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, 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 housing appreciation measured at the MSA-level is a significantly positive determinant of entry into self-employment. Our estimates indicate that a 10 percent annual increase in housing equity increases the mean probability of entrepreneurship by roughly 20 percent and that the effect is not concentrated at the upper tail of the distribution.

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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.

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[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), 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. Housing appreciation is found to be a positive and statistically significant determinant of self-employment entry and the effect is not concentrated at the upper tail of the distribution.

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(.) 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(.) 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 behave differently within this model. 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:

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

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

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

conditions under which they enter self-employment for a given w and A will be fundamentally different for both groups, which implies that separate regressions should be estimated for each group.

Data Description for the PSID

Data from the Panel Study of Income Dynamics (PSID) are used to analyze business entry rates. 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. For the analysis of the relationship between net worth and entry, we use one similar wave and one different wave of the PSID 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 1994 wave does not contain information on job loss. The only difference between the 1984 and 1989 waves is the way in which uncertainty over precise values of assets is approximated.[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. Since we 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, the 1999 wave of the survey is not ideal for our analysis of one-year transitions into self-employment, since the PSID did not survey its respondents in

[6] In both the 1984 and 1989 wave, if the value of a particular asset (such as a house, 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.

2000.[7] We conduct several additional analyses, however, that include more years of the PSID and different measures of assets.

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-employed in 1984 and 1989: those who become self-employed business owners in the following year, and those who do not become self-employed business owners. We follow the more common approach in the literature of analyzing entrants into self-employment instead of using household business ownership as in Hurst and Lusardi (2004). Household business ownership captures ownership of businesses by any household member and includes side or small-scale businesses owned by wage/salary workers. Self-employed business owners are defined by their main job activity in the following analysis. Nevertheless, we replicate our results by analyzing entry into household business ownership and find similar main results.[8]

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

[7] The PSID began collecting its information in two-year intervals starting in 1997.
[8] Hurst and Lusardi (2004) also note similar results for models of self-employment and household business entry.
[9] This is the same definition of net worth used by Hurst and Lusardi (2004).

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 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

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

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 are associated with a higher 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 two and three (see also Figure 1). 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

[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), Johansson (2000), Hurst and Lusardi (2004), and Holtz-Eakin and Rosen (2004).

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 eight 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 five 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 nine, 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 six, the magnitudes of the coefficients are reasonably similar for columns nine and six 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.

The analysis of the relationship between net house equity and entry rates is further explored in Table 4. Once again, the three samples are analyzed independently, but for each sample, we consider three separate regressions. In columns one, four and seven, the 1979 to 1993 sample is used to consider entry rates for respondents in the 40th to 80th percentiles, 80th to

[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.

95th percentiles and above the 95th percentiles. For the pooled sample and the non-job-loss sample, respondents in the 40th to the 80th percentile category exhibit significantly higher entry rates than those in the 0 to 40th percentile group. This significant variation in entry rates is consistent with the existence of liquidity constraints and differs from the findings presented in Hurst and Lusardi (2004) of no significant variation in entry rates below the 80th percentile. Similarly, for the job-loss sample, the entry probabilities rise as net housing equity increases from the lowest to the 40th to 80th percentile groups, but the coefficient estimate is not statistically significant.

We also consider two other sets of regressions in Table 4. First, in columns two, five and eight, we expand our sample to include the years 1979 to 1996. From 1994 to 1996, the PSID did not collect information on job loss, but does contain information on spells of unemployment. Although this is not a perfect measure of involuntary job loss, it will capture some displaced workers. Results in columns three, six and nine are derived from the second sample we consider, which contains the years 1979 to 2001. Since the PSID began conducting interviews every two years after 1997, for 1997 and 1999, we define entrants as those who become self-employed in the following interview. The results from the two new samples we consider are generally in line with our findings in Table 3, which suggest that entry rates are (in general) monotonically increasing for higher categories in the net housing equity distribution and that there is no significant increase entry rates for non-job-losers above the 95th percentile of the net housing equity distribution.

