The self-employment duration of younger men over the business cycle

Ellen R. Rissman

Introduction and summary

There are two competing views of self-employment that appear to be at odds with one another. On the one hand, entrepreneurs are credited with stimulating job growth and encouraging innovation. President George W. Bush clearly expressed this sentiment in a recent speech in which he stated that cutting taxes is important because "70 percent of the new jobs in America are created by small businesses."[1] Policies that encourage the creation of small businesses are based upon just such a perspective.

A somewhat contrarian viewpoint argues that although the ranks of the self-employed may include future successful entrepreneurs, the majority of workers choose self-employment because of limited opportunities in the wage sector.[2] Put another way, workers are pushed into self-employment as a stopgap measure, rather than being drawn to self-employment because of the opportunities self-employment itself creates. Wage sector prospects for these workers may be limited either because they do not have the necessary skills to be successful in the wage sector or because of weak labor demand, such as that experienced during a recession. If workers select self-employment as a second-best alternative to wage sector work, then an economy that is *growing* should actually feature *reductions* in self-employment. In this case, well-intentioned policies aimed at buttressing self-employment may be misguided. Rather than encouraging workers to start small businesses, policymakers may prefer to support investment in human capital or subsidize job search in the wage sector.

Being able to distinguish those who are entrepreneurs from those who are discouraged wage workers would be useful in understanding the role each plays in economic growth. Certainly, identifying entrepreneurs earlier would be useful for channeling resources. In a recent study, Davis et al. (2006) calculate that in 2000, about 74 percent of businesses had no employees,

apparently being operated entirely by the business owner. These nonemployer businesses are quite small, accounting for about 4 percent of aggregate U.S. business revenue. Yet small nonemployer firms do sometimes grow into employers. Davis et al. (2006) find that about 16 percent of young employers came from the nonemployer ranks.

However, distinguishing one from the other is not an easy task. The U.S. Bureau of Labor Statistics collects data in its monthly household survey on "class of worker." The survey asks employed respondents, "Last month, were you employed by government, by a private company, a nonprofit organization, or were you self-employed?" In 2005, approximately 6.8 percent of all nonagricultural workers aged 16 and older were self-employed.[3]

Although self-employment appears to represent a relatively small share of total employment, the incidence of self-employment is relatively high. In fact, almost 27 percent of all younger males aged 21 or older experience at least some period of self-employment. Furthermore, of those young men who do experience self-employment, approximately 26 percent of their time is spent in self-employment.[4] These numbers suggest that self-employment is a fluid state with a great deal of turnover within the ranks of the self-employed.

Many models of self-employment and entrepreneurship focus on the decision to become self-employed. Some of these emphasize the importance of liquidity constraints in starting a business. Evans and Jovanovic (1989), Holtz-Eakin, Joulfaian, and Rosen

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(1994), and, more recently, Cagetti and De Nardi (2003) are among these.[5] In Rissman (2003), on the other hand, I modeled the decision to become self-employed as an alternative to unemployment and analyzed the cyclical implications of the model. Aaronson, Rissman, and Sullivan (2004) provide some evidence from the *Current Population Survey* (CPS) about the cyclicality of self-employment. Other researchers have examined the intergenerational linkages in self-employment and its role in intergenerational mobility. Dunn and Holtz-Eakin (2000) find that children of self-employed parents are more likely to be self-employed themselves. Hipple (2004) and Fairlie (2005a) provide an interesting overview of self-employment. Hipple (2004) focuses on characteristics of the self-employed. Fairlie (2005a) surveys the work of other researchers who have used the *National Longitudinal Survey of Youth 1979* (NLSY79) to analyze questions related to self-employment.

Although we are far from a complete understanding of the decision to enter self-employment, there is even less of a body of research on exits from self-employment. The purpose of this article is to examine the determinants of turnover in self-employment, with particular emphasis on the role economic activity plays. It is hoped that a fuller understanding of which factors influence the duration of self-employment spells may help identify relevant models. In the first section, I introduce the U.S. Bureau of Labor Statistics' *National Longitudinal Survey of Youth 1979* data set that I use to examine self-employment and provide some summary statistics. In the next section, I examine exits from self-employment with a particular emphasis on the role of aggregate and local economic conditions.

I find that durations of self-employment tend to be short, with many first spells of self-employment terminating within a year. But the longer a worker has been self-employed, the less likely he is to leave self-employment. Spell duration does not seem to be influenced by educational levels and, after controlling for aggregate and local labor market conditions, does not seem to be influenced by race (white and non-white), marital status, or region. Aggregate and local labor market conditions play an important role in determining the duration of self-employment spells. A growing economy appears to encourage people who are self-employed to exit self-employment, suggesting that small business owners take the opportunities provided by growth to enter the wage sector.

Self-employment and its duration in the National Longitudinal Survey of Youth 1979

Ideally, one would want to continuously observe a large number of people over an extended period and to know their entire employment histories, including information about self-employment experiences. One would want detailed information about their businesses while self-employed, including such things as corporate structure, capitalization, industry, number of employees, time spent working, and profitability. This is in addition to other individual characteristics such as wealth, income, consumption, family background, age, race, geographical region, education, marital status, sex, health, and prior work history. Unfortunately, the ideal data set does not yet exist.[6]

Although the U.S. Bureau of Labor Statistics collects detailed information about a large number of individuals through its *Current Population Survey*, the survey has a severe limitation for studying the problem at hand: The CPS is a short panel. Data on individuals are collected for four consecutive months, followed by a hiatus of eight months, and then followed again for four consecutive months. Accordingly, only short spells of self-employment are observed directly. This data set is, thus, not particularly well-suited for studying the determinants of self-employment duration and its dynamics. A longer panel is better suited for this purpose.

The *National Longitudinal Survey of Youth 1979* follows a group of individuals over time, first surveying them in 1979. Annual interviews were conducted through 1994, after which the survey was conducted biannually. The most recent data contained in the analysis presented here are for 2002. There were 12,686 original participants, ranging in age at the time of the initial survey from 14 to 22. In 2002, these same individuals ranged in age from 37 to 45, enabling us to follow them for an important formative part of their working lives. Males accounted for 6,486 of the initial respondents. The empirical work presented here focuses exclusively on males aged 21 and older. The self-employment decisions of males are less complicated than those of females, who during their younger years must also make childbearing decisions that may complicate their employment choices. The reason for focusing on those aged 21 and older is to reduce the effects of school attendance on the employment decision.[7]

At the time of each interview, respondents were asked a number of questions about their current employment or most recent job. Class of worker data indicate whether a worker 1) works for a private company or individual for wages, salary, or commission; 2) is a government employee; 3) is self-employed in his own business, professional practice, or farm; or 4) is working without pay in a family business or farm. Similar to the CPS, respondents are also asked whether their business is incorporated or unincorporated.[8] For the

TABLE 1			
Transitions between wage work and self-employment, males aged 21 and older, 1979–2002			
Status at time t−1	**Status at time t**		
	Wage work	**Self-employment**	**Total**
Wage work	52,138	1,832	53,970
Percent	96.61	3.39	100.00
Self-employment	1,506	2,686	4,192
Percent	35.93	64.07	100.00
Total	53,644	4,518	58,162
Percent	92.23	7.77	100.00

Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979*.

