

AN EMPIRICAL MICROECONOMIC STUDY OF THE ENTREPRENEUR

By

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## ABSTRACT

Entrepreneurs are an important segment of the economy, particularly in terms of economic development (Baumol, et al. 2007). However, the study of entrepreneurs and how they create firms is still an open question (Venkataraman 1998). In part, this question remains open as a result of the academic discussion about various definitions of entrepreneur and the identification of these individuals under each definition.

This dissertation uses the Panel Survey of Entrepreneurial Dynamics (PSED) to study two questions about nascent entrepreneurs. The first question is about the identity of these nascent entrepreneurs and if they differ from the self-employed. The second question examines what happens to these nascent entrepreneurs over their periods of firm formation, where they may either successfully begin an operating firm or choose to quit the effort at firm formation.

For the first question, a probability model of the decision to become an entrepreneur is analyzed. It is found that the self-employed are, in fact, a different group than nascent entrepreneurs, although there are similarities. The differences between these groups dominate the similarities. The differences support the contention of entrepreneurship researchers, such as Aldrich (1990), that researching only the self-employed as entrepreneurs introduces selection bias in the study of entrepreneurship.

For the second question, a competing risks hazard model is used to estimate the effects of ability, optimism, resources, and management strategy on two possible outcomes for the nascent entrepreneur – successfully creating an operating firm or

deciding instead to quit the effort. It is found that the nascent entrepreneur's ability, access to resources, and management strategy significantly affect the nascent entrepreneur's chances of getting a firm operational. However, only the self-employment status of the nascent entrepreneur has a significant effect on a nascent entrepreneur's decision to quit the effort of firm formation.

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## CHAPTER ONE

### INTRODUCTION

Entrepreneurs are an important segment of the economy, particularly in terms of economic development (Baumol, et al. 2007). However, the study of entrepreneurs and how they create firms is still an open question (Venkataraman 1998). In part, this question remains open as a result of the academic discussion about the various definitions of an entrepreneur and the identification of these individuals under each definition.

In past empirical studies, the entrepreneur has been defined as a self-employed person (Aldrich 1990). Additionally, these studies have estimated the probability an individual is self-employed at a particular point as a function of personal characteristics. Aldrich (1990) derogatorily calls this method of studying entrepreneurship the “traits” method of research. Aldrich’s criticism of using probability models of self-employment to study entrepreneurship is based on the understanding that entrepreneurship is a dynamic process, rather than a choice made at a particular point in time. Venkataraman (1998) states that the dynamic nature of entrepreneurship implies that all proper entrepreneurship research should focus on the process of firm formation.

Unfortunately, properly defined dynamic data on firm formation has not been available (Gartner, et al. 2004). In fact, it can be argued that past research on entrepreneurship has focused on the self-employed precisely because the self-

employed can be identified in easily obtainable government datasets, such as the National Longitudinal Survey of Youth (NLSY). In response to the lack of dynamic data on entrepreneurship, the Panel Survey of Entrepreneurial Dynamics (PSED) was developed by an interdisciplinary group of researchers (Gartner, et al. 2004). The PSED fills a void in entrepreneurship data both by defining entrepreneurship differently from self-employment and by following a sample of entrepreneurs over time.

This chapter provides a discussion of the problems associated with using self-employment as a definition of entrepreneurship and how these problems led to the development of the PSED. This discussion is followed by a brief overview of the PSED, and how the PSED has been combined with other data for use in this dissertation. Then, a synopsis is given of the two methods used to analyze the data in the dissertation. Finally, this chapter concludes with a summary of the findings in the subsequent chapters and the contributions of this research to the study of entrepreneurship.

### **Problems Associated with the Self-Employed Definition of the Entrepreneur**

Past economics research, such as Evans and Jovanovic (1989), Evans and Leighton (1989), Lindh and Ohlsson (1996), Blanchflower and Oswald (1998), Hamilton (2000), Fairlie (2002), and Lazear (2004, 2005), focus on the entrepreneur as the self-employed individual. In part, the focus on self-employment was a response to the lack of other definitions of the entrepreneur in datasets published by

government sources. This reliance on self-employment has been criticized by entrepreneurship researchers outside the profession as defining entrepreneurship too narrowly (Aldrich 1990).

In fact, the criticism of the use of self-employment as the definition of entrepreneurship has centered on the selection bias that may be caused by such a definition. Using a wider definition that identifies entrepreneurs at an earlier stage of firm formation, called nascent entrepreneurship, researchers have noted that the self-employed are successful nascent entrepreneurs, since the goal of nascent entrepreneurship is self-employment by the formation of an operating firm (Venkataraman 1998, Reynolds 1997). This implies that models of self-employment suffer from selection bias in comparison with models of entrepreneurship using the nascent definitions of the entrepreneur.

Using self-employment as the definition of entrepreneur likely biases the significance estimates of who chooses to be an entrepreneur in policy-relevant ways. Blanchflower and Oswald (1998), for instance, find that women are less likely to be self-employed than men. Similarly, Lazear (2005) finds that males are more likely to be self-employed. However, any conclusions about women's entrepreneurship based on studies of the self-employed may be unreliable if entrepreneurs are a larger group than individuals who are self-employed.

Another potential selection issue caused by using self-employment as the definition of entrepreneurship is that conclusions about the skills and experiences of potential entrepreneurs will be incorrect. For example, Lazear (2004) defines



entrepreneurship as incorporated self-employment. Using this definition in an analysis of a sample of Stanford MBA graduates, he concludes “It is executives and other administrative personnel who form the bulk of entrepreneurs, and they are found primarily in construction, retail trade, and professional services.” Lazear (2004) may be mistaken in this conclusion, since his definition suffers from two potential selection issues – incorporation and self-employment. First, Lazear’s (2004) results about entrepreneurship are biased towards self-employment. Then, the results about the self-employed are further biased towards those that have incorporated. This means that Lazear’s (2004) results are biased toward the most successful entrepreneurs – the successfully incorporated self-employed – since the self-employed are themselves successful nascent entrepreneurs.

Finally, several papers conclude that liquidity constraints are binding to entrepreneurs (Evans and Jovanovic 1989; Evans and Leighton 1989; Holtz-Eakin, et al. 1994a & 1994b; Blanchflower and Oswald 1998). These studies – all of which use some measure of wealth to measure liquidity – come to this conclusion by studying the self-employed as the exclusive definition of the entrepreneur. However, the selection bias due to the use of self-employment means that the wealth effects may be overestimated while simultaneously underestimating the effects of human capital.