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 Caroll (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 5 to determine the characteristics of these wealthier job losers. The first column demonstrates that average age of all workers is increasing in our sample as assets increase, and the second column shows that this is also true for workers who entered self-employment in either 1985 or 1990. 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 columns three and four include only the job loser sub-sample, and demonstrate that most 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, column three shows that in the highest asset category (where we see the spike in entry rates) the job-loser sample is approximately 50 years old, and column four shows that self-employment entrants in this category were over 51 years of age, 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 peer 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 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 because a household's asset accumulation may be related to its underlying entrepreneurial ability. To address this concern, previous studies 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. They are also generally found to have a positive association with the probability of entering or being self-employed, which has been interpreted as providing evidence supporting the liquidity constraint hypothesis.

Using our sample from the PSID, we find a similar result that inheritances increase the probability of self-employment entry. We find positive and statistically significant coefficients on net worth instrumented by inheritances for the pooled, job loser and non-job loser samples.[14] Thus, our main finding holds in the instrumental variables context - we find a positive relationship between the business entry probability and a more exogenous measure of wealth for both job losers and non-job losers. Hurst and Lusardi (2004), however, point out 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, which may be correlated with entrepreneurial ability.[15] Consistent with this argument, they find that both past and future inheritances yield similar instrumental variable results, weakening the credibility of using inheritances as an instrument for wealth. But, it should be noted that this finding does not necessarily rule out the presence of liquidity constraints if family members serve as lenders of last resort to the entrepreneur. A potential business owner may be liquidity constrained in the absence of family assistance, but not constrained with it. This may be especially important in the case where a business owner could only become self-employed if a wealthy family member co-signed for a

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

[14] Similar to previous studies, we find that the first-stage net worth regressions yield very high F-values for the inheritance variable.

[15] Entrepreneurs may also simply inherit their businesses from previous family members. Estimates from the CBO, SSBF and SCF, however, indicate that very few businesses are inherited (1.6 percent to less than 4.0 percent) suggesting that this is not driving the positive relationship between future inheritances and entrepreneurship (Fairlie and Robb 2006).

business loan. If this wealthy family member is also more likely to leave an inheritance then the finding of a positive coefficient on future inheritances would be consistent with the presence of liquidity constraints.

Housing Capital Gains

In either case, we want to explore alternative exogenous measures of wealth. Hurst and Lusardi (2004) provide an example of a new instrument in this context -- gains 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 gains in this variable would represent a substantial change in net worth for individuals. In their work, Hurst and Lusardi estimate housing equity gains from a regression of changes in house prices from 1985Q1 to 1988Q4 on nine region dummies, initial levels and changes in economic indicators (state GDP per capita and unemployment rates), and demographic characteristics. The inclusion of growth rates in state GDP per capita and unemployment rates controls for differences in local economic growth which may be correlated with entrepreneurship. The regional dummies resulting from this regression therefore capture unaccounted for 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 housing appreciation and entrepreneurship by using panel data created by matching consecutive years of the Current Population Survey (CPS) Outgoing Rotation Group (ORG) files from 1994 to 2004.[16] The CPS panel 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 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.

Second, because the ideal instrument would capture only changes in housing values that are completely unanticipated by the individual in addition to being uncorrelated with local economic growth, 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 four-year period before the entrepreneurial decision is made.[17] 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 a second set of regressions that modify the Hurst and Lusardi housing appreciation regression to also include MSA growth rates in housing prices over the previous four-year period.

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[16] 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.

[17] We choose a four-year period to correspond to Hurst and Lusardi's use of regional house price appreciation between 1985Q1 to 1988Q4.

To create a measure of housing appreciation net of changes in local economic conditions and other factors, we first regress four-year housing appreciation values by MSA on initial levels and growth rates in economic indicators (state-level GDP per capital and MSA-level unemployment rates), detailed demographic characteristics by MSA (race, gender, age, marital status, family size, education, family income, labor force participation), and year dummies. MSA-level housing price data are obtained from the Office of Federal Housing Enterprise Oversight (OFHEO). To create a measure of unanticipated housing appreciation, we also estimate a first-stage regression that includes the previous four-year housing appreciation as an additional control. The residuals from these first-stage regressions are then included in logit regressions for the probability of becoming a self-employed business owner.