1994 survey, class of worker data are not comparable to earlier years.[9]

Self-employment is transitory

Transitions from self-employment to wage work are quite common. Table 1 shows transition rates between self-employment and wage work for consecutive observations from 1979 to 2002.[10] These transition rates are reported for males aged 21 and older. Over the sample period, once a person is employed in the wage sector, on average, he tends to stay in the wage sector. Only 3.4 percent of males move from wage work to self-employment from one observation to the next. Self-employment, however, is a far more transient state, with 35.9 percent of self-employed males moving from self-employment to wage work from one reporting period to the next.[11]

Self-employment is common

Table 2 illustrates how widespread self-employment is. The columns headed "overall" give the incidence of self-employment in terms of people-years. These are annual observations on an individual. Self-employment occurred in about 7.5 percent of the

observations on men.[12] The "between" calculations repeat the analysis, but this time in terms of individuals rather than people-years. The incidence of self-employment is more pervasive than the simple percentage would lead us to believe. In fact, over a quarter of all men in the sample who ever worked in the wage sector (25.9 percent) also experienced self-employment at some point during their observed young work lives.[13] Finally, the last column gives the fraction of time a person has the specified employment status, conditional on ever having that status. Given that a male is ever self-employed, he spends about 26 percent of his time self-employed.[14]

Self-employment increases with age for young males

The incidence of self-employment has risen over time within the NLSY79.[15] Figure 1, panel A shows the percentage of workers aged 21 years and older at the interview date who are self-employed. For young males in the NLSY79, the fraction of the self-employed increased steadily until 1992, cresting temporarily at 9.6 percent before increasing to 10.9 percent in 2002.[16]

It is misleading to think that self-employment has become more prevalent over time. In fact, this upward trend reflects the maturing of the sample population. In 1979, only 1,079 of those males interviewed were over the age of 20. Of these young men, only 520 were working, and only 3.5 percent of these were engaged in self-employment. Ten years later, 5,196 of those sampled were aged 21 and older, and 4,719 were working, of whom 7.6 percent were self-employed.[17]

Figure 1, panel B examines this age effect in more detail. This panel shows the percentage of workers self-employed by age. Young workers just starting out are, on average, less likely to be self-employed.

TABLE 2					
Incidence of wage work and self-employment, males aged 21 and older, 1979–2002					
	Overall		**Between**		**Within**
	Frequency	**Percent**	**Frequency**	**Percent**	**Percent**
Wage work	60,695	92.53	6,034	99.47	92.82
Self-employment	4,903	7.47	1,572	25.91	25.87
Total	65,598	100.00	7,606	125.38	78.98

Notes: The sample consists of 6,175 individuals, with 6,034 ever having wage work and 1,572 ever being self-employed. Numbers in the columns marked "between" and "within" need not total 100 percent, since some people experience both labor market outcomes over the time they are observed.
Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979*.

FIGURE 1

Incidence of self-employment, males aged 21 and older

A. Percentage of workers who are self-employed

percent
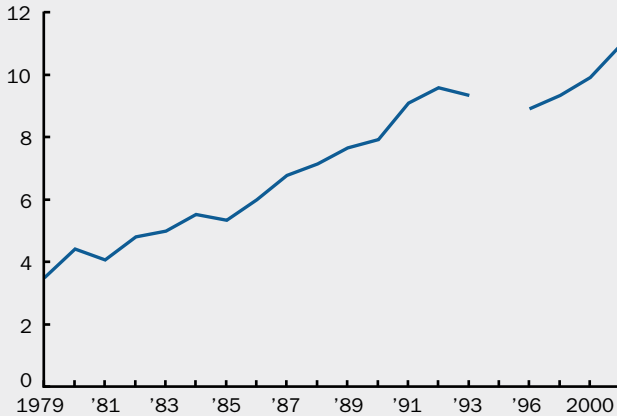
B. Percentage of workers self-employed, by age

percent
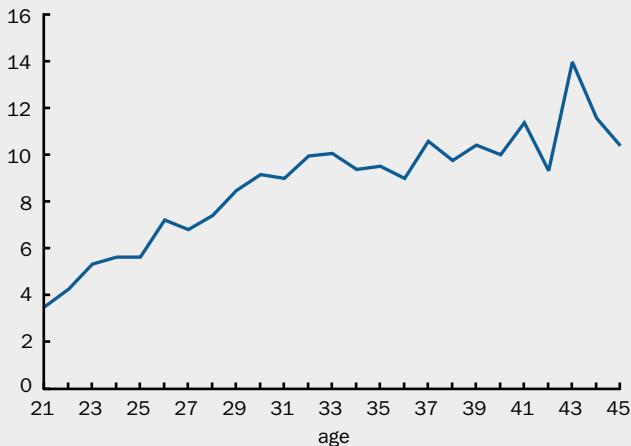
Note: In panel A, the data point for 1994 is missing because of noncomparability with earlier years.

Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979*.

The percentage self-employed by age rises steadily, reaching between 9 percent and 10 percent of workers by the time they are 30 years old. The incidence of self-employment remains fairly stable after this, with some volatility due to the dwindling number of older people in the survey: Those who are the oldest in the sample in 2002 were the first to enter the labor force in 1979.

Other factors in addition to age influence the decision to enter self-employment and the duration of self-employment once entered. Some simple statistics on a variety of factors shown in table 3 help clarify

which features may be important to consider. The sample focuses on males aged 21 and older and is divided into two groups—those who are never self-employed (4,494) and those who experience at least one spell of self-employment (1,572). I used standard t-tests to test the equality of the statistic between the two groups. The self-employed were slightly more likely to be white (68.7 percent versus 63.4 percent), more likely to have been married (79.0 percent versus 75.9 percent), and are about half a year older, on average, than those who are never self-employed. They are also more likely to have lived at some point in an urban area and have higher average wages and salaries. The self-employed also tend to have higher percentile scores on the Armed Services Vocational Aptitude Battery (ASVAB) exam.[18] Despite their having slightly lower average local unemployment rates, they have at times tended to live in high unemployment rate areas, experiencing fewer weeks of unemployment, on average, than those who have never been self-employed. In addition, the self-employed are more likely than those who have never been self-employed to claim that their health has prevented them from working.

