. The first column demonstrates that average age is increasing in our sample as assets increase. This is not surprising, since it takes time to accumulate assets, and the same is evident in the third column of the table, which uses only non-job-losers. But column two includes only the job loser sub-sample, and demonstrates that most

¹² There are approximately 10,000 observations for column nine and over 60,000 for column six. Also, since there is a greater concentration of job losers in the low house value categories, there are only 20 to 30 entrants in the second and third rows of column nine.

job losers are in the lower portion of the asset distribution, since many of them are younger workers – much younger than the non-job-loss sample. But as assets increase for the job losers, their average age becomes similar to the non-job-loser sample. In particular, in the highest asset category (where we see the spike in entry rates) the job-loser sample is approximately 50 years old, which is a little older than the non-job-loss sample for this asset category.

This result provides insight into the rationale for the entry spike among wealthier job losers. Many authors have written about the negative consequences of job loss for older workers (see McCall 1997, Farber 2004, and Chan and Stevens 1999, 2001 for example). In particular, Chan and Stevens have analyzed the increased propensity of older workers who suffer job loss to become retired, since they face worsened employment prospects in many respects after involuntary job loss. Specifically, older workers who search for a job in the wage and salary sector require significant search time. Also, if they are re-employed in this sector, their earnings losses (in comparison to the pre-displacement job) are quite large, and they tend to have a decreased attachment to the labor market due to fewer hours worked per week, and a greater likelihood of working at a part-time job. As a result, the spike in entry rates may be attributable to the fact that with severely worsened wage-and-salary options, relatively older displaced workers may need to create employment for themselves, which can be accomplished in the self-employment sector.

Self-Employment Entry and Endogeneity

The issue of endogeneity is highly important when analyzing the relationship between assets and entrepreneurship. The propensity to become self-employed has been shown to be positively related to initial asset levels, but it is difficult to make causal inferences about the

relationship between these two variables. Since a household's asset accumulation may be related to its underlying entrepreneurial ability, the positive relationship between assets and entry may not be causal. To counter this objection, many authors have attempted to find suitable instrumental variables or other proxies for wealth, such as inheritances, gifts, lottery winnings or insurance settlements, which are otherwise unrelated to the decision to become self-employed.¹³ Because inheritances and other unanticipated (or at least less-anticipated) lump sum payments are highly correlated with overall net worth, they have become popular in the analysis of entry into self-employment. In general, inheritances and other lump sum payments are found to increase the probability of entering or being self-employed, which has been interpreted as providing evidence supporting the liquidity constraint hypothesis.

The PSID contains information on whether the respondent received an inheritance in the prior year. We use this information to instrument for pre-entry asset levels in 1984 and 1989 by using the value of an inheritance received by the household in the prior four years. This is not a new approach using the PSID, but the results in Table 5 demonstrate that in the pooled sample, and also in the two sub-samples we consider (job losers prior to entry, and non-job-losers), we find a positive relationship between asset levels and entry rates into self-employment.¹⁴ Thus, our main finding holds in the instrumental variables context.

Hurst and Lusardi (2004) objected to this approach, arguing that an inheritance may not be a random event, since the receipt of an inheritance may simply signal that the household comes from a wealthy family. And given the strong intergenerational correlations in education,

¹³See Holtz-Eakin, Joulfaian, and Rosen (1994a), Lindh and Ohlsson (1996), Blanchflower and Oswald (1998), Fairlie (1999), Taylor (2001), and Hurst and Lusardi (2004) for example.

¹⁴ The first stage of the instrumental variables regression yields very high F-values, and the inheritance variable is quite significant in these regressions. We chose not to display these values because many other authors have demonstrated that inheritances meet any reasonable standard for being an appropriate instrument for asset levels, but the F-statistics for pooled sample, job-loss sub-sample and non-job-loss sub-sample are 19.69, 25.24 and 17.98 respectively.

occupation and savings behavior, if wealth and entrepreneurial skill are related, then a household which receives an inheritance may have higher than average entrepreneurial ability (conditional on wealth). To test this theory, the authors compare past and future inheritances as instruments: if inheritances alleviate liquidity constraints, then only past inheritances should matter. The authors discovered that both past and future inheritances yield similar instrumental variable results, and thus argue against the appropriateness of inheritances as an instrument.