The Panel Survey of Entrepreneurial Dynamics (PSED) was developed in response to criticisms of past entrepreneurship research using cross-sectional data of the self-employed. The PSED contains data on 830 nascent entrepreneurs over four waves from 1998 to 2003, as well as data on a control group of 431 individuals who

are not nascent entrepreneurs. Only one wave of data is reported in the PSED on the control group of respondents who are not nascent entrepreneurs. However, the PSED identifies the self-employed as well, which allows for a useful comparison between definitions of the entrepreneurship used in the literature and one based on firm formation. Additionally, the longitudinal data on nascent entrepreneurs is useful for studying the eventual results of the efforts by nascent entrepreneurs to create firms – some successful, some not successful.

This dissertation uses the PSED to study two questions about nascent entrepreneurs. The first question, in chapter two, is about the identity of these nascent entrepreneurs and if they differ from the self-employed. The second question, in chapter three, is about what happens to these nascent entrepreneurs over their periods of potential firm formation, where they may either successfully begin an operating firm or choose to quit the effort at firm formation. By examining the rate at which nascent entrepreneurs leave entrepreneurship, chapter three quantifies the selection bias caused by defining entrepreneurship as self-employment

### **Data Used in the Dissertation**

This dissertation uses data from the Panel Survey of Entrepreneurial Dynamics (PSED) to evaluate the entrepreneurship decision. Additional regional measures from the U.S. Bureau of Economic Analysis and the U.S. Bureau of Labor Statistics are constructed and added to the PSED data for analysis in chapters two and three. The PSED is detailed in the next section with the additional data detailed in the section

after that.

### The Panel Survey of Entrepreneurial Dynamics (PSED)

Gartner, et al. (2004) explain that the Panel Survey of Entrepreneurial Dynamics (PSED) was developed in response to the need for data that better identify entrepreneurs at earlier stages of their activity. The dataset contains responses from 1,261 respondents – 830 identified entrepreneurs and 431 non-entrepreneurs in the control group. Previously, researchers had to identify entrepreneurs by using self-employed individuals in various datasets, such as the National Longitudinal Survey or the Current Population Survey, or by surveying existing business owners about their recollections of the early days of their ventures. The restrictions of existing data to defining entrepreneurs only as individuals who are self-employed had two consequences.

The first consequence of past researchers limiting the definition of entrepreneurship to self-employment was that researchers were investigating the issues of self-employment and not entrepreneurship. Although the difference seems trivial, it does mean that the only entrepreneurs in the data were those that had successfully created firms, and thus became self-employed. The result is positive selection bias to self-employment in that those who planned to setup firms but were still planning when the data were collected were not included as entrepreneurs, even though they may have in fact been actively engaged in entrepreneurial activities.

The second consequence of the limitation of entrepreneurship to self-

employment results from using the recollections of the established business owner. The use of firm owners' recollections means that the results rely heavily on the accuracy of the entrepreneurs' memories. This bias means that research based on this definition of entrepreneur does not include information about uncreated, but planned, firms.

The PSED solves both of these problems by identifying entrepreneurs according to the respondent's answers to two questions (Reynolds, et al. 2004). The first of these questions is, "Are you, alone or with others, now trying to start a business?" The second is, "Are you, alone or with others, now starting a new business or new venture for your employer?" If the respondent answers "Yes" to either of these questions, the respondent is considered a nascent entrepreneur. If the respondent answers affirmatively only to the first, the respondent is considered simply a nascent entrepreneur. If affirmative only to the second, the respondent is considered a nascent corporate entrepreneur. Here, the nascent entrepreneur is identified by whether the respondent answers "Yes" to at least the first question.

The PSED follows the entrepreneur group over four waves. Unfortunately, panel data is unavailable for the control group of individuals who were not involved in some stage of creating a new business during the first wave of the survey. The PSED research consortium did not survey this group in the subsequent waves. As a result, any comparison between nascent entrepreneur and non-entrepreneur can use only the initial wave of the PSED.

Finally, several county-level measures included in the PSED are taken from

other sources. The PSED includes Federal Information Processing Standards (FIPS) identifiers at the state and county level for each respondent. Additionally, the PSED reports a number of county-level economic and demographic data for each respondent, obtained from either the Regional Economic Information System (REIS) of the U.S. Bureau of Economic Analysis or the U.S. Census Bureau's City and County Data Book (CCDB) (Reynolds 2004). Finally, three indicator measures for region location – midwest, south, and west – and are also part of the PSED. County-level regressors in this dissertation from the PSED are the percentage of non-farm proprietorship, population density, per-capita income, income distribution, education, population growth, and region location.

#### Data Added to Augment the PSED

While regional measures are included in the PSED, several useful regional measures of regional economic conditions are missing. These measures were collected separately and matched to the PSED data using the included FIPS identifiers. Two measures – regional unemployment rate and regional population – are included as reported by U.S. government sources. Indicator measures for micropolitan and rural areas were created separately from regional population.

The regional unemployment rate was taken from the U.S. Bureau of Labor Statistics (BLS). The unemployment rate is matched to the respondent by FIPS number. The unemployment rate is also match according to the year the respondent completed the phone survey.

Population-based indicators for micropolitan area and rural area are constructed from county population measures from the Regional Economic Accounts of the U.S. Bureau of Economic Analysis (BEA). The county population measures are matched to the respondent by FIPS identifier and then used to create the indicators for micropolitan area and for rural area. A micropolitan area is defined by the U.S. Census Bureau as a county with a population greater than 10,000 but less than 50,000. Counties with more than 50,000 population are considered metropolitan. Rural counties are those counties with fewer than 10,000 people.

The dataset that results from the augmentation of the PSED with other government data is then divided in two distinct datasets for use in the dissertation. The first dataset contains survey results from both nascent entrepreneurs and non-entrepreneurs from the first wave of the PSED. This dataset is used in chapter two to study the probability an individual chooses to become an entrepreneur. The second dataset contains survey results from only nascent entrepreneurs, but over all four waves of the PSED. This dataset is used in chapter three to identify the determinants of two nascent entrepreneur outcomes – successfully starting an operating firm or choosing to quit being a nascent entrepreneur.

### **Methods Used to Study the Entrepreneur**

Two methods are employed in this dissertation to examine separate, but related, issues of entrepreneurship. The first method, used in chapter two, is a probability model of an individual's decision to become an entrepreneur. This

method is applied to the first dataset. The second method, employed in chapter three, is a competing risks hazard model of two potential outcomes of nascent entrepreneurship – setting up a firm or quitting the effort to start a firm. The hazard model is used on the second dataset.

### Modeling the Decision to Become an Entrepreneur

Lazear (2005) is among the latest in line of research on entrepreneurship that employs a probability model of self-employment. While the probability model has been criticized in terms of its applicability to the questions of entrepreneurship (e.g., Aldrich 1990), it has yielded a greater understanding of what is necessary to be self-employed. Additionally, to date no research has been published on whether the nascent entrepreneur definition of the PSED is truly different from the self-employment definition used in the past.