Self-employment duration

The evidence presented in the previous section suggests that many workers explore self-employment for a relatively short period, but most of these workers eventually return to wage work. Closer examination of self-employment duration may help illuminate what factors are important in explaining the longevity and entrepreneurial nature of self-employment.

In earlier work (Rissman, 2003), I explicitly modeled the decision to enter self-employment when wage work and unemployment are alternatives to self-employment. In this model, people self-select into self-employment because of limited wage sector opportunities. As unemployment insurance benefits expire, some choose self-employment as a way to make ends meet until a better wage sector offer is obtained.

Accordingly, the business cycle affects the wage offer distribution and frequency of offers. As the economy expands, discouraged wage workers who

TABLE 3

Some characteristics of wage workers and the self-employed, males aged 21 and older, 1979–2002

	Never self-employed	Ever self-employed
	(percent, unless stated otherwise)	
Number	4,494	1,572
White***	63.4	68.7
Foreign born	6.9	7.2
Average local unemployment rate***	2.93	2.88
Ever high local unemployment rate***	4.12	4.19
Ever married***	75.9	79.0
Age (years)***	27.97	28.53
Ever has more than four years of college	8.8	9.0
Weeks unemployed***	5.06	4.53
Ever urban**	93.6	95.7
Real wages and salary (dollars)**	13,659	14,998
Ever claimed health prevents working***	12.3	15.6
Mean ASVAB percentile***	40.7	42.2

**Significant at the 5 percent level.
***Significant at the 2 percent level.
Notes: ASVAB is the Armed Services Vocational Aptitude Battery. Tests of differences in the means were conducted.
Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979*.

have entered self-employment as a stopgap will return to the wage sector. This suggests that economic conditions at the time of entry into self-employment and over the course of self-employment are important determinants of self-employment duration. Discouraged wage workers are more likely to enter self-employment during economic downturns and are more likely to exit during economic expansions.[19]

Focusing on the dichotomy between discouraged wage workers and entrepreneurs may be misleading. Instead, it may be more useful to think about the pool of self-employed in terms of their degree of attachment to self-employment. Those workers who have greater attachment to self-employment are likely to have longer durations. Those who have less attachment to self-employment are more likely to enter self-employment during economic downturns and to exit self-employment during economic expansions.

People can be attached to self-employment for a number of reasons. One possibility is that self-employment pays well for the individual. In this case, it would take a large wage offer to induce the worker to leave self-employment for work in the wage sector. Similarly, the individual may value being his own boss, so again a high wage offer is necessary to induce him to exit self-employment. Yet another possibility is that those who anticipate being self-employed for longer periods are more likely to make investments in the business. These sunk costs effectively reduce the option value of wage work and increase the "attachment" of the worker to self-employment. Whatever the source of the attachment, the business cycle will have a differential impact on entry to and exit from self-employment, depending upon the degree of attachment.

Nonparametric analysis of self-employment duration

For the analysis presented here, the focus is on exits from self-employment. A person is deemed to be self-employed if he responds that he was "self-employed in his current or most recent job." Unfortunately, we cannot be sure that the person is currently self-employed because the wording of the question leaves open the possibility that the person is no longer working. This could happen if, for example, the respondent had been self-employed but either has left the labor force or is currently unemployed.
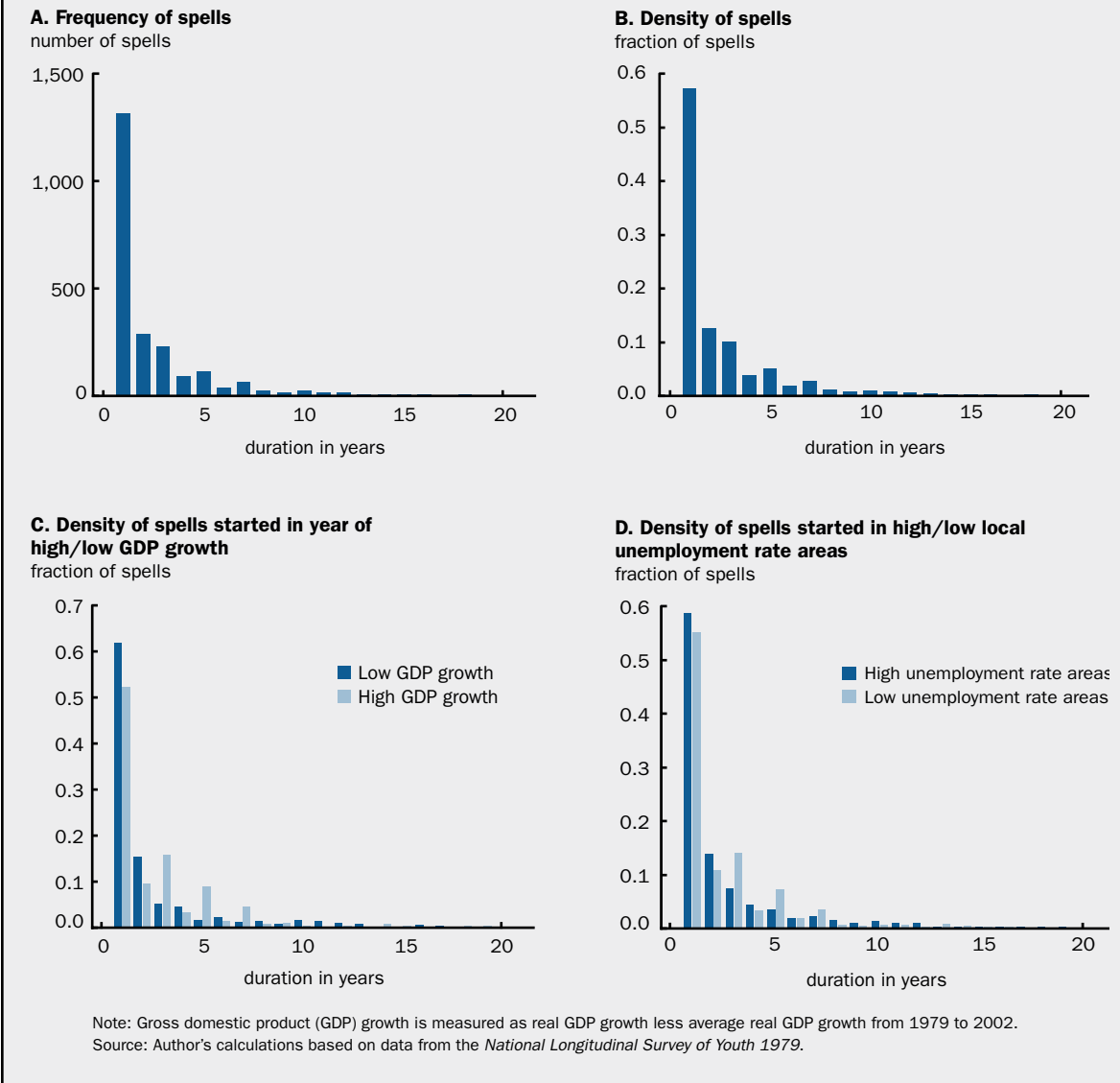
Changes over time in the response to the class of worker question can help identify shifts in self-employment status. Typically, the data set provides annual observations on the individual respondent. Ignore for a moment the complication that jobs with short tenure may not be observed. Tenure in self-employment may be overstated. To see this, imagine a person who is currently self-employed. There are various potential labor market outcomes that can subsequently occur. First, he can remain self-employed. Second, he can move to a job in the wage sector. Third, he can become unemployed. And fourth, he can drop out of the labor force altogether. The person who moves to the wage sector from self-employment will respond to the class of worker question that he is employed by a private company, the government, or employed without pay.[20]