One rejoinder to this test is that the specific comparison of future and past inheritances may not be a conclusive way of ruling out the existence of liquidity constraints. In particular, because intra-family transfers of money exist, then a relatively wealthy family can serve as a lender of last resort to the business owner. A potential business owner may be liquidity constrained in the absence of family assistance, but not constrained with it. For instance, suppose a business owner could only become self-employed if a wealthy family member co-signed for a business loan. If the business owner subsequently received a large inheritance from this family member after entering self-employment, then this case would be consistent with the existence of liquidity constraints.

Unanticipated Housing Price Appreciation

Hurst and Lusardi (2004) control for the unobserved heterogeneity of entrants into self-employment by constructing an intriguing new instrument in this context: unanticipated increases in housing equity. The efficacy of this new instrument is due to the fact that housing equity represents well over half of net worth for homeowners, and unanticipated variations in this variable would represent a substantial change in net worth for individuals. In their work, Hurst and Lusardi estimated unanticipated housing equity from a regression of changes in house

prices from 1985 to 1988 on nine region dummies, initial levels and changes in economic indicators (state GDP per capita and unemployment rates), and demographic characteristics. The region dummies capture unanticipated changes in household wealth and are used as an instrument for 1989 household wealth. Hurst and Lusardi find a highly significant coefficient estimate on the regional dummy in a regression determining household wealth. Their estimate implies that households save 94 percent of their housing capital gains, which is consistent with previous findings (Engelhardt 1996, Skinner 1996, and Hurst and Stafford 2005). In the second-stage regression for business entry, they find a negative and statistically insignificant coefficient estimate on the instrumented level of household wealth.

We expand on these findings in two ways. First, we note that identification using the PSID data relies on variation across only nine Census divisions in one year. Since analysis at this level may obscure underlying trends in smaller geographic regions, we further investigate the relationship between unanticipated housing appreciation and entrepreneurship by using data from matched Current Population Survey (CPS) Outgoing Rotation Group (ORG) files from 1994 to 2004.¹⁵ The matched CPS data allow us to exploit the variation in housing equity across a large number of metropolitan areas over a long period of time. One limitation of these data, however, is that the CPS does not include a measure of net worth. Instead, we include unanticipated housing appreciation directly into the regression explaining entry into self-employment. The finding by Hurst and Lusardi (2004) that households save almost 100 percent of their unanticipated gains in housing equity suggests that this may not be a serious problem for the analysis.

¹⁵ The CPS files can be matched by linking consecutive years to create longitudinal data. Households in the CPS are interviewed each month over a 4-month period and 8 months later they are re-interviewed in each month of a second 4-month period. This rotation panel makes it possible to create a one-year panel for up to half of the respondents.

Second, because the instrument requires changes in housing values to be completely unanticipated by the individual, we consider whether housing appreciation is explained by any additional information. For instance, it may be the case that there are persistent trends in regional housing prices which pre-date the 1985 to 1988 period. In this case, the housing price changes would not be unanticipated by the individual, but would still be captured by the regional dummies. To address this issue we modify the Hurst and Lusardi housing appreciation regression to also include regional growth rates in housing prices from 1981 to 1984.

To create unanticipated housing appreciation, we first regress four-year housing appreciation by MSA on initial levels and changes in economic indicators (state-level GDP per capital and MSA-level unemployment rates), and detailed demographic characteristics. We also estimate a housing appreciation regression that includes the previous four-year housing appreciation as an additional control. The residuals from these regressions are then included in logit regressions for the probability of becoming a self-employed business owner. Estimates are reported in Table 6. The coefficient on unanticipated housing appreciation is positive and statistically significant using both types of residuals. The point estimate implies that a 10 percentage point change in unanticipated housing prices over the previous four-year period is associated with roughly a 0.1 percentage point increase in the probability that an individual starts a business in the following year, which is about 5 percent of the mean probability.¹⁶

Separating our sample into job losers and non-job losers is not entirely possible with the CPS. In the CPS, we cannot identify individuals who were wage/salary workers at the first survey date then suffered a job loss and became self-employed by the second survey date. Instead, we can only identify job losers who are unemployed at the first survey date by their

¹⁶ We also find positive and statistically significant coefficient estimates of a similar magnitude on unanticipated housing appreciation over three- or five-year periods instead of four-year periods.

reported reason for losing their job. Table 6 reports separate estimates for non-job losers and job losers. For non-job losers, we find similar results -- unanticipated increases in housing prices lead to higher rates of self-employment entry. Estimates for the restricted job loser sample, however, do not reveal a statistically significant relationship.