A theoretical model of an individual's decision to become an entrepreneur is constructed by a modification to Lazear (2005) in chapter two. The primary difference between this model and Lazear's is the use of a random utility model. Lazear's (2005) model of the decision to be an entrepreneur is based on the assumption of income differences between the states of entrepreneurship and employed work. The assumption is that an individual will choose entrepreneurship if the income from doing so is greater than that from paid employment. However, Hamilton (2000) finds that the self-employed earn less on average than paid employees, which implies that the self-employed may be responding to something

other than higher income. Benz (2005) demonstrates, by adapting Lazear's (2005) model, that the self-employed may be choosing the autonomy that comes from self-employment over income. This indicates that entrepreneurs are willing to pay to be entrepreneurs.

In order to model this willingness-to-pay (WTP) to be an entrepreneur, a random utility model (RUM) is adapted to this purpose. Hanemann (1984) is the foundation for this model. The RUM is a model of the difference in utility functions between two states of nature, where the two states of nature can be described by an identifiable change in income. Then, the preferences for the differences between states is identified by the random portion of the RUM. In the case of entrepreneurship, the decision to become an entrepreneur is described by the fact that entrepreneurs prefer entrepreneurship so long as the difference between the income possible under paid employment and the income possible under self-employment is not so large as to cause the utility from paid employment to be larger than the utility from self-employment. Non-entrepreneurs may have the same preferences for self-employment, which means that the RUM is able to deal with one particular criticism of Aldrich (1990) since non-entrepreneurs may become entrepreneurs at any time, depending on the conditions. The RUM is then applied to the first wave of the PSED in order to examine whether the nascent entrepreneur definition used in the PSED identifies a different group of individuals than the self-employed definition used in the past.



### Competing Risks Hazard Models of Nascent Entrepreneur Outcomes

Three possible options exist for the nascent entrepreneur – remaining a nascent entrepreneur, starting an operation firm, or quitting as a nascent entrepreneur. Parker and Belghitar (2006) used the PSED to study these options with a multinomial probability model. However, two of the possibilities – operating or quitting – results in the nascent entrepreneur leaving the PSED. This attrition from the data required Parker and Belghitar (2006) to remove the final wave of the PSED from their data and to further reduce their estimated dataset to those nascent entrepreneurs that reported in the remaining waves. Their final dataset reduces the original PSED sample of 831 nascent entrepreneurs to a dataset of 340.

Chapter three of this dissertation, however, uses a competing risks hazard model to study the options of the nascent entrepreneur. Competing risks hazard models estimate the probability an individual leaves a dataset for a particular reason at particular time given that the individual is in that dataset and that the individual has not left the data already. In relation to the PSED, this means that the probability a nascent entrepreneur starts an operating firm is actually a model of the nascent entrepreneur leaving the data for this reason. Parker and Belghitar (2006) themselves admit they lose observations due to nascent entrepreneurs leaving the data early for this reason.

The competing risks hazard model has another advantage in terms of the study of entrepreneurship. Venkataraman (1998) states that the proper domain for entrepreneurship research should be the examination of firm formation. Aldrich

(1990) notes that entrepreneurship is a dynamic activity, with individuals switching between the states of entrepreneur and non-entrepreneur at various points in time. Unfortunately, the individual's switching between states has required researchers to reduce the number of observations in their research to account for this switching. This has resulted in studies with low numbers of observations (e.g., Reynolds 1997), which is another problem of past entrepreneurship research. However, the competing risks hazard model estimates the relationship between an individual's state of nature and that individual's remaining in a dataset. The result is that the attrition of respondents due to identifiable states of nature is the actual focus of the competing risks hazard model, rather than a cause for removing these respondents as in other estimation methods.

Two potential hazards – successfully starting an operating firm and quitting as a nascent entrepreneur – are modeled in the competing risks framework in chapter three. The dataset used in chapter three, although originally from the same source as Parker and Belghitar (2006), has almost twice as many observations as Parker and Belghitar (2006). In this respect particularly, the competing risks hazard model has great potential for the study of the dynamics of entrepreneurship.

### **Overview of Dissertation**

This dissertation proceeds with two additional chapters, each of which studies a particular question about nascent entrepreneurs. The first question, in chapter two, is about the identity of these nascent entrepreneurs and if they differ from the self-

employment. The second question, in chapter three, is about what happens to these nascent entrepreneurs over their periods of potential firm formation, where they may either successfully begin an operating firm or choose to quit the effort at firm formation. Conclusions of the dissertation are in chapter 4.

For chapter two, the initial wave of the PSED, both nascent entrepreneurs and the control group, are used in a probability model of the decision to become an entrepreneur. It is found that the self-employed are, in fact, a different group than nascent entrepreneurs, although there are many similarities. However, the differences between these groups dominate the similarities. The differences support the contention of entrepreneurship researchers, such as Aldrich (1990), that researching only the self-employed as entrepreneurs introduces selection bias in the study of entrepreneurship.

For chapter three, all four waves of the PSED are used, but only of the nascent entrepreneurs. This chapter uses a competing risks hazard model to estimate the effects of ability, optimism, resources, and management strategy on two possible outcomes for the nascent entrepreneur – successfully creating an operating firm or deciding instead to quit the effort. It is found that the nascent entrepreneur's ability, access to resources, and management strategy significantly affect the nascent entrepreneur's chances of getting a firm operational. However, only the self-employment status of the nascent entrepreneur has a significant effect on a nascent entrepreneur's decision to quit the effort of firm formation.

## CHAPTER TWO

### WHO BECOMES AN ENTREPRENEUR? AN EXPLORATION OF THE ENTREPRENEURIAL DECISION

Entrepreneurs are an important segment of the economy (Baumol, et al. 2007), but who are these individuals? If entrepreneurs are different from the rest of society, how are they different? If they basically are the same as everyone else, then what makes them decide to start businesses? The literature has debated the definition of the entrepreneur. Reynolds (et.al. 2004) defines an entrepreneur as a person engaged in some stage of firm formation. In contrast, Baumol (1968) defines an entrepreneur by his function, that is, the entrepreneur's function is "to locate new ideas and to put them into effect"(p. 65). Still further, some scholars argue that an acceptance of the risk inherent to starting a venture is central to defining entrepreneurship (e.g., Kihlstrom and Laffont 1979). In this regard, Casson's (1982) distilling of leading theories results in defining an entrepreneur as one who bears risk to seek profit through innovative activity. Any study of entrepreneurship will likely be sensitive to what definition is used to identify the entrepreneur.