Complications arise in interpreting how someone who becomes unemployed or drops out of the labor force answers the question. If there is no intervening job, the worker who exits self-employment to become unemployed will likely answer that he was self-employed in his current or *most recent* job. Even though he exits self-employment, by focusing on changes in class of worker, we do not observe the transition. The same issue arises for the transition to nonparticipation.

In the sample of young men aged 21 and older in the NLSY79, there were 1,479 who experienced self-employment. Of these, 938 had only one spell of self-employment and the rest went on to have

FIGURE 2

Duration of self-employment spells

A. Frequency of spells
number of spells

B. Density of spells
fraction of spells

C. Density of spells started in year of high/low GDP growth
fraction of spells

- Low GDP growth
- High GDP growth

D. Density of spells started in high/low local unemployment rate areas
fraction of spells

- High unemployment rate areas
- Low unemployment rate areas

Note: Gross domestic product (GDP) growth is measured as real GDP growth less average real GDP growth from 1979 to 2002.
Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979*.

multiple spells. Figure 2, panel A shows the number of spells by duration. Approximately 1,350 spells lasted for only one year and around 300 lasted for only two years. The frequency drops off quickly. Figure 2, panel B exhibits the same data, but in terms of density. A little more than half of all spells terminate after one year. Less than 15 percent last for two years, and a little more than 10 percent last for three years.

Theory suggests that those who are less attached to self-employment generally have shorter spells of self-employment. Figure 2, panel C provides some evidence on this point. The spells have been divided into two groups: those that started during years when

real gross domestic product (GDP) growth was below average and those that started when real GDP growth was above average.[21] Spells that started when the economy was doing poorly tended to have shorter durations than spells that started when the economy was doing well.

The NLSY79 provides information on the unemployment rate for the labor market of the respondent's current residence at the time of the interview. Because of privacy concerns, the public use data files do not include the exact local unemployment rate, only a range for the individual. For example, if the local unemployment rate is between 6.0 percent and
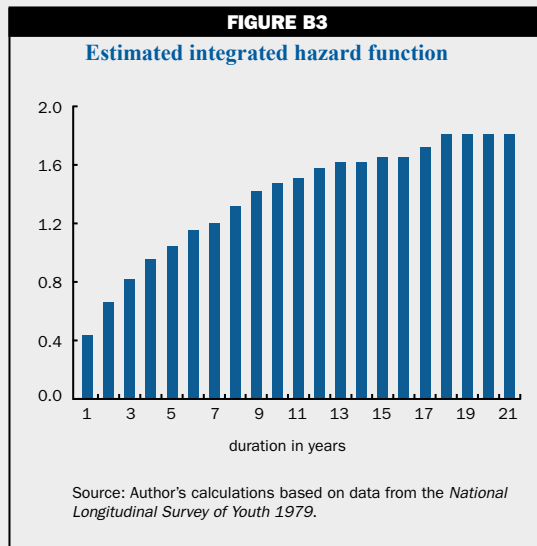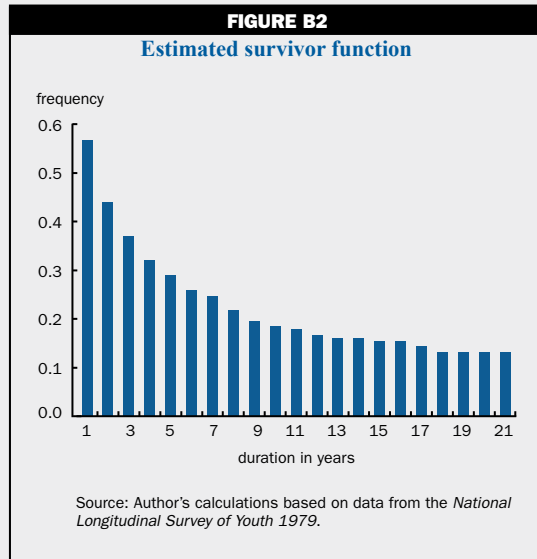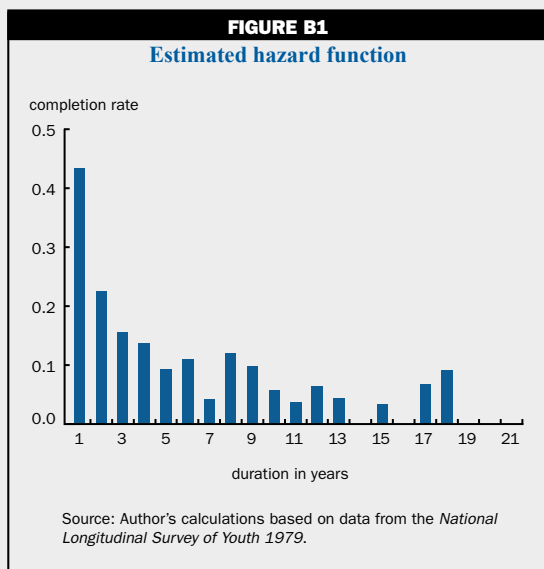
BOX 1

Estimated hazard, survivor, and integrated hazard functions

The panels in figures 2 are somewhat misleading because they do not distinguish between spells that result in exits to wage work after *x* years and those that are censored after *x* years. Censoring occurs when no further observations are available for the respondent or when observations are missing. For example, all workers who are self-employed in 2002 are by definition censored, since no subsequent observations are available. Similarly, workers who drop out of the sample are said to be censored. The appendix provides additional information on censoring.

Figure B1 exhibits the estimated hazard function for males at least 21 years of age from the NLSY79. Roughly, the hazard is the rate at which spells will be completed at duration *t*, given that they last until *t*. This hazard is calculated as the number of exits from self-employment at duration *t* divided by the number "at risk of failure" at duration *t*. The appendix provides additional information about the hazard rate. About 43 percent of observations last for only one year; that is, the respondent identifies himself as self-employed at the time of one interview and as employed in the wage sector in the subsequent interview occurring about a year later. The hazard function exhibits negative duration dependence, since the hazard rate declines with duration.