Overall, the CPS results using variation in housing appreciation across 254 MSAs and 9 time periods differ from the PSID estimates using 9 regions and 1 time period. We find a strong positive relationship between unanticipated housing appreciation at the MSA level and self-employment entry in the pooled and non-job loser samples. Although the CPS data have some limitations, these findings are consistent with the liquidity constraint hypothesis.

Self-Employment Duration and Exit

A remarkably small amount of the literature on self-employment has been devoted to self-employment duration and its relationship with owner's wealth. Holtz-Eakin et. al. (1994) demonstrated that current business owners who receive an inheritance are more likely to remain self-employed than those who do not, which is highly supportive of the hypothesis that liquidity constraints are a persistent issue for entrepreneurs. We present first-order evidence on this matter by examining the duration of self-employment and its relation to pre-entry assets in Table 7. The first, third and fifth columns of the table report estimates of the impact of pre-entry assets on duration for the pooled sample, non-job-loser and job-loser subsamples, respectively, from a Cox proportional hazard model. In all three cases, higher pre-entry assets are associated with a lower probability of exiting self-employment. Similarly, in columns two, four and six, we use pre-entry net house value instead of pre-entry assets, and we see a similar pattern for all three

samples: as pre-entry net house value increases, the probability of exiting self-employment decreases.

As with entry into self-employment, the analysis of exit from self-employment is still subject to concerns about endogeneity. The fact that workers with higher pre-entry assets have longer durations in self-employment may not be evidence in favour of liquidity constraints limiting self-employment duration if more able workers are able to save more money. To account for this possibility, we compare the duration of entrants who lost their job prior to entry and those who did not. This particular comparison is informative because Evans and Jovanovic's model of entry predicts that job losers should be more willing to enter with relatively lower assets and ability. The reason for this is most easily recognized by comparing two equivalent workers, one of whom has been displaced from his job and the other who has not. Since the displaced worker can choose a wage and salary job and receive \hat{Y}^W , which is less than Y^W , the earnings available to the worker not displaced from his job. Since both workers can receive the same self-employment earnings, $Y^{SE} = \theta f(k)\varepsilon + r(A-k)$, then the job loser is more likely to choose self-employment given the same level of assets. But, more than this, job losers are more likely to enter self-employment even if they have low assets (and is liquidity constrained), or a lower value of θ . As a result, this fact presents an opportunity to consider the impact of liquidity constraints on duration by comparing the relative duration of job losers in comparison with entrants who were not displaced from their jobs.

Table 8 conducts such an analysis. Table 1 demonstrated that job losers have significantly lower assets than non-displaced workers, which is also true in a regression context.¹⁷ This finding is consistent with Evans and Jovanovic's theory since lower-asset and

¹⁷ We ran a regression which uses pre-entry asset levels or pre-entry net house values as the dependent variable and an indicator variable equal to one if the respondent lost his or her job prior to entering self-employment (and zero if

lower- θ individuals should be included in the job loser group. In the first four columns, we consider the impact of including pre-entry asset levels in a hazard model to determine their effect on self-employment duration for job losers. In column one, we show that job losers have significantly shorter durations than non-job-losers, but including four pre-entry asset dummy variables and their interaction with the job-loser indicator in column two significantly alters the relative duration of job losers. The same effect is evident in columns three and four when we control for pre-entry wages. As supplementary evidence, we also use pre-entry net house value in columns five through eight as the measure of net worth, and the same patterns are evident here as in the first four columns. In particular, column five demonstrates that job losers have a significantly lower duration in self-employment, but column six demonstrates that including controls for pre-entry net house value significantly changes the relative duration of job losers, who no longer have significantly different durations from non-job-losers. Columns seven and eight demonstrate that this finding holds even conditioning on pre-entry wages, which suggests that the difference in duration between job-losers and non-job-losers can be largely attributed to differences in pre-entry net worth. This finding is consistent with liquidity constraints impacting not only the propensity to become self-employed, but also the duration of self-employment for those who become entrepreneurs.