Using labor market data to study this phenomenon adds another definition – the entrepreneur as a self-employed individual. There has been research on the entrepreneurship decision, including Evans and Jovanovic (1989), Evans and Leighton (1989), Lindh and Ohlsson (1996), Blanchflower and Oswald (1998), Hamilton (2000), Fairlie (2002), and Lazear (2004, 2005). These papers define the entrepreneur as one who is self-employed. Aldrich (1990), in particular, criticizes this

approach, arguing instead that entrepreneurship generally is a dynamic decision, with individuals alternating between paid and self-employment (Aldrich 1990). This criticism is based on the view that understanding entrepreneurship requires study of the process of firm formation and that anyone can choose to become an entrepreneur given the right circumstances (Venkataraman 1998).

Using self-employment as the definition of entrepreneurship likely biases estimates of who chooses to be an entrepreneur in policy-relevant ways.

Blanchflower and Oswald (1998), for instance, find that women are less likely to be self-employed than men. Similarly, Lazear (2005) finds that males are more likely to be self-employed. However, any conclusions about women's entrepreneurship based on studies of the self-employed may be unreliable if entrepreneurs are a larger group than individuals who are self-employed.

Another potential selection issue arising from the self-employment definition of entrepreneurship is that conclusions about the skills and experiences of potential entrepreneurs may be incorrect. For example, Lazear (2004) defines entrepreneurship as incorporated self-employment. Using this definition in an analysis of a sample of Stanford MBA graduates, he concludes “It is executives and other administrative personnel who form the bulk of entrepreneurs, and they are found primarily in construction, retail trade, and professional services”(p. 210). Lazear (2004) may be mistaken in this conclusion, since his definition suffers from two potential selection issues – incorporation and self-employment. First, Lazear’s (2004) results about entrepreneurship are based on self-employment. Then, the results about the self-

employed are further biased towards those that have incorporated. This means that Lazear's (2004) results are biased toward the most successful entrepreneurs – the successfully incorporated self-employed – since the self-employed are themselves successful nascent entrepreneurs.

Finally, several papers conclude that liquidity constraints are binding to entrepreneurs (Evans & Jovanovic 1989; Evans & Leighton 1989; Holtz-Eakin, et al. 1994a & 1994b; Blanchflower & Oswald 1998). These studies – all of which use some measure of wealth to measure liquidity – come to this conclusion by studying the self-employed as the exclusive definition of the entrepreneur. However, the selection bias due to the use of self-employment means that the wealth effects may be overestimated.

Shifting away from the definition of entrepreneurship as self-employment, this study of an individual's decision to become an entrepreneur has much to offer. The research on the decision to become an entrepreneur has been referred, somewhat derogatorily, as “traits” research (Aldrich 1990). A shortcoming of this approach is that some of the past “traits” research has relied on very small samples (e.g., Reynolds 1997). While Venkataraman (1998) argues that the best way to study entrepreneurship is to study the dynamics of firm formation, it has added little to the understanding of the supply of entrepreneurs, which itself has been a point of contention among entrepreneurship researchers (Burke, et al. 2006).

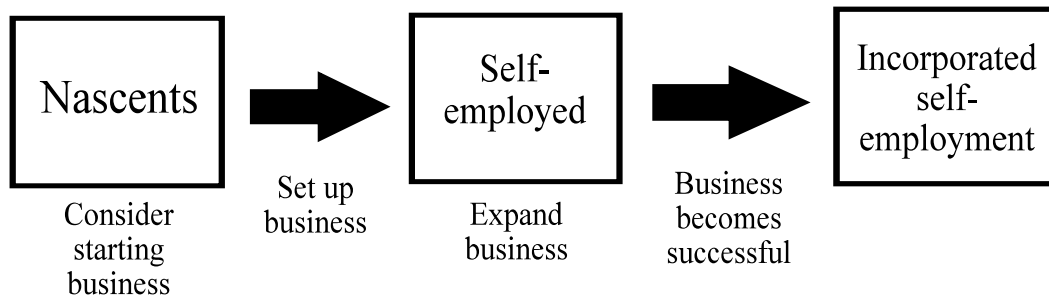
To address the shortcomings in this line of research, I develop a theoretical model of the decision to become an entrepreneur extending Lazear's (2005) model of

the entrepreneurship decision. This theoretical model has the advantage of being able to explain why individuals choose to become entrepreneurs even when the income from doing so is lower than they would receive from paid employment. This result has been found by Hamilton (2000), but is not accounted for in Lazear's model. In order to test the theoretical model, this chapter estimates the probability that an individual chooses to become an entrepreneur using data from the Panel Survey of Entrepreneurial Dynamics (PSED) which focuses on nascent entrepreneurs – defined by whether they plan to start a business, not whether they are self-employed.

The PSED was developed by a consortium of researchers interested in developing a dataset focused on the dynamics of firm formation (Gartner, et al 2004). The PSED follows a group of 830 nascent entrepreneurs over four waves along with a control group of 431 individuals. The difference between nascent entrepreneurs and the self-employed is that a self-employed individual operates a firm which was being planned when that individual was a nascent entrepreneur. In a sense, a self-employed individual is a successful nascent entrepreneur since the goal of nascent entrepreneurship is to create an operating firm. This difference between nascent entrepreneurs and the self-employed is illustrated in Figure 1. Some entrepreneurship researchers believe the identifiable difference between nascent entrepreneurs and the self-employed means a gap exists in the information about firm formation. The PSED is intended to fill this gap.

This chapter contributes to the literature on the entrepreneurial decision in three ways. First, it develops a utility-based model of the decision to become an

Figure 1. The Entrepreneurship Process



entrepreneur. Second, this model is analyzed by using an entrepreneurship-focused dataset. Third, several subsamples are created from this dataset based on competing definitions of entrepreneurship – self-employment or nascent entrepreneurship – and models of these subsamples are compared.

This chapter finds significant differences between the self-employed and nascent entrepreneurs. However, these differences can be explained by the observation that self-employment is the objective of the nascent entrepreneur. The existence of differences between the self-employed and nascent entrepreneurs is evidence that selection bias results from using self-employment as the exclusive definition of entrepreneurship. The chapter proceeds with a description of the relevant theory in section two, a detailed description of the data in section three, presentation and interpretation of the empirical results in section four, and discussion of the conclusions in section five.

## Theory



Knight (1921) is among the foundational papers in entrepreneurship research, particularly with regard to the analysis of entrepreneurs. By tying the risk-bearing of potential entrepreneurs to the decision they make to enter the market for entrepreneurs, he makes possible the identification of the supply of entrepreneurs. The supply of entrepreneurs has since been the basis for examinations of the decision to become an entrepreneur.

Kihlstrom and Laffont (1979), in particular, build on the risk-bearing function of entrepreneurs to formulate a general equilibrium model of entrepreneurial choice based on income differentials. Their model assumes that all potential entrepreneurs are risk averse to build a model of the supply of the self-employed under uncertainty. Evans and Jovanovic (1989) alter this model by assuming instead that all entrepreneurs are risk neutral, which guarantees that the self-employment decision is a simple comparison of expected incomes. They estimate several models of self-employment using data from the National Longitudinal Survey of Young Men (NLS). The Evans and Jovanovic (1989) risk neutral model is then used by Evans and Leighton (1989) to estimate separate earnings models of self-employment and wage work using both the NLS and the Current Population Survey (CPS).