The sample survivor function for the data is shown in figure B2, and the sample integrated hazard function is shown in figure B3. Both of these functions are described more fully in the appendix. The survivor function is the probability that the duration will last at least *t* periods.[1] The integrated hazard has no precise interpretation. It is, however, particularly helpful

FIGURE B2

Estimated survivor function

Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979.*

FIGURE B3

Estimated integrated hazard function

Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979.*

in assessing departures from a constant hazard model. If the data exhibited no duration dependence, then the integrated hazard would be linear in duration, rising by a constant amount with each increase in duration. From figure B3, it is apparent that the integrated hazard has a more concave shape, increasing by less for each unit increase in duration. This suggests that negative duration dependence is a fixture of the data and should be accounted for in the estimation.

[1]The sample survivor function shown in figure B2 is the Kaplan-Meier estimate. This estimator is obtained by setting the estimated conditional probability of completing a spell at duration *t* equal to the observed relative frequency of completion in the data. It expressly considers censored observations.

FIGURE B1

Estimated hazard function

Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979.*

8.9 percent, the NLSY79 assigns the unemployment rate variable a value of 3. Clearly, the range for each value of the local unemployment rate is quite large at 3.0 percent. However, changes do occur from one survey year to the next.

Figure 2, panel D shows the density of self-employment spell duration for those spells initiated in areas with a high unemployment rate and a low unemployment rate. Durations in low unemployment rate areas tend to be longer than in high unemployment rate areas (see box 1 for a more rigorous analysis of the data).

Logit analysis

It is assumed that a person is either self-employed or is not self-employed.[22] The probability of an individual i exiting self-employment at time t is modeled as a function of individual-specific characteristics and the amount of time the person has been self-employed. Specifically,

$$\Pr(y_{it} = 1) = \frac{\exp(\beta' x_{it})}{1 + \exp(\beta' x_{it})}.$$

The dummy variable y_{it} takes on the value 0 if the self-employed worker remains self-employed and 1 if he leaves self-employment at time t to go to the wage sector. The probability of exiting self-employment depends upon a vector of variables x_{it}. Individual characteristics that could potentially be included as explanatory variables in this vector are age, human capital, marital status, the number of jobs held, and race. Recalling the previous discussion, other variables that reflect the performance of the aggregate and local economies may also be included as explanatory variables. β is a vector of constant parameters to be estimated that measures the effect of the independent variables x_{it} on the probability of exiting self-employment.

The data set is constructed as follows. Only people who are self-employed are included in the estimation, and the individual must have at least one period of self-employment. He exits the data set if he either transitions to wage work or is censored, meaning no current and possibly future observations are available for the individual. Many people exhibit multiple spells of self-employment. In this case, the individual enters the data set multiple times. The standard error estimates explicitly consider that observations from the same individual are not independent. Roughly 67 percent of all individuals who are ever self-employed

exhibit only one spell of self-employment, and around 23 percent have two. Three spells are far less common, with only about 8 percent of all self-employed exhibiting a maximum of three spells. The maximum number of spells is five (recorded for seven workers).

Table 4 provides results for logit estimates. The dependent variable is the hazard of self-employment, taking on the value of 0 while the individual is self-employed and 1 if the individual exits self-employment. Explanatory variables include a dummy variable taking on the value 1 if the respondent scored above the 50th percentile on the 1989 equivalent of the Armed Forces Qualifications Test, age and its square, a dummy variable for race[23] (white and nonwhite), a dummy variable indicating if the respondent is married, the number of jobs the respondent had in the last calendar year, educational attainment variables described later, the index of the current spell of self-employment, and the natural logarithm of the duration of the current spell of self-employment and its square.[24] In addition, I included variables capturing local and aggregate economic conditions.

I assessed a number of different educational variables. These included years of education and stratifying the level of education at various cutoffs. Generally, after including the other variables listed previously, education variables were not significantly different from 0 in the estimation results. The results reported in table 4 include stratified educational variables. Categories include those having a high school degree or less, those having some college, those having four years of post-high-school education, and those having more than four years of post-high-school education.

Spells are numbered from 1 to 5. A spell can be thought of as a continuation of self-employment from

	1	**2**	**3**
TABLE 4			
Probability of leaving self-employment, logit results			
GDP growth less mean GDP growth	4.6675** (2.1347)	—	4.9373** (2.1375)
Local unemployment rate	—	0.1076*** (0.0402)	0.1120*** (0.0403)
Number of observations	4,804	4,804	4,804
Number of people	1,551	1,551	1,551

**Significant at the 5 percent level.
***Significant at the 2 percent level.
Notes: GDP is gross domestic product. The dependent variable is the hazard of self-employment. Standard errors are in parentheses. Statistically significant variables include the test score dummy (–), age (+) and its square (–), the number of jobs in the past calendar year (+), race (+), spell (–), log duration (–) and its square (+), and a constant term (–).
Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979*.

the time of entry into self-employment to either the time of exit or the time of censoring. The reason for incorporating such a variable is that it is reasonable to assume that those workers who have multiple episodes of self-employment are different from those who have only one or two spells of self-employment. Those who enter multiple times are either very loosely attached to the wage sector or have a greater affinity for self-employment.

Theory suggests that economic conditions play a role in both entrance into self-employment and exit from self-employment. According to Rissman (2003) and Paulson and Townsend (2005), people should enter self-employment when the economy is doing relatively poorly. During contractions, opportunities in the wage sector dry up and self-employment becomes relatively more attractive. However, these workers are less attached to self-employment and are likely to be the first to exit self-employment as the economy improves. Thus, the likelihood of exiting self-employment depends upon two factors—the state of the economy at the time of entry and how the economy changes during the time the worker is self-employed.

I employ two different ways of assessing the economy in my analysis. One way is to consider aggregate economic conditions over the duration of self-employment. The other way is to focus on the role of local economic conditions and the local unemployment rate in particular. Aggregate economic conditions are measured as deviations of real annual GDP growth from its mean from 1979 to 2002. There is one observation for each year. If the economy is growing more quickly in real terms than average, we are in an expansion. Contractions are characterized by real GDP growth below average. People entering and exiting self-employment at the same time face the same aggregate economic conditions.[25]

Examination of the local unemployment rate provides a source of variation across individuals. As noted earlier, this measure of local unemployment rates is from the public use data files of the NLSY79 and is highly stratified. As a result, changes in local unemployment can occur that are not captured in the data. Only changes that result in a change in the stratification level are observable.