Conclusion

The well-established positive relationship between assets and self-employment entry rates has been traditionally interpreted as evidence in favor of liquidity constraints, but recently

the entrant was not displaced prior to entry) as well as standard human capital variables such as age or education, as well as pre-entry wages. With both dependent variables, job losers have significantly less assets. The job loser indicator had a p-value of 0.044 in the regression which used assets as the dependent variable, and 0.005 for the regression which used net house value.

this evidence has been reexamined by Hurst and Lusardi. They have noted that the positive relationship often cited in the data is actually due to a relatively unchanging entry rate for individuals with assets at or below the 95th percentile, and then a large increase in entry rates for individuals above this point. They argue that this is inconsistent with the existence of liquidity constraints, because liquidity constraints should cause entry rates to be rising over the entire asset distribution.

In this paper, we corroborated Hurst and Lusardi's finding for a pooled sample of workers, but found different results when we separated our sample into job losers and non-job losers. The standard theoretical model of entry into self-employment implies that these two groups face different incentives, and thus different entrepreneurial choices. In particular, job loss can cause some displaced workers to enter self-employment who otherwise would have remained in the wage and salary sector. We found that entry rates do increase steadily as assets rise for each subsample; the result of a constant entry rate in the pooled sample is only due to the changing frequency of job-losers (in comparison with non-job-losers) as assets rise. Furthermore, the spike in entry rates is due to a sharp increase in entry rates for wealthy job losers, who are on average 50 years old. Given the literature on the adverse consequences of job loss for older workers, the rise in entry rates for this group is attributable to the lack of attractive options in the wage and salary sector. Overall, we argue that entry rates in the two subsamples serve as evidence that is consistent with liquidity constraints being an important issue for individuals who are considering starting businesses. We also attempted to address the issue of endogeneity by demonstrating that our results remain significant even after we use inheritances to instrument for assets in the pooled, job-loser and non-job-loser samples. Hurst and Lusardi objected to using this approach and instead chose to use unanticipated gains in housing prices as

an instrument for household wealth. Expanding on this approach, we use the more detailed geographic and time variation available in the CPS and find that MSA-level unanticipated gains in housing prices are positively associated with self-employment entry.

A related issue to this analysis is the effect of pre-entry assets on the duration of self-employment. We showed some preliminary evidence demonstrating that entrants with higher pre-entry asset levels have longer durations in self-employment. But, this issue is impacted by endogeneity concerns in much the same way as the relationship between entry rates into self-employment and pre-entry asset levels: individuals with higher pre-entry assets may also be better skilled at self-employment. To address this concern, we compared the self-employment spells of job losers and non-displaced entrants into self-employment. Entrants who lost a job prior to entry should have lower ability and lower assets; this was confirmed in our data, and it was shown that job losers have significantly shorter self-employment spells. But, controlling for pre-entry assets removed any differences in the length of self-employment spells, which is consistent with assets being a causal determinant of self-employment duration.

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Table 1: Sample Means for Non-Self-Employed Workers in 1984 and 1989 Waves of the PSID

	Pooled Sample of Workers in 1984 and 1989		Subsample of Workers who Experience Job Loss Prior to Entry		Subsample of Workers who Don't Experience Job Loss Prior to Entry	
	Enter Self Employment	Non Entrant	Enter Self Employment	Non Entrant	Enter Self Employment	Non Entrant
Age	37.48 (11.44)	37.49 (11.73)	35.79 (10.52)	33.02 (9.78)	38.30 (11.79)	38.30 (11.87)
High School Graduate or less education	0.644 (0.480)	0.651 (0.477)	0.689 (0.465)	0.726 (0.446)	0.622 (0.486)	0.637 (0.481)
Assets	\$72,868 (181,122)	\$53,203 (132,788)	\$65,684 (212,655)	\$22,527 (51,539)	\$76,343 (164,077)	\$58,720 (141,868)
Net House Value	\$31,316 (71,709)	\$24,677 (51,417)	\$27,670 (71,454)	\$11,814 (30,367)	\$33,079 (71,911)	\$26,990 (54,021)
Hourly Wage	\$13.42 (8.66)	\$12.46 (6.68)	\$11.12 (7.65)	\$10.25 (5.85)	\$14.11 (8.85)	\$12.77 (6.73)
Sample Size	365	10,045	119	1,531	246	8,514