Table 6 reports marginal effects estimates from the second-stage entrepreneurship logits. The coefficient on housing appreciation is positive and statistically significant.[18] The point estimate implies that a 10 percent annual increase in housing equity leads to a 0.46 percentage point increase in the probability that an individual starts a business in the following year.[19] This effect is large, representing roughly 20 percent of the mean probability of entrepreneurship. Furthermore, when we switch to including housing appreciation that is unanticipated by the individual we find a very similar coefficient estimate, which is also statistically significant.

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 exact time of the first survey

[18] We estimate specifications that include residuals for housing appreciation across 9 regions and find small, statistically insignificant estimates in the second-stage entrepreneurship logits.

[19] These results are not sensitive to the length of the time period used to measure housing capital gains. The coefficient estimates for three-year housing appreciation imply larger annual effects and the coefficient estimates for five-year housing appreciation imply very similar annual effects.

by their reported reason for losing their job, which captures only a fraction of all job losers during the year.[20] Table 6 reports separate estimates for two groups: non-initially unemployed workers and initially unemployed workers. For the non-initially unemployed group, we find similar results -- increases in housing prices lead to higher rates of self-employment entry. Estimates for the initially unemployed worker sample, however, do not reveal a statistically significant relationship. In fact, the coefficient estimate is so imprecisely measured that we cannot rule out similar sized effects as those found for the pooled and non-initially unemployed samples.

An important concern with these results is that the positive linear relationship may be driven by the upper tail of the distribution in gains in housing equity. To examine this question, we first estimate regressions with a 5th order polynomial in housing equity gains. Instead of a convex relationship, we find an s-shaped relationship with the upper tail of the distribution flattening out and declining slightly. Furthermore, we find a stronger relationship between housing equity gains and entrepreneurship in the middle of the distribution than for the linear specification. At the middle of the distribution, we find an average derivative of 0.0162 compared to 0.0098 in the linear specification suggesting that the effects of housing equity gains are not concentrated at the upper tail of the distribution.

To investigate this question more directly, Table 6 reports estimates from regressions that include dummy variables for the main percentile categories in the unanticipated housing equity gains distribution. The coefficients generally provide evidence of a positive relationship when moving up through the percentile categories for the pooled and non-initially unemployed samples. These patterns are consistent with the findings of positive linear and quintic (evaluated at the mean) relationships. The estimates also do not provide evidence of a substantial increase

[20] This definition captures only about one quarter of all job losers based on estimates from the PSID.

in the probability of entrepreneurship at the 95th percentile in the housing appreciation distribution. In fact, the coefficient estimate is smaller for the 95th percentile than the coefficient for the 80th-95th percentile.

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 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 use regional changes 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. Our estimates from 254 MSAs and 9 time periods indicate that a 10 percent annual increase in housing prices leads to an increase in self-employment entry rates of 20 percent. We also find that the positive relationship is not being driven by the upper tail of the housing appreciation distribution. These new findings on the relationship between housing appreciation and entrepreneurship are also consistent with the liquidity constraint hypothesis.

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Figure 1: Self-Employment Entry Rates by Pre-Entry Asset Levels