Column 1 of table 4 shows the logit results for regressions that include the explanatory variables discussed previously and the measure of aggregate economic conditions over the spell of self-employment.[26] Positive GDP growth relative to the average significantly increases the probability of exit from self-employment. This effect is significant at the 5 percent confidence level. Thus, an expanding economy

appears to encourage self-employed workers to exit self-employment and return to wage work. Why this occurs is somewhat ambiguous. It may be that they are discouraged wage workers who find more and better opportunities in a growing economy. It might also be the case that the small businesses they own continue on in some fashion, but that their businesses are no longer their primary jobs. Or these businesses may be merged or acquired by other firms, so that, technically, the respondent is no longer self-employed.

The effect of local economic conditions on exits from self-employment is shown in column 2 of table 4. As the local unemployment rate rises, exits from self-employment increase. The reason for this may be that conditional on starting a business, a worsening local economy has a larger effect on small businesses than on larger businesses. Thus, failure rates of small businesses would be higher during times when the local economy is poor, inducing business owners to seek work elsewhere.

Both the measure of aggregate economic activity and the local unemployment rate are included in the findings in column 3 of table 4. It presents a picture similar to the results reported in columns 1 and 2. Specifically, real GDP growth relative to the average over the period of self-employment tends to encourage people to exit self-employment, as does a rising local unemployment rate.

To summarize the results of the other variables included in the logits, but not reported in table 4, non-white respondents are more likely than white ones to exit self-employment *ceteris paribus* and those scoring above the 50th percentile on the 1989 equivalent of the Armed Forces Qualification Test tend to have longer spells of self-employment. The number of spells significantly influences the duration of self-employment, with duration increasing with the number of spells for the individual. As the number of jobs in the past calendar year rises, the likelihood of exiting self-employment rises significantly. The natural logarithm of duration enters with a negative and significant coefficient estimate, indicating that as the length of time in self-employment rises, the likelihood of exiting declines. Exit probabilities rise with age, but at a decreasing rate. Marital status does not significantly affect the likelihood of exiting self-employment.

Heterogeneity

As noted previously, duration dependence is captured by the natural logarithm of duration and its square. The results suggest that people who have longer self-employment tenure are *less* likely to leave self-employment. However, this effect is nonlinear. After about

seven years, the likelihood of leaving self-employment starts to rise. The hazard for self-employment is said to exhibit negative duration dependence. The proper interpretation of this result hinges upon how well the model captures heterogeneity in the sample of self-employed.[27]

In general, heterogeneity leads to a downward-biased estimate of duration dependence. The intuition is straightforward. Suppose that there are two types of self-employed individuals—those that are good at self-employment and those that do better in the wage sector. Let's assume that both groups have a constant probability of exiting self-employment, regardless of the time spent self-employed to date. Furthermore, I assume that this constant exit probability is lower for those who are good at self-employment than for those who are not. If I could identify which people belonged to which group, I would estimate the logit regressions for each separately and find that duration does not significantly influence the likelihood of exiting self-employment. Unfortunately, I am unable to distinguish between the two types of individuals, so my sample contains both. The combined sample looks as if those who have been self-employed longer are less likely to exit and, therefore, exhibit negative duration dependence, despite there being no duration dependence for the individual. This merely reflects the fact that the composition shifts, with those who have a lower exit probability making up an increasing proportion of the self-employed over time.

To examine this issue of worker heterogeneity a little more carefully, I consider how multiple job holders may differ from those who have had only a single job in the past calendar year. Those who have had only one job are likely to be different from those who have had many. Those with many jobs may be using self-employment to moonlight and make a little extra money on the side. Or they may be poor-quality wage workers, being repeatedly hired and fired. In the NLSY79, 539 young men aged 21 and older reported having had a single job in the past calendar year at the time they entered self-employment, while 1,183 respondents reported having had multiple jobs.

I provide logit results for these two samples in table 5. I find that those having a single job in the previous calendar year are far more sensitive to aggregate economic conditions than the full sample. Furthermore, these workers apparently

are not affected by local economic conditions, as evidenced by the insignificant coefficient on the local unemployment rate variable. In comparison, those having multiple jobs in the past calendar year are affected less by changes in aggregate economic conditions, but more by the local economy. These multiple job holders are the ones more likely to exit self-employment when the local economy worsens. One possible interpretation is that these small business owners are moonlighting and when a contraction occurs, their businesses are more likely to suffer. They then turn to other wage sector opportunities.

Conclusion

Self-employment is a fluid labor market state, exhibiting a great deal of turnover. Because it is believed that self-employment is a significant determinant of economic growth, it is important for policymakers to understand both what factors influence people to enter self-employment and what encourages them to exit self-employment. This article has focused on the latter.

Data from the NLSY79 for young males suggest that durations of self-employment tend to be short, with many first spells of self-employment terminating within a year. However, the longer a worker has been self-employed, the less likely he is to leave self-employment. Spell duration does not seem to be influenced by educational levels and, after controlling for aggregate and local labor market conditions, appears to be the same for whites and nonwhites. Marital status and region are also not significant.

TABLE 5		
Probability of leaving self-employment for single and multiple job holders, logit results		
	Single job at time of entry	**Multiple jobs at time of entry**
GDP growth less mean GDP growth	11.2989** (5.1145)	2.2091 (2.3061)
Local unemployment rate	0.0759 (0.0837)	0.1200*** (0.0439)
Number of observations	1,163	3,484
Number of people	539	1,183

**Significant at the 5 percent level.
***Significant at the 2 percent level.
Notes: GDP is gross domestic product. The dependent variable is the hazard of self-employment. Standard errors are in parentheses. For column 1, statistically significant variables include the test score dummy (–), race (+), having some college (–), and spell (–). For column 2, statistically significant variables include age (+) and its square (–), number of jobs in the past calendar year (+), spell (–), log duration (–) and its square (+), and a constant term (–).
Source: Author's calculations based on data from the *National Longitudinal Survey of Youth 1979*.

Aggregate and local labor market conditions play an important role in determining the duration of self-employment spells. A growing economy appears to encourage people who are self-employed to exit self-employment. This fact suggests that small business owners take the opportunities provided by growth to enter the wage sector. Local labor market conditions are also important. As the local economy worsens, small business owners are likely to suffer disproportionately more. These aggregate and local effects should be evaluated more comprehensively in a framework that incorporates exits from self-employment to the wage sector, unemployment, and nonparticipation.

NOTES

[1]For a transcript of President Bush's January 6, 2006, speech to the Economic Club of Chicago, see www.whitehouse.gov/news/releases/2006/01/20060106-7.html.

[2]Rissman (2003) provides a theoretical framework for this hypothesis.