Standard deviations are listed in parentheses. The sample was constructed from respondents between the age of 21 and 64 in the 1984, 1985, 1989 and 1990 years of the PSID. A respondent is considered to have entered self-employment if he or she is working in the wage and salary sector or is unemployed in 1984 and is self-employed in 1985. The reason that job loss in 1985 and 1990 is considered is that we wanted to use an estimate of asset wealth that was unchanged by job loss. As such, we considered individuals who had not been impact by job loss until the year after the asset measure was taken. A similar procedure is used for 1989 and 1990. The reason that 1984 and 1989 are used as the base years in this analysis is that the PSID only collects detailed information on assets every five years, starting in 1984. Unfortunately, the PSID does not collect information about job loss in 1994, so that year is not useful for this table. Also, 1999 collects information on assets and job loss, but the PSID didn't re-interview its respondents until 2001, so entry into self-employment after 1999 is difficult to discern from the data. Assets were calculated using the same definition of Hurst and Lusardi (2004); they are the sum of savings and checking accounts, bonds, stocks, IRAs, housing equity (defined as the reported house value minus the remaining mortgage), other real estate, and vehicles minus all debt.

Table 2: Self-Employment Entry Rates for 1984-1985
and 1989-1990 by Pre-entry Asset Levels

Asset Percentile	Pooled Sample of Workers	Subsample of Workers who Experience Job Loss Prior to Entry	Subsample of Workers who Don't Experience Job Loss Prior to Entry
Below 40 th Percentile	0.0336 (0.1802)	0.0619 (0.2412) [0.5964]	0.0253 (0.1572) [0.3656]
40 th to 60 th Percentile	0.0351 (0.1840)	0.0828 (0.2760) [0.1933]	0.0272 (0.1628) [0.2126]
60 th to 80 th Percentile	0.0335 (0.1799)	0.0682 (0.2526) [0.1367]	0.0293 (0.1687) [0.2123]
80 th to 95 th Percentile	0.0343 (0.1821)	0.0879 (0.2847) [0.0613]	0.0304 (0.1718) [0.1579]
Above 95 th Percentile	0.0614 (0.2404)	0.5000 (0.5164) [0.0123]	0.0399 (0.1960) [0.0515]

Standard deviations are listed in parentheses, and column frequencies are listed in square brackets.

The sample was constructed from respondents between the age of 21 and 64 in the 1984, 1985, 1989 and 1990 years of the PSID. A respondent is considered to have entered self-employment if he or she is working in the wage and salary sector or is unemployed in 1984 and is self-employed in 1985. A similar procedure is used for 1989 and 1990. The reason that 1984 and 1989 are used as the base years in this analysis is that the PSID only collects detailed information on assets every five years, starting in 1984. Unfortunately, the PSID does not collect information about job loss in 1994, so that year is not useful for this table. Also, 1999 collects information on assets and job loss, but the PSID didn't re-interview its respondents until 2001, so entry into self-employment after 1999 is difficult to discern from the data. Assets were calculated using the same definition of Hurst and Lusardi (2004); they are the sum of savings and checking accounts, bonds, stocks, IRAs, housing equity (defined as the reported house value minus the remaining mortgage), other real estate, and vehicles minus all debt.

Table 2A: Self-Employment Entry Rates for 1979-1993
by Pre-entry Net House Values

House Value Percentile	Pooled Sample of Workers	Subsample of Workers who Experience Job Loss Prior to Entry	Subsample of Workers who Experience Job Loss Prior to Entry
No House	0.0272 (0.1627) [0.4838]	0.0399 (0.1957) [0.6717]	0.0247 (0.1554) [0.4606]
Below 20 th Percentile	0.0217 (0.1457) [0.1025]	0.0371 (0.1891) [0.0871]	0.0200 (0.1401) [0.1044]
20 th to 40 th Percentile	0.0243 (0.1541) [0.1034]	0.0326 (0.1776) [0.0718]	0.0236 (0.1518) [0.1073]
40 th to 60 th Percentile	0.0270 (0.1620) [0.1038]	0.0437 (0.2046) [0.0624]	0.0257 (0.1582) [0.1090]
60 th to 80 th Percentile	0.0279 (0.1648) [0.1029]	0.0475 (0.2130) [0.0593]	0.0265 (0.1605) [0.1083]
80 th to 95 th Percentile	0.0314 (0.1745) [0.0769]	0.0650 (0.2468) [0.0371]	0.0292 (0.1683) [0.0819]
Above 95 th Percentile	0.0462 (0.2099) [0.0266]	0.1802 (0.3861) [0.0106]	0.0377 (0.1905) [0.0286]

Standard deviations are listed in parentheses, and column frequencies are listed in square brackets.