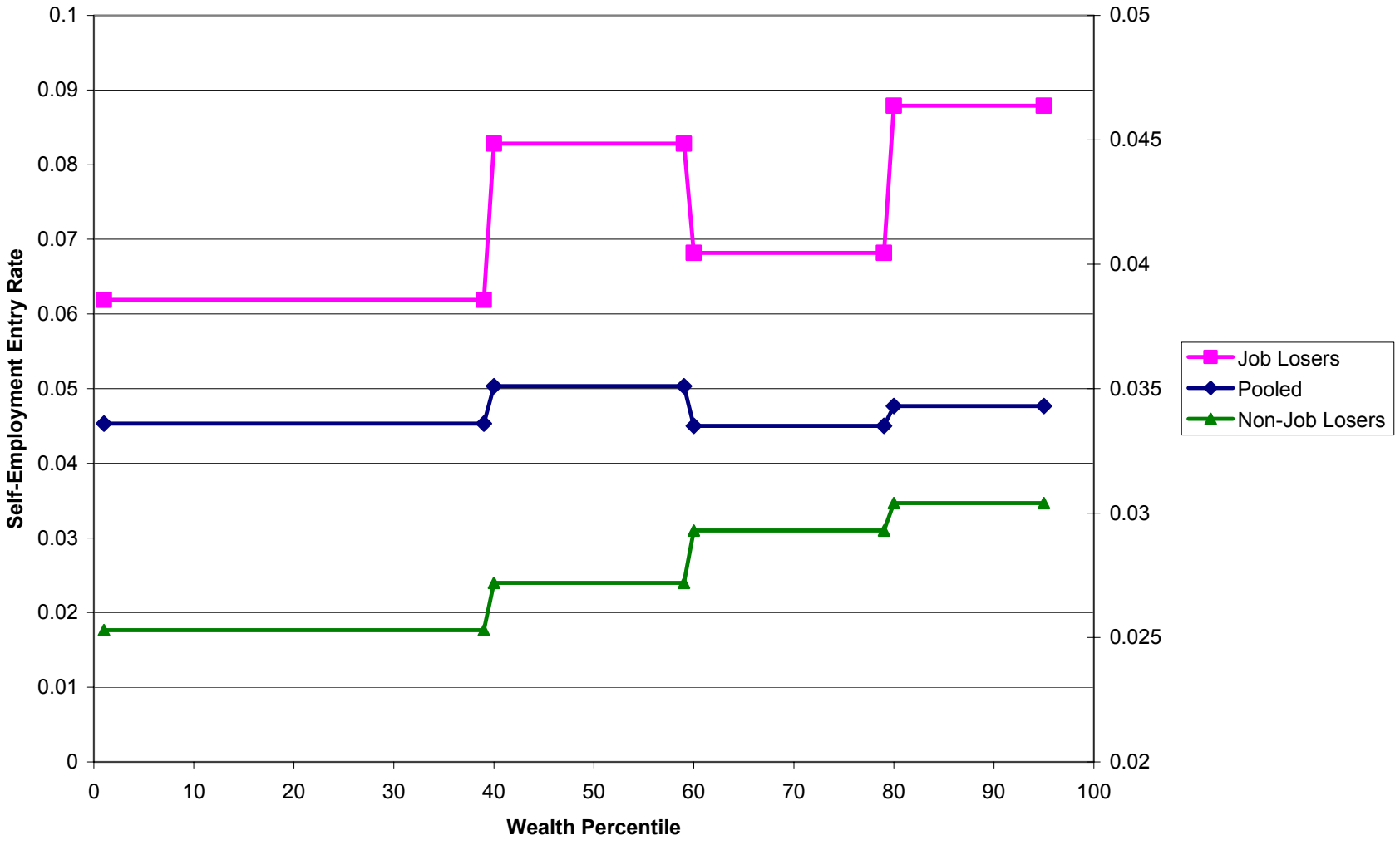

Table 1: Sample Means for Non-Self-Employed Workers in 1984 and 1989 Waves of the PSID