[3]This number includes both males and females. In contrast, Fairlie (2005b) computes a much higher 9.8 percent self-employed in 2003, with male self-employment accounting for 12.4 percent of total male wage and salary workers. The discrepancy appears to be the result of how incorporated and unincorporated businesses are treated.

[4]Rissman (2003).

[5]In contrast to others, Hurst and Lusardi (2004) find no evidence that financial constraints affect entrepreneurial activity.

[6]Davis et al. (2006) are making progress in merging the employer and nonemployer universes in the Integrated Longitudinal Business Database (ILBD). Efforts are also under way at the U.S. Census Bureau to integrate business and household data in the Longitudinal Employer–Household Dynamics (LEHD) Program. Abowd, Haltiwanger, and Lane (2004) discuss the data set. The University of Michigan's *Panel Study of Entrepreneurial Dynamics* (PSED) follows a group of individuals who are considering starting a business and tracks them over time to determine the steps and outcomes of their decisions.

[7]Analysis of data for those aged 24 and older yields no difference in the results.

[8]Data are collected for the "CPS job." The CPS job is the respondent's current or most recent job at the interview date. If more than one job is held at that time, the CPS job/employer is the one at which the respondent works the most hours. If the respondent is not working, the CPS job is the job most recently held since the date of the last interview.

[9]The class of worker questions asked in the 1994 wave of the NLSY79 inquired about a number of jobs. The counts of self-employed workers are very different for 1994 than 1993 or in the next survey year 1996. Estimation results assume that if the class of worker was the same in 1993 as recorded in 1996, then the class of worker had the same value in 1994.

[10]Technically, the transition is from self-employment to other employment. This other employment can, in practice, involve a transition to nonpaid employment in a family business or farm. There are few instances of this recorded in the data.

[11]For females, the transition rate from wage work to self-employment was similar at 2.1 percent, and the transition rate from self-employment to wage work was 41.6 percent. The sample covers younger workers, so women are followed during their childbearing years. Family and work choices are complicated decisions with women weighing if and when to have children, and whether and how much to work after children are born. For women, self-employment may offer young mothers flexibility in work scheduling, suggesting that women would be more likely than men to engage in self-employment. Alternatively, it may be that self-employment is too time-consuming and the income too unstable relative to wage work so that young self-employed mothers would have even less flexibility. The results suggest that once women opt to work, they have about the same transition rates between wage work and self-employment as do men.

[12]For women, this figure was lower at 4.8 percent.

[13]More than one in five women aged 21 and older (22.8 percent) experience self-employment at some point in their young working lives. Similar to males, a female who has ever been self-employed spends about 19.7 percent of her time in self-employment.

[14]Numbers in the columns marked "between" and "within" in table 2 need not total 100 percent, since some people experience both labor market outcomes over the time they are observed.

[15]Fairlie (2005a) makes the same point.

[16]In figure 1, panel A, note that the data point for 1994 is missing because of noncomparability with earlier years.

[17]Unfortunately, although an effort is made to track everyone in the original sample, not everyone is interviewed each time. Sometimes respondents cannot be tracked either because they cannot be located or because they have died or are otherwise incapacitated.

[18]The ASVAB is a standardized test that was administered to all NLSY79 respondents in 1980. Subject areas include word knowledge, paragraph comprehension, arithmetic reasoning, and mathematics knowledge. The results of these subtests were used to create a percentile ranking that is comparable to another standardized test, the Armed Forces Qualification Test (AFQT), which was reweighted in 1989. The percentiles reflected in table 3 are for the 1989 weighting.

[19]In related work, Paulson and Townsend (2005) find that in Thailand more new businesses were started around the time of the currency crisis in the late 1990s, suggesting that economic activity is an important factor in the decision to start a new business.

[20]It is difficult to know what employment without pay entails. Fortunately, such incidences are rare, with less than 0.3 percent of both men and women in this classification.

[21]The GDP variable is constructed as $y_t - Y$ where y_t is real annual GDP growth at time t and Y is average annual GDP growth from 1979 to 2002.

[22]This simple model does not differentiate between unemployment, wage sector employment, or nonparticipation. A richer model

would distinguish among these alternatives. Because of the nature of the question asked, the transition is almost certainly from self-employment to wage work.

[23]Fairlie and Meyer (2000) document the convergence of black/white self-employment rates over a long period.

[24]In 1980 and again in 1989, the ASVAB subtests were used to create a composite percentile ranking that facilitated comparisons between the ASVAB and the AFQT. The reason for the re-creation of the composite score in 1989 was to ensure comparability with the U.S. Department of Defense's revised AFQT. The AFQT variable employed in the logit analysis is a dummy variable taking on the

value 1 if the respondent scored above the 50th percentile in the AFQT equivalent ASVAB score and 0 otherwise. Thus, it is a crude measure of aptitude and intelligence.

[25]A time variable indicating the year of entry and years since entry could capture the same information.

[26]Aggregate conditions are measured as real GDP growth less average GDP growth over the period from 1979 to 2002.

[27]Ham and LaLonde (1996) examine biases introduced by sample selection and initial conditions.

APPENDIX: AN INTRODUCTION TO SURVIVAL ANALYSIS

The discussion given here draws heavily from the discussion found in Kiefer (1988). Kalbfleisch and Prentice (1980) is a useful text for the interested reader. The focus of this article is on the dynamics of self-employment, in particular on the duration of self-employment. Figure A1 is helpful in understanding key concepts. This figure shows hypothetical self-employment durations for four individuals. The individuals are assumed to be surveyed at time A and then again at time B.

Short spells can be overlooked in the data. This is the case for persons 1 and 2 who are self-employed for periods of time that fall between A and B. The survey never records them as having been self-employed. Estimates of average self-employment duration are likely to be overstated as a result.

Surveys typically have a beginning and an end.[1] This can lead to censoring problems. For example, person 3 was not self-employed at time A, but was self-employed at time B. However, there are no subsequent observations for him because the survey was terminated. This individual was "right-censored," meaning that at the time of the last observation, he was self-employed and therefore still at risk of leaving self-employment. We know the duration of self-employment up to the time of his final observation but do not know what happened thereafter. Right-censoring may lead to an underestimation of average durations. The last individual, person 4, was self-employed even before he was observed at time A. This individual is said to be "left-censored." Left-censoring is not a large problem for studying self-employment in the NLSY79 because most respondents were younger than 21 at the time of the initial survey, and we are interested in their self-employment experiences only after they become attached to the labor force, which is typically at an age 21 and older.