The sample was constructed from respondents between the age of 21 and 64 in the 1979 to 1993 years of the PSID. A respondent is considered to have entered self-employment if he or she is working in the wage and salary sector or is unemployed one year, and is self-employed in the next. The reason that these years are used in this analysis is that the PSID collects self-reported information about house value and remaining principle on the house's mortgage every year, but does not collect information about job loss after 1993, so later years are not useful for the analysis. Net house value was calculated using the reported house value minus the remaining mortgage.

Table 3: A Logit Analysis of Self-Employment Entry, Using Various Asset Measures

	Pooled Sample			Sub-Sample of Non-Job-Losers			Sub-Sample of Job-Losers		
		Assets	House		Assets	House		Assets	House
Assets/\$100,000	0.109 (0.036)	...	...	0.079 (0.041)	...	...	0.322 (0.100)	...	...
40 th to 60 th Percentile	...	0.276 (0.223)	0.238 (0.110)	...	0.287 (0.283)	0.258 (0.120)	...	0.491 (0.603)	0.204 (0.274)
60 th to 80 th Percentile	...	0.202 (0.224)	0.258 (0.113)	...	0.289 (0.300)	0.255 (0.123)	...	0.459 (0.731)	0.308 (0.278)
80 th to 95 th Percentile	...	0.276 (0.255)	0.367 (0.122)	...	0.501 (0.337)	0.339 (0.133)	...	0.507 (0.915)	0.595 (0.300)
Above 95 th Percentile	...	0.827 (0.312)	0.810 (0.156)	...	0.889 (0.425)	0.544 (0.182)	...	2.566 (1.019)	1.938 (0.335)
p-value for Assets/\$100,000 ¹	0.002	...	...	0.049	...	...	0.001	...	...
p-value for difference in percentiles groups ²	...	0.048	0.004	...	0.278	0.259	...	0.023	<0.001

The regressions in this table use all the standard demographic controls (age, age squared, marital status, gender, gender interacted with marital status, and three educational dummy variables) as well as an indicator equal to one if the individual had been previously self-employed in the prior five years, or if the individual had been unemployed in the prior five years. The samples for the regression results in columns one, two, four and five are comprised from the 1984 and 1989 waves of the PSID, while the samples in columns three, six and nine are comprised of the 1979-1993 waves of the PSID. In all nine regressions, the analysis is restricted to individuals who are not self-employed in the survey year, and the dependent variable representing entry into self-employment is equal to one if the individual becomes self-employed in the following year, and zero otherwise. The regressions in columns 2,3,5,6,8 and 9 contained more than four indicators for net worth, but for brevity's sake, only the highest four categories were included; specifically, the excluded comparison group in columns 2,5 and 8 are individuals whose assets are in the 1st to 10th percentile of the asset distribution, and the comparison group in columns 3,6 and 9 are individuals whose house value is in the 1st to 20th percentile.

¹ This p-value is for the coefficient on the variable which represents the value of the respondent's assets, divided by \$100,000.

² This p-value is for the test of the equality of the coefficients on the dummy variables equal to one for individuals whose assets are in the 80th to 95th percentile of the asset distribution, and the dummy variable equal to one for individuals whose assets are at or above the 95th percentile of the asset distribution.

Table 4: The Average Age for Non-Self-Employed Workers in 1984 and 1989 by Asset Levels

Asset Percentile	Pooled Sample of Workers	Subsample of Workers who Experience Job Loss Prior to Entry	Subsample of Workers who Don't Experience Job Loss Prior to Entry
Below 40 th Percentile	33.99 (10.87)	30.94 (8.62) [0.5964]	34.85 (11.28) [0.3656]
40 th to 60 th Percentile	35.66 (10.31)	33.57 (8.68) [0.1933]	35.99 (10.51) [0.2126]
60 th to 80 th Percentile	40.55 (10.67)	39.21 (9.84) [0.1367]	40.69 (10.76) [0.2123]
80 th to 95 th Percentile	45.08 (10.54)	44.04 (10.09) [0.0613]	45.16 (10.56) [0.1579]
Above 95 th Percentile	48.87 (9.83)	49.90 (8.29) [0.0123]	48.83 (9.89) [0.0515]

Standard deviations are listed in parentheses, and column frequencies are listed in square brackets.