Holtz-Eakin, et al. (1994b) confirm previous results that liquidity constraints bind on the self-employment decision by studying the impact of inheritances using data from U.S. federal income tax returns. Lindh and Olhsson (1996) model the effect of “windfall” gains such as lottery winnings to the self-employment decision. Both papers find further support for the theory that liquidity constraints are binding to

the self-employment decision. Blanchflower and Oswald (1998) add psychological measures to empirical models of self-employment. Their results add to the confirmation of the importance of liquidity constraints to being self-employed.

Lazear (2004, 2005) builds, in part, on Kihlstrom's and Laffont's (1979) general equilibrium model. Lazear presents the entrepreneurial decision as a choice between a less risky paid income and a more risky entrepreneurial one. Lazear discounts the entrepreneurial choice to reflect the potential non-pecuniary benefits to being self-employed. The difference in outcomes is important given the results of Hamilton (2000), who demonstrates that the self-employed enter and remain in business despite the fact they have lower initial earnings and experience lower earnings growth than if they worked for others. Lazear (2005) discounts the potential entrepreneur's income to account for the market value of entrepreneurial activity – in essence, the discount is meant to equate the supply and demand of entrepreneurs accounting for the fact that entrepreneurs must have a number of skills to run a business. Under this model, an individual chooses to become an entrepreneur if his income from being an entrepreneur is greater than his discounted income from working for others.

Frey and Benz (2003) and Benz and Frey (2003) note that the self-employed in developed countries are much happier than their counterparts working for others, a result also found by Blanchflower and Oswald (1998). That the self-employed are more content in their work than the employed indicates that an important consideration in the entrepreneurial decision may not be income related. The

preferences for autonomy or other non-income factors, such as filling some otherwise unfilled personal demand of the entrepreneur,<sup>1</sup> do not fit well with Lazear's (2005) model but are clearly demonstrated in these papers. As a response to the incongruity between income-based models and utility-based reasons for an individual's decision to be an entrepreneur, Benz (2005) modifies Lazear's (2005) model to be a comparison of discounted utility, rather than income states. Benz (2005) adjusts the Lazear (2005) model by adding a term to the discount value to account for non-monetary benefits to the entrepreneur. The addition of a non-monetary utility for gains from being an entrepreneur thus reduces the threshold for choosing entrepreneurship.

In the Benz (2005) model, an entrepreneur chooses to become self-employed if his income from entrepreneurship exceeds the income from working for others discounted to account both for Lazear's (2004, 2005) measures for skill differences and for the entrepreneur's preference for autonomy. Therefore, the resulting Benz (2005) model allows for entrepreneurs choosing to enter markets even when doing so will result in less income. Unfortunately, though, this model still requires a comparison of incomes between states even though income data in both states may not be available.

This chapter modifies the Benz (2005) model to account for the lack of

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<sup>1</sup> An example is the homebrewing entrepreneur that has no local access, beyond the Internet, to homebrewing supplies. If this entrepreneur has enough friends with the same need, she might find opening a homebrew supply store advantageous even if it means lower income than working for others. See Tregear (2005) for more examples of so-called "lifestyle" entrepreneurs.

income data in both states. Since we cannot measure either the potential entrepreneurial income of non-entrepreneurs or the non-entrepreneurial income of entrepreneurs, we need a different way to compare states in a way that still accounts for the possibility that the entrepreneur's decision is based on income and non-income reasons. The method developed in this chapter to model an entrepreneur's decision using both income and non-income reasons is the random utility model.

The following discussion follows Hanemann (1984) except that it replaces the willingness-to-accept (WTA) measure used in the original paper with a similarly defined measure for the willingness to become an entrepreneur. An individual with utility function  $u(j, y_j; s)$  with states  $j$ , state-dependent income  $y_j$ , and vector of individual control variables  $s$ , chooses entrepreneurial activity if

$$u(1, y_1; s) \geq u(0, y_0; s) \quad (1)$$

In the case of the above equation, state 1 is the entrepreneurial state. Individuals with greater preferences for entrepreneurial characteristics – e.g., greater autonomy and internal locus of control – are more likely to choose state 1 over state 0 since they value the non-pecuniary benefits of entrepreneurship more highly.

Each individual assigns some value to the entrepreneurial characteristics and compares the value of these characteristics to the pecuniary costs of entrepreneurship measured, in part, by the difference between entrepreneurial income and the income from paid work. Individuals who stand to earn more as entrepreneurs will certainly choose to become entrepreneurs, as demonstrated by Lazear's (2004, 2005) model. In

the random utility model of entrepreneurial choice, however, the individual who may earn less as an entrepreneur than in paid work, but has a higher value for entrepreneurial characteristics, will choose to become an entrepreneur so long as this individual's preferences for entrepreneurial characteristics exceeds the difference in income between states. In Lazear's (2004, 2005) model, this type of individual is expected to always choose to remain in paid work.

The counterfactual income for both entrepreneurs and non-entrepreneurs is not observed in either Lazear's model or random utility model. The lack of counterfactual income is not a problem in the random utility model of entrepreneurial choice since the decision to become an entrepreneur is not based solely on the comparison between incomes in each state. However, the lack of counterfactual income in the Lazear (2004, 2005) model is a significant problem since his model of entrepreneurial choice is based entirely on the basis of income comparison. In fact, the Lazear (2004, 2005) model actually assumes that entrepreneurs always have higher incomes as entrepreneurs than as paid workers, even though Hamilton (2000) has demonstrated that the self-employed earn less on average than paid workers. The random utility model of entrepreneurial choice makes no such assumption about income differences between the entrepreneurial and non-entrepreneurial states.