To deal with the unique problems that arise from duration data, statisticians have modeled the hazard function. To start, the probability distribution of durations is given by the distribution function:

$$F(t) = \Pr(T < t).$$

This is the probability that a spell of self-employment T will be less than some value t. The corresponding density function is given by:

$$f(t) = dF(t)/dt.$$

Other functions are also now easily defined. The survivor function $S(t)$ is given by:

$$S(t) = 1 - F(t) = \Pr(T \geq t).$$

This is the probability that the duration of self-employment is greater than or equal to t and gives the upper tail of the distribution. The hazard function can now be defined. It is the rate at which spells are completed at duration t, given that they last until t. The hazard function is given by:

$$\lambda(t) = f(t)/S(t).$$

FIGURE A1

Hypothetical self-employment duration data

Source: Kiefer (1988).
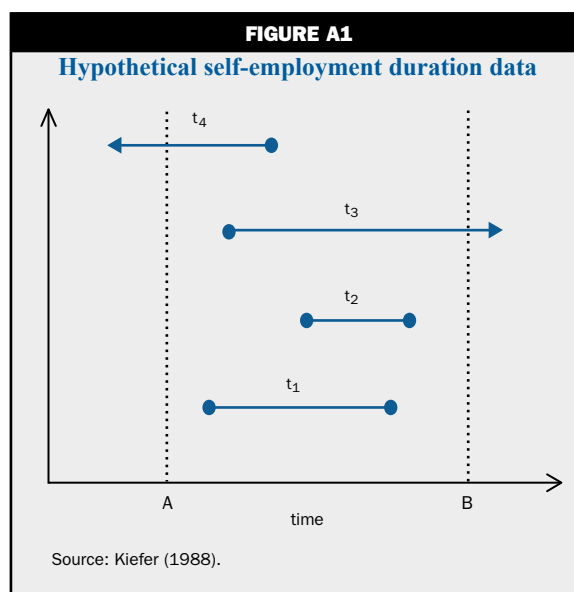
Lastly, the integrated hazard is a useful function for empirical testing. It is defined as:

$$\Lambda(t) = \int_0^t \lambda(u)\,du.$$

Its relation to the survivor function is given by:

$$S(t) = \exp[-\Lambda(t)].$$

Note that knowing the hazard function uniquely characterizes the other functions.

A number of different distributions have been used successfully in modeling duration data. An exponential distribution is perhaps the most widespread because it is easy to work with. This distribution has the interesting property that its hazard function is constant: The rate at which people exit is not dependent on how much time they have already spent in the state. Because of this "memoryless" property, the exponential distribution is not a good description of data that contains both very short and very long durations. Other distributions that have been successfully employed include the Weibull, log-logistic, Gompertz, lognormal, and generalized gamma. The Weibull distribution permits the exponential distribution as a special case. These other distributions have the benefit of capturing a time-varying hazard. For example, if the statistician believes that workers are quick to leave self-employment at short durations but that they are less likely to leave once they have been around for awhile, then a log-logistic or lognormal distribution may be a better description than the exponential.

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[1]In the NLSY79, the respondents were interviewed in 1979 and followed periodically through 2002. Although the survey is ongoing, this is the most recent observation.

REFERENCES

Aaronson, Daniel, Ellen R. Rissman, and Daniel G. Sullivan, 2004, "Assessing the jobless recovery," *Economic Perspectives*, Federal Reserve Bank of Chicago, Vol. 28, No. 2, Second Quarter, pp. 2–20.

Abowd, John M., John C. Haltiwanger, and Julia I. Lane, 2004, "Integrated longitudinal employee–employer data for the United States," U.S. Census Bureau, Longitudinal Employer–Household Dynamics Program, technical paper, No. TP-2004-02, May, available at http://lehd.dsd.census.gov/led/library/techpapers/tp-2004-02.pdf.

Cagetti, Marco, and Mariacristina De Nardi, 2003, "Entrepreneurship, frictions, and wealth," Federal Reserve Bank of Minneapolis, staff report, No. 322, September.

Davis, Steven J., John Haltiwanger, Ron S. Jarmin, C. J. Krizan, Javier Miranda, Alfred Nucci, and Kristin Sandusky, 2006, "Measuring the dynamics of young and small businesses: Integrating the employer and nonemployer universes," U.S. Census Bureau, Center for Economic Studies, discussion paper, No. CES 06-04, February, available at http://webserver01.ces.census.gov/index.php/ces/1.00/cespapers?down_key=101744.

Dunn, Thomas, and Douglas Holtz-Eakin, 2000, "Financial capital, human capital, and the transition to self-employment: Evidence from intergenerational links," *Journal of Labor Economics*, Vol. 18, No. 2, April, pp. 282–305.

Evans, David S., and Boyan Jovanovic, 1989, "An estimated model of entrepreneurial choice under liquidity constraints," *Journal of Political Economy*, Vol. 97, No. 4, August, pp. 808–827.

Fairlie, Robert W., 2005a, "Self-employment, entrepreneurship, and the NLSY79," *Monthly Labor Review,* Vol. 128, No. 2, February, pp. 40–47.

_____, 2005b, "Self-employed business owners—Nonagricultural industries: Calculations from the *Current Population Survey*, Outgoing Rotation Group files (1979–2003)," University of California, Santa Cruz, table, available at http://econ.ucsc.edu/faculty/fairlie/serates/sesex7903data.pdf.

Fairlie, Robert W., and Bruce D. Meyer, 2000, "Trends in self-employment among white and black men during the twentieth century," *Journal of Human Resources*, Vol. 35, No. 4, Fall, pp. 643–669.

Ham, John C., and Robert J. LaLonde, 1996, "The effect of sample selection and initial conditions in duration models: Evidence from experimental data on training," *Econometrica*, Vol. 64, No. 1, January, pp. 175–205.

Hipple, Steven, 2004, "Self-employment in the United States: An update," *Monthly Labor Review*, Vol. 127, No. 7, July, pp. 13–23.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen, 1994 "Sticking it out: Entrepreneurial survival and liquidity constraints," *Journal of Political Economy*, Vol. 102, No. 1, February, pp. 53–75.

Hurst, Erik, and Annamaria Lusardi, 2004, "Liquidity constraints, household wealth, and entrepreneurship," *Journal of Political Economy*, Vol. 112, No. 2, April, pp. 319–347.

Kalbfleisch, J. D., and R. L. Prentice, 1980, *The Statistical Analysis of Failure Time Data*, New York: John Wiley and Sons.

Kiefer, Nicholas M., 1988, "Economic duration data and hazard functions," *Journal of Economic Literature,* Vol. 26, No. 2, June, pp. 646–679.

Paulson, Anna L., and Robert M. Townsend, 2005, "Financial constraints and entrepreneurship: Evidence from the Thai financial crisis," *Economic Perspectives*, Federal Reserve Bank of Chicago, Vol. 29, No. 3, Third Quarter, pp. 34–48.

Rissman, Ellen R., 2003, "Self-employment as an alternative to unemployment," Federal Reserve Bank of Chicago, working paper, No. WP-2003-34.