	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 40th Percentile	0.0336 (0.1802)	0.0619 (0.2412) [0.5964]	0.0253 (0.1572) [0.3656]
40th to 60th Percentile	0.0351 (0.1840)	0.0828 (0.2760) [0.1933]	0.0272 (0.1628) [0.2126]
60th to 80th Percentile	0.0335 (0.1799)	0.0682 (0.2526) [0.1367]	0.0293 (0.1687) [0.2123]
80th to 95th Percentile	0.0343 (0.1821)	0.0879 (0.2847) [0.0613]	0.0304 (0.1718) [0.1579]
Above 95th 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 Don't 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 20th Percentile	0.0217 (0.1457) [0.1025]	0.0371 (0.1891) [0.0871]	0.0200 (0.1401) [0.1044]
20th to 40th Percentile	0.0243 (0.1541) [0.1034]	0.0326 (0.1776) [0.0718]	0.0236 (0.1518) [0.1073]
40th to 60th Percentile	0.0270 (0.1620) [0.1038]	0.0437 (0.2046) [0.0624]	0.0257 (0.1582) [0.1090]
60th to 80th Percentile	0.0279 (0.1648) [0.1029]	0.0475 (0.2130) [0.0593]	0.0265 (0.1605) [0.1083]
80th to 95th Percentile	0.0314 (0.1745) [0.0769]	0.0650 (0.2468) [0.0371]	0.0292 (0.1683) [0.0819]
Above 95th 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 Job-Losers			Sub-Sample of Non-Job-Losers		
		Assets	House		Assets	House		Assets	House
Assets/$100,000	0.109 (0.036)	…	…	0.322 (0.100)	…	…	0.079 (0.041)	…	…
40th to 60th Percentile	…	0.276 (0.223)	0.184 (0.098)	…	0.491 (0.603)	0.179 (0.233)	…	0.287 (0.283)	0.193 (0.107)
60th to 80th Percentile	…	0.202 (0.224)	0.203 (0.101)	…	0.459 (0.731)	0.298 (0.238)	…	0.289 (0.300)	0.189 (0.110)
80th to 95th Percentile	…	0.276 (0.255)	0.313 (0.111)	…	0.507 (0.915)	0.568 (0.256)	…	0.501 (0.337)	0.273 (0.120)
Above 95th Percentile	…	0.827 (0.312)	0.711 (0.160)	…	2.566 (1.019)	1.816 (0.308)	…	0.889 (0.425)	0.477 (0.180)
p-value for Assets/$100,000[1]	0.002	…	…	0.001	…	…	0.049	…	…
p-value for difference in percentiles groups[2]	…	0.048	0.002	…	0.023	<0.001	…	0.278	0.271

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: A Logit Analysis of Self-Employment Entry, Using Only Net Housing Equity

	Pooled Sample			Sub-Sample of Job-Losers			Sub-Sample of Non-Job-Losers		
	1979 to 1993	1979 to 1996	1979 to 2001	1979 to 1993	1979 to 1996	1979 to 2001	1979 to 1993	1979 to 1996	1979 to 2001
40th to 80th Percentile	0.193 (0.083)	…	…	0.238 (0.192)	…	…	0.192 (0.091)	…	…
40th to 60th Percentile	…	0.146 (0.085)	0.124 (0.079)	…	0.179 (0.233)	0.100 (0.227)	…	0.150 (0.090)	0.135 (0.083)
60th to 80th Percentile	…	0.181 (0.088)	0.207 (0.081)	…	0.298 (0.238)	0.228 (0.233)	…	0.167 (0.094)	0.208 (0.086)
80th to 95th Percentile	0.313 (0.111)	0.329 (0.098)	0.292 (0.093)	0.567 (0.256)	0.568 (0.256)	0.534 (0.244)	0.277 (0.121)	0.304 (0.104)	0.267 (0.099)
Above 95th Percentile	0.711 (0.160)	0.663 (0.145)	0.610 (0.142)	1.813 (0.307)	1.816 (0.308)	1.672 (0.302)	0.480 (0.180)	0.471 (0.159)	0.438 (0.158)
p-value for difference in 40th to 80th and 80th to 95th	0.253	…	…	0.188	…	…	0.458	…	…
p-value for difference in 80th to 95th and Above 95th	0.015	0.026	0.033	0.0002	0.002	0.002	0.271	0.230	0.279

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) and a dummy variable equal to one if the individual does not own a house, and zero otherwise. The samples for the regression results in columns one, four and seven are comprised from the 1979 to 1993 waves of the PSID. The samples for the results in columns two, five and eight are comprised from the 1979 to 1996 waves of the PSID, and the samples in columns three, six and nine are comprised of the 1979-2001 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 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 consists of individuals whose net house equity is in the 1st to 20th percentile of the net house equity distribution.