Equation 1 models the difference in utility measures, which cannot be measured, by assuming that the utility in each state is a random variable that can be written as follows:

$$u(j, y_j, s) = v(j, y_j, s) + \varepsilon_j, \quad j = \{0, 1\} \quad (2)$$

where  $\varepsilon_j$  is an i.i.d. random variable with zero mean. Equation 2 means the same as saying an individual becomes an entrepreneur if the following condition holds:

$$v(\mathbf{1}, y_1; s) + \varepsilon_1 \geq v(\mathbf{0}, y_0; s) + \varepsilon_0 \quad (3)$$

Since the individual knows which state, entrepreneur or employed work, maximizes her utility, the trouble with signing the derivative of the utility function with respect to state for non-entrepreneurs becomes trivial. Additionally, knowing that an individual will always choose entrepreneurship when equation 3 is true allows the estimation of a model with probabilities defined as follows:

$$\begin{aligned} P_1 &= \Pr\{\text{being an entrepreneur}\} = \Pr\{v(\mathbf{1}, y_1; s) + \varepsilon_1 > v(\mathbf{0}, y_0; s) + \varepsilon_0\} \\ P_0 &= \Pr\{\text{not being an entrepreneur}\} = 1 - P_1 \end{aligned} \quad (4)$$

It should be noted that the counterfactual income is not available for either the entrepreneur or the non-entrepreneur. However, this does not affect the conclusions of the random utility model. Since only the utility difference matters to the choice of entrepreneurship, any individual that chooses to be an entrepreneur will have higher utility in this state regardless of income. In short, if an individual entrepreneur's entrepreneurial income is not higher, the income lost to the entrepreneurial venture is compensated by the non-pecuniary benefits of being an entrepreneur. The opposite is true for any non-entrepreneur. Thus, the counterfactual income is not an issue for the random utility model.

The random utility model employed in this chapter will compare entrepreneurs with non-entrepreneurs using a model based on the existence of the utility difference

between these states. An individual chooses the entrepreneur state if that individual's utility from entrepreneurship is higher than the utility from paid work.

## **Data**

This chapter uses data from the Panel Survey of Entrepreneurial Dynamics (PSED) to evaluate the entrepreneurship decision. Gartner, et al. (2004) explain that the PSED was developed in response to the need for data that better identify entrepreneurs at earlier stages of their activity. The dataset contains responses from 1,261 respondents – 830 identified entrepreneurs and 431 non-entrepreneurs in the control group. Previously, researchers had to identify entrepreneurs by using self-employed individuals in various datasets, such as the National Longitudinal Survey or the Current Population Survey, or from surveying existing business owners about their recollections of the early days of their ventures. The restrictions of existing data to defining entrepreneurs only as individuals who are self-employed had two consequences.

The first consequence, due to the limitation of the data to those self-employed, is that researchers were investigating the issues of self-employment and not entrepreneurship. Although the difference seems trivial, it does mean that the only entrepreneurs in the data were those that had successfully created firms, and thus became self-employed. The result is positive selection bias to self-employment in that those who planned to setup firms but were still planning when the data were collected were not included as entrepreneurs, even though they may have in fact been

actively engaged in entrepreneurial activities.

The second consequence results from using the recollections of the well-established business owner. The use of firm owners' recollections means that the results are biased toward the self-employed and that the data rely heavily on the accuracy of the entrepreneurs' memories. This bias means that research based on this definition of entrepreneur does not include information about uncreated, but planned, firms.

The PSED solves both of these problems by identifying entrepreneurs according to the respondent's answers to two questions (Reynolds, et al. 2004). The first of these questions is, "Are you, alone or with others, now trying to start a business?" The second is, "Are you, alone or with others, now starting a new business or new venture for your employer?" If the respondent answers "Yes" to either of these questions, the respondent is considered a nascent entrepreneur. If the respondent answers affirmatively only to the first, the respondent is considered simply a nascent entrepreneur. If affirmative only to the second, the respondent is considered a nascent corporate entrepreneur. Here, the nascent entrepreneur is identified by whether the respondent answers "Yes" to at least the first question.

The PSED follows the entrepreneur group over four waves. Unfortunately, panel data is unavailable for the control group, which includes individuals who were not involved in some stage of creating a new business during the first wave of the survey, because the PSED research consortium dropped this group in the subsequent waves. Therefore, only the first wave is used in this chapter.



Table 1 is an overview of the number of respondents classified by each entrepreneurship definition. The column of Table 1 labeled “Total PSED” reports the numbers of respondents by entrepreneurship definition for the entire PSED. The PSED defines an entrepreneur according to the nascent entrepreneur definition discussed earlier in this section. However, past studies, such as Hamilton (2000), identify the self-employed as entrepreneurs. For this reason, self-employed respondents are noted as a distinct category from nascent entrepreneurs. A separate model of entrepreneurship is estimated for the self-employed, as well. A final definition of the entrepreneur is the corporate nascent entrepreneur also discussed earlier in this section. These entrepreneurs are nascent entrepreneurs that are planning ventures with a current employer. Since they are identified as a distinct subcategory of nascent entrepreneurs, they are noted in Table 1 and separate models of corporate nascent entrepreneurship are estimated as well.

The two rows below the label “Self-employed Samples” report the counts for the alternatives of the self-employed definition of entrepreneur. These samples sum to the total number of respondents since some nascent entrepreneurs are also self-employed while some nascent entrepreneurs are not self-employed. Some respondents in the control group may also be self-employed.

The rows below the label “Nascent Entrepreneur Sub-samples” report the number of respondents for each sub-sample of nascent entrepreneur. Each pair of rows in this category sum to the total number of nascent entrepreneurs, or 830 in the case of the complete PSED.

**Table 1. Samples From Panel Survey of Entrepreneurial Dynamics**

|   | <b>Total PSED</b> | <b>Full Model Sample</b> |
|---|-------------------|--------------------------|
| Total Number of Respondents                                   | 1,261             | 1,167                    |
| Nascent Entrepreneur  | 830               | 751                      |
| Control (Not Nascent Entrepreneurs)                           | 431               | 416                      |
| <i>Self-employed Samples</i>                                  | <i>1,261</i>      | <i>1,167</i>             |
| Self-employed (Both Nascent Entrepreneurs and Control)        | 555               | 513                      |
| Not Self-employed (Both Nascent Entrepreneurs and Control)    | 706               | 654                      |
| <i>Nascent Entrepreneur Sub-samples</i>                       | <i>830</i>        | <i>751</i>               |
| Nascent Entrepreneur and Self-employed                        | 457               | 418                      |
| Nascent Entrepreneur and not Self-employed                    | 373               | 333                      |
| Corporate Nascent Entrepreneur                                | 118               | 107                      |
| Nascent Entrepreneur and not a Corporate Nascent Entrepreneur | 712               | 644                      |
| Nascent Entrepreneur and either Self-employed or Corporate    | 513               | 467                      |
| Nascent Entrepreneur and neither Self-employed nor Corporate  | 317               | 284                      |
| <i>Control Group Sub-samples</i>                              | <i>431</i>        | <i>416</i>               |
| Self-employed and not a Nascent Entrepreneur                  | 98                | 95                       |
| Neither Self-Employed nor a Nascent Entrepreneur              | 333               | 321                      |

The rows below the label “Control Group Sub-samples” report the number of respondents in each category in the control group. These rows sum to the total number in the control group, or 431 in the complete PSED. The last row of Table 1 gives the number of non-entrepreneurs using both major definitions, self-employed or planning a new business. In the PSED, 333 respondents are neither self-employed nor a nascent entrepreneur.