The sample was constructed from respondents between the age of 21 and 64 in the 1984, 1985, 1989 and 1990 years of the PSID. A respondent is considered to have entered self-employment if he or she is working in the wage and salary sector or is unemployed in 1984 and is self-employed in 1985. The reason that job loss in 1985 and 1990 is considered is that we wanted to use an estimate of asset wealth that was unchanged by job loss. As such, we considered individuals who had not been impact by job loss until the year after the asset measure was taken. A similar procedure is used for 1989 and 1990. The reason that 1984 and 1989 are used as the base years in this analysis is that the PSID only collects detailed information on assets every five years, starting in 1984. Unfortunately, the PSID does not collect information about job loss in 1994, so that year is not useful for this table. Also, 1999 collects information on assets and job loss, but the PSID didn't re-interview its respondents until 2001, so entry into self-employment after 1999 is difficult to discern from the data. Assets were calculated using the same definition of Hurst and Lusardi (2004); they are the sum of savings and checking accounts, bonds, stocks, IRAs, housing equity (defined as the reported house value minus the remaining mortgage), other real estate, and vehicles minus all debt.

Table 5: The Impact of Assets on Entry into Self-Employment Using Inheritances as an Instrumental Variable

Asset Percentile	Pooled Sample of Workers	Workers who Experience Job Loss Prior to Entry	Workers who Don't Experience Job Loss Prior to Entry
Net Assets	0.024 (0.010)	0.082 (0.024)	0.018 (0.009)

Huber-White standard errors are listed in parentheses. The sample was constructed from respondents between the age of 21 and 64 in the 1984, 1985, 1989 and 1990 years of the PSID. A respondent is considered to have entered self-employment if he or she is working in the wage and salary sector or is unemployed in 1984 and is self-employed in 1985. The reason that job loss in 1985 and 1990 is considered is that we wanted to use an estimate of asset wealth that was unchanged by job loss. As such, we considered individuals who had not been impact by job loss until the year after the asset measure was taken. A similar procedure is used for 1989 and 1990. The reason that 1984 and 1989 are used as the base years in this analysis is that the PSID only collects detailed information on assets every five years, starting in 1984. Unfortunately, the PSID does not collect information about job loss in 1994, so that year is not useful for this table. Also, 1999 collects information on assets and job loss, but the PSID didn't re-interview its respondents until 2001, so entry into self-employment after 1999 is difficult to discern from the data. Assets were calculated using the same definition of Hurst and Lusardi (2004); they are the sum of savings and checking accounts, bonds, stocks, IRAs, housing equity (defined as the reported house value minus the remaining mortgage), other real estate, and vehicles minus all debt. The instrumental variable for assets is inheritances received in the previous four years.

Table 6: A Logit Analysis of Self-Employment Entry with Unanticipated Housing Appreciation Current Population Survey, Outgoing Rotation Group Files (1993-2004)

	Pooled Sample	Sub-Sample of Non-Job-Losers	Sub-Sample of Job Losers
Unanticipated Housing Appreciations (without previous housing appreciation)	0.0098 (0.0020)	0.0102 (0.0020)	-0.0115 (0.0174)
Sample Size	476,033	466,938	9,095
Unanticipated Housing Appreciations (with previous 4-year housing appreciation)	0.0097 (0.0020)	0.0102 (0.0020)	-0.0139 (0.0175)
Sample Size	472,844	463,798	9,046

Notes: The regressions in this table use all the standard demographic controls (age, age squared, marital status, gender, gender interacted with marital status, education, central city status region, and year dummies). The samples for the regressions are comprised from the 1993 to 2004 matched CPS ORG files (excluding 1994-95 and 1995-96). In all regressions, the analysis is restricted to individuals who are not self-employed in the first survey year, and the dependent variable representing entry into self-employment is equal to one if the individual becomes self-employed in the following year, and zero otherwise. Unanticipated housing appreciation is the residual from a regression of four-year MSA-level housing appreciation on MSA averages of race, gender, age, marital status, family size, education, family income, labor force participation, and unemployment, year dummies, changes in MSA unemployment rates, state GDP per capita, and changes in state GDP per capita. The second panel uses previous 4-year housing appreciation as an additional control in estimating the housing appreciation residual. Housing price data are from the Office of Federal Housing Enterprise Oversight (OFHEO).