Table 5: The Average Age for Non-Self-Employed Workers in 1984 and 1989 by Asset Levels

Asset Percentile	Pooled Sample of Workers		Subsample of Job Losers		Subsample of Non-Job-Losers	
	Whole Sample	Entrants Only	Whole Subsample	Entrants Only	Whole Subsample	Entrants Only
Below 40th Percentile	33.99 (10.87)	34.32 (10.67)	30.94 (8.62) [0.5964]	33.71 (10.32)	34.85 (11.28) [0.3656]	34.75 (10.96)
40th to 60th Percentile	35.66 (10.31)	34.77 (9.76)	33.57 (8.68) [0.1933]	33.23 (6.67)	35.99 (10.51) [0.2126]	35.54 (10.97)
60th to 80th Percentile	40.55 (10.67)	41.47 (11.05)	39.21 (9.84) [0.1367]	40.53 (11.86)	40.69 (10.76) [0.2123]	41.74 (10.92)
80th to 95th Percentile	45.08 (10.54)	42.76 (10.79)	44.04 (10.09) [0.0613]	40.38 (5.80)	45.16 (10.56) [0.1579]	43.26 (11.57)
Above 95th Percentile	48.87 (9.83)	50.33 (7.63)	49.90 (8.29) [0.0123]	51.38 (7.07)	48.83 (9.89) [0.0515]	49.69 (8.17)

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. Columns one, three and five analyze the age of respondents by asset category for all workers in the sample or subsample, whereas columns two, four and six only consider workers who enter self-employment.

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

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

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. 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, state GDP per capita, and growth rates in MSA unemployment rates and state GDP per capita. The second panel uses previous 4-year housing appreciation as an addiitonal control in estimating the housing appreciation residual. Housing price data are from the Office of Federal Housing Enterprise Oversight (OFHEO).

Table 7: A Logit Analysis of Self-Employment Entry with Housing Appreciation
Current Population Survey, Outgoing Rotation Group Files (1993-2004)

	Pooled Sample		Sub-Sample of Initially Unemployed Workers		Sub-Sample of Initially Unemployed Workers	
Previous housing appeciation included in first stage	No	Yes	No	Yes	No	Yes
20^{th} to 40^{th} Percentile	0.0004 (0.0008)	-0.0001 (0.0008)	0.0040 (0.0062)	0.0040 (0.0061)	0.0003 (0.0008)	-0.0002 (0.0008)
40^{th} to 60^{th} Percentile	0.0033 (0.0008)	0.0032 (0.0008)	-0.0043 (0.0070)	-0.0061 (0.0071)	0.0034 (0.0008)	0.0034 (0.0008)
60^{th} to 80^{th} Percentile	0.0015 (0.0008)	0.0014 (0.0008)	-0.0012 (0.0066)	-0.0027 (0.0067)	0.0015 (0.0008)	0.0015 (0.0008)
80^{th} to 95^{th} Percentile	0.0039 (0.0008)	0.0040 (0.0008)	-0.0043 (0.0070)	-0.0041 (0.0070)	0.0041 (0.0008)	0.0042 (0.0008)
Above 95^{th} Percentile	0.0028 (0.0012)	0.0022 (0.0012)	0.0021 (0.0094)	0.0003 (0.0093)	0.0028 (0.0012)	0.0022 (0.0012)
Sample Size	476,033	472,844	9,095	9,046	466,938	463,798

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. 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, state GDP per capita, and growth rates in MSA unemployment rates and state GDP per capita. The second set of regressions uses previous 4-year housing appreciation as an addiitonal control in estimating the housing appreciation residual. Housing price data are from the Office of Federal Housing Enterprise Oversight (OFHEO).