The column labeled “Full Model” reports the sample used in the analysis, which is the sample that results when missing values are removed for the regressors in

the model with all variables included. Table 2 gives a list of these regressors and their definitions. The “Full Model” sample noted in Table 1 has a total of 1,167 respondents, 751 of which are nascent entrepreneurs and 416 are in the control group. The rows of this column follow a similar description as the explanation given above for the “Total PSED” column.

Table 3 reviews the sample sizes and other summary statistics for the regressors used in the analysis. The statistics reported in this table are for the complete PSED when no respondents have been removed. Of particular note in Table 3 are the number of non-missing observations for each regressor. As shown in this column, net worth is the regressor which results in the largest individual number of lost observations. Half of the 94 respondents removed for any reason are removed for missing values of net worth. The remaining 47 respondents are removed from the total sample for age, born in the U.S., number of children, education, years of work experience, and years living in current county, employment status, and home ownership. The resulting dataset is the “Full Model” sample of 1,167 respondents described in Table 1. The summary statistics for each regressor from the “Full Model” sample is reported in Table 4.

Table 5 reports the mean and standard deviation for each regressor by entrepreneurship definition – self-employed, nascent entrepreneur, and corporate nascent entrepreneur – from the “Full Model” sample.

Several county-level measures are taken from other sources. Each of these measures are included to control for the potential effects of county economic

**Table 2. Definitions of Variables Used in the Analysis**

| <b>Variable Name</b>             | <b>Definition</b>   |
|----------------------------------|---|
| Female                           | Female = 1  |
| Nonwhite                         | Nonwhite = 1  |
| Age                              | Age at time of survey   |
| Born in the U.S.                 | Born in the U.S. = 1  |
| Education                        | Years of education  |
| Married                          | Married = 1   |
| Number of children               | Number of children under age 18                                       |
| Parent was Self-employed         | At least one parent of respondent was self-employed = 1               |
| Friend Owns Business             | At least one friend of respondent owns a business = 1                 |
| Positive Impression of Self-emp. | Has positive impression of the self-employed = 1                      |
| Positive Economic Outlook        | Has positive economic outlook = 1                                     |
| Years of Work Experience         | Total Years of Work Experience  |
| Years Living in Current County   | Years Living in Current County  |
| Prefers Doing Things “Better”    | Prefers doing things “better” = 1                                     |
| Unemployed                       | Unemployed = 1  |
| Retired                          | Retired = 1   |
| Net Worth                        | Net Worth (\$10,000)  |
| Homeowner                        | Homeowner = 1   |
| Regional Business Ownership      | Regional proportion of non-farm proprietors to number of households   |
| Regional Population Density      | Regional population density (1,000/square mile)                       |
| Regional Per Capita Income       | Regional per capita total personal income (\$1,000)                   |
| Regional Income Distribution     | Regional percentage of households with income \$75K or more           |
| Regional Age Distribution        | Regional percentage of population ages 25-44                          |
| Regional Education Level         | Regional percentage of population age 25 or older with college degree |
| Regional Population Growth       | Annualized percentage change in regional population                   |
| Regional Unemployment            | Regional unemployment rate  |

**Table 3. Summary Statistics, Total PSED**

| <b>Variable Name</b>             | <b>Obs.</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|----------------------------------|-------------|-------------|------------------|------------|------------|
| Female                           | 1,261       | 0.509       | 0.5              | 0          | 1          |
| Nonwhite                         | 1,261       | 0.443       | 0.497            | 0          | 1          |
| Age                              | 1,258       | 39.893      | 12.18            | 18         | 93         |
| Born in the U.S.                 | 1,230       | 0.915       | 0.278            | 0          | 1          |
| Education                        | 1,257       | 14.866      | 2.623            | 8          | 20         |
| Married                          | 1,261       | 0.549       | 0.498            | 0          | 1          |
| Number of Children               | 1,250       | 1.13        | 1.314            | 0          | 7          |
| Parent was Self-employed         | 1,261       | 0.47        | 0.499            | 0          | 1          |
| Friend Owns Business             | 1,261       | 0.698       | 0.459            | 0          | 1          |
| Positive Impression of Self-emp. | 1,261       | 0.8         | 0.4              | 0          | 1          |
| Positive Economic Outlook        | 1,261       | 0.49        | 0.5              | 0          | 1          |
| Years of Work Experience         | 1,242       | 17.08       | 11.105           | 0          | 60         |
| Years Living in Current County   | 1,236       | 18.31       | 15.477           | 0.011      | 93         |
| Prefers Doing Things “Better”    | 1,261       | 0.712       | 0.453            | 0          | 1          |
| Unemployed                       | 1,260       | 0.132       | 0.338            | 0          | 1          |
| Retired                          | 1,260       | 0.054       | 0.226            | 0          | 1          |
| Net Worth (\$10,000)             | 1,214       | 25.189      | 39.418           | -38        | 260        |
| Homeowner                        | 1,257       | 0.656       | 0.475            | 0          | 1          |
| Regional Business Ownership      | 1,261       | 0.213       | 0.06             | 0.07       | 0.6        |
| Regional Population Density      | 1,261       | 2.426       | 7.065            | 0.001      | 53.181     |
| Regional Per Capita Income       | 1,261       | 20.305      | 6.824            | 2.185      | 52.498     |
| Regional Income Distribution     | 1,261       | 9.306       | 5.56             | 0.876      | 33.345     |
| Regional Age Distribution        | 1,261       | 32.718      | 3.219            | 21.1       | 49.1       |
| Regional Education Level         | 1,261       | 20.712      | 7.817            | 4.795      | 52.299     |
| Regional Population Growth       | 1,261       | 1.342       | 1.814            | -2.041     | 11.827     |
| Regional Unemployment            | 1,261       | 4.395       | 1.927            | 1.1        | 23.6       |