Table 7: A Hazard Analysis of the Effect of Pre-Entry Assets on Self-Employment Duration

The Value of the Pre-entry Assets	Pooled Sample		Sub-Sample of Job-Losers		Sub-Sample of Non-Job-Losers	
	Asset Value	Net House Value	Asset Value	Net House Value	Asset Value	Net House Value
20 th to 40 th Percentile	0.064 (0.143)	-0.153 (0.135)	-0.106 (0.239)	-0.176 (0.258)	0.223 (0.185)	-0.136 (0.155)
40 th to 60 th Percentile	-0.007 (0.128)	-0.319 (0.150)	-0.126 (0.260)	-0.773 (0.381)	-0.001 (0.148)	-0.197 (0.166)
60 th to 80 th Percentile	-0.343 (0.192)	-0.419 (0.138)	-0.524 (0.414)	-0.394 (0.292)	-0.324 (0.212)	-0.407 (0.154)
80 th to 95 th Percentile	-0.683 (0.260)	-0.258 (0.147)	-1.287 (0.886)	-1.148 (0.580)	-0.599 (0.273)	-0.078 (0.158)
Above 95 th Percentile	-0.568 (0.473)	-0.631 (0.222)	-34.73 (1.127)	-0.743 (0.496)	-0.397 (0.495)	-0.563 (0.244)

Estimates in this table were calculated using a Cox proportional hazard model which allows for left-censoring, and the robust standard errors for the model are listed in parentheses beneath the coefficient estimates. The dependent variable for all six columns is the observed number of years an individual is self-employed, and exit occurs when the individual leaves self-employment for a job in the wage and salary sector or becomes unemployed. The hazard models in this table use all the standard demographic controls (age, age squared, marital status, gender, gender interacted with marital status, and three educational dummy variables) as well as an indicator equal to one if the individual had been previously self-employed in the prior five years, or if the individual had been unemployed in the prior five years, as well as industry controls. The samples for the regression results in columns one, three and five are comprised of individuals who are not self-employed in either 1984 and 1989, but enter self-employment in the following year, while the samples in columns two, four and six are comprised of individuals who are not self-employed in any of the 1979-1993 waves of the PSID, but become self-employed in the following year. The six rows in the table report the coefficients on indicator variables which represent the individual's pre-entry asset level, or pre-entry net house value (defined as the reported value of the house minus the remaining principal on the house's mortgage).

**Table 8: The Impact of Pre-Entry Assets on Self-Employment Duration
for Job-Losers and Non Job-Losers**

	Pre-Entry Asset Controls				Pre-Entry Net House Controls			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Job Loser	1.297*** (0.124)	1.001 (0.182)	1.598** (0.354)	1.009 (0.220)	1.261*** (0.098)	0.947 (0.297)	1.222** (0.108)	0.839 (0.340)
Control for Net Worth?	No	Yes	No	Yes	No	Yes	No	Yes
Control for Pre-Entry Wage?	No	No	Yes	Yes	No	No	Yes	Yes

** Significant at the 5% level of significance

*** Significant at the 1% level of significance

Estimates in this table were calculated using a Cox proportional hazard model which allows for left-censoring, and the robust standard errors for the model are listed in parentheses beneath the coefficient estimates. The dependent variable for all eight columns is the observed number of years an individual is self-employed, and exit occurs when the individual leaves self-employment for a job in the wage and salary sector or becomes unemployed. The hazard models in this table use all the standard demographic controls (age, age squared, marital status, gender, gender interacted with marital status, and three educational dummy variables) as well as an indicator equal to one if the individual had been previously self-employed in the prior five years, or if the individual had been unemployed in the prior five years, as well as industry controls. The samples for the regression results in columns one through four are comprised of individuals who are not self-employed in either 1984, 1985, 1989 or 1990, but enter self-employment in the following year. The 1984 asset measure is used for the 1984 and 1985 entrants, and the 1989 asset measure is used for the 1989 and 1990 entrants (we used 1985 and 1990 entrants to increase our sample size). The samples in columns five through eight are comprised of individuals who are not self-employed in any of the 1979-1993 waves of the PSID, but become self-employed in the following year. The first row in the table displays the coefficient on an indicator variable equal to one if the respondent was displaced from a job before entering self-employment. The second and third row report whether or not the hazard model includes the respondent's pre-entry net worth variables (these include net asset variables in columns one to four, and the net house value variables in columns five through eight), and whether or not the respondent's pre-entry wage rate is included in the hazard model.