**Table 4. Summary Statistics, Full Model Sample**

| <b>Variable Name</b>             | <b>Obs.</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|----------------------------------|-------------|-------------|------------------|------------|------------|
| Female                           | 1,167       | 0.51        | 0.5              | 0          | 1          |
| Nonwhite                         | 1,167       | 0.436       | 0.496            | 0          | 1          |
| Age                              | 1,167       | 39.922      | 12.165           | 18         | 93         |
| Born in the U.S.                 | 1,167       | 0.928       | 0.259            | 0          | 1          |
| Education                        | 1,167       | 14.877      | 2.597            | 8          | 20         |
| Married                          | 1,167       | 0.556       | 0.497            | 0          | 1          |
| Number of Children               | 1,167       | 1.141       | 1.318            | 0          | 7          |
| Parent was Self-employed         | 1,167       | 0.47        | 0.499            | 0          | 1          |
| Friend Owns Business             | 1,167       | 0.706       | 0.456            | 0          | 1          |
| Positive Impression of Self-emp. | 1,167       | 0.8         | 0.4              | 0          | 1          |
| Positive Economic Outlook        | 1,167       | 0.494       | 0.5              | 0          | 1          |
| Years of Work Experience         | 1,167       | 17.015      | 11.086           | 0          | 60         |
| Years Living in Current County   | 1,167       | 18.360      | 15.48            | 0.011      | 93         |
| Prefers Doing Things “Better”    | 1,167       | 0.721       | 0.449            | 0          | 1          |
| Unemployed                       | 1,167       | 0.129       | 0.336            | 0          | 1          |
| Retired                          | 1,167       | 0.055       | 0.228            | 0          | 1          |
| Net Worth (\$10,000)             | 1,167       | 25.228      | 39.601           | -38        | 260        |
| Homeowner                        | 1,167       | 0.658       | 0.475            | 0          | 1          |
| Regional Business Ownership      | 1,167       | 0.213       | 0.061            | 0.07       | 0.6        |
| Regional Population Density      | 1,167       | 2.296       | 6.68             | 0.001      | 53.181     |
| Regional Per Capita Income       | 1,167       | 20.3        | 6.657            | 2.185      | 52.498     |
| Regional Income Distribution     | 1,167       | 9.256       | 5.566            | 0.876      | 33.345     |
| Regional Age Distribution        | 1,167       | 32.683      | 3.228            | 21.1       | 49.1       |
| Regional Education Level         | 1,167       | 20.676      | 7.83             | 4.795      | 52.299     |
| Regional Population Growth       | 1,167       | 1.352       | 1.835            | -2.041     | 11.827     |
| Regional Unemployment            | 1,167       | 4.394       | 1.935            | 1.1        | 23.6       |

**Table 5. Regressor Statistics by Entrepreneurship Definition, Full Model Sample**

| Variable Name                          | Self-Employed<br>(N=513) |              | Nascent Ent.<br>(N=751) |              | Corporate Ent.<br>(N=107) |              |
|--|--------------------------|--------------|-------------------------|--------------|---------------------------|--------------|
|  | Mean                     | Std.<br>Dev. | Mean                    | Std.<br>Dev. | Mean                      | Std.<br>Dev. |
|  | Female                   | 0.466        | 0.499                   | 0.485        | 0.5                       | 0.336        |
| Nonwhite                               | 0.365                    | 0.482        | 0.368                   | 0.482        | 0.523                     | 0.502        |
| Age                                    | 41.207                   | 11.922       | 39.63                   | 11.103       | 35.72                     | 9.725        |
| Born in the U.S.                       | 0.932                    | 0.252        | 0.936                   | 0.245        | 0.888                     | 0.317        |
| Education                              | 14.945                   | 2.676        | 15.085                  | 2.55         | 14.374                    | 2.486        |
| Married                                | 0.583                    | 0.494        | 0.574                   | 0.495        | 0.458                     | 0.501        |
| Number of children                     | 1.146                    | 1.32         | 1.125                   | 1.317        | 1.252                     | 1.304        |
| Parent was Self-employed               | 0.526                    | 0.5          | 0.502                   | 0.5          | 0.458                     | 0.501        |
| Friend Owns Business                   | 0.735                    | 0.442        | 0.743                   | 0.437        | 0.720                     | 0.451        |
| Positive Impression of Self-employment | 0.854                    | 0.354        | 0.846                   | 0.362        | 0.85                      | 0.358        |
| Positive Economic Outlook              | 0.507                    | 0.5          | 0.518                   | 0.5          | 0.514                     | 0.502        |
| Years of Work Experience               | 18.661                   | 11.531       | 17.369                  | 10.64        | 14.794                    | 9.192        |
| Years Living in Current County         | 18.959                   | 15.62        | 17.405                  | 14.421       | 16.397                    | 13.254       |
| Prefers Doing Things “Better”          | 0.694                    | 0.461        | 0.679                   | 0.467        | 0.729                     | 0.447        |
| Unemployed                             | 0.129                    | 0.335        | 0.119                   | 0.323        | 0.103                     | 0.305        |
| Retired                                | 0.051                    | 0.22         | 0.031                   | 0.172        | 0.009                     | 0.097        |
| Net Worth (\$10,000)                   | 26.97                    | 44.798       | 25.301                  | 41.067       | 25.311                    | 43.293       |
| Homeowner                              | 0.694                    | 0.461        | 0.672                   | 0.47         | 0.551                     | 0.5          |
| Regional Business Ownership            | 0.219                    | 0.061        | 0.218                   | 0.061        | 0.215                     | 0.065        |
| Regional Population Density            | 1.878                    | 5.791        | 2.114                   | 6.35         | 2.367                     | 5.207        |
| Regional Per Capita Income             | 20.165                   | 6.534        | 20.354                  | 6.598        | 20.18                     | 6.762        |
| Regional Income Distribution           | 9.262                    | 5.518        | 9.314                   | 5.404        | 10.033                    | 5.743        |
| Regional Age Distribution              | 32.735                   | 3.365        | 32.784                  | 3.247        | 33.033                    | 3.312        |
| Regional Education Level               | 20.561                   | 7.844        | 21.013                  | 7.844        | 22.056                    | 7.957        |
| Regional Population Growth             | 1.392                    | 1.845        | 1.372                   | 1.74         | 1.282                     | 1.647        |
| Regional Unemployment                  | 4.38                     | 1.879        | 4.387                   | 1.874        | 4.273                     | 1.773        |

conditions on the probability an individual chooses to become an entrepreneur. The PSED includes Federal Information Processing Standards (FIPS) identifiers at the state and county level for each respondent. Additionally, the PSED reports a number of county-level economic and demographic data for each respondent, obtained from either the Regional Economic Information System (REIS) of the U.S. Bureau of Economic Analysis or the U.S. Census Bureau's City and County Data Book (CCDB) (Reynolds 2004). County-level regressors in this analysis that are directly taken from the PSED are the percentage of non-farm proprietorship, population density, per-capita income, income distribution, education, and population growth. One additional county-level measure is constructed separately and added to the sample by matching state and county FIPS codes. This measure is the county-level unemployment rate, which is taken from the U.S. Bureau of Labor Statistics (BLS). The unemployment rates are matched to the respondent based on the year the respondent completed the phone survey.

### **Empirical Results**

The analysis begins by estimating a model of self-employment since previous empirical research has defined entrepreneurship in this way. Two other definitions of entrepreneurship – nascent entrepreneurship and corporate nascent entrepreneurship – are then tested in separate models using the same specification as the model of self-employment. These definitions of entrepreneurship and the number of respondents identified within each definition are reported in Table 1.



The probability that respondent  $R_i$  chooses to be an entrepreneur is estimated

using the following model:

$$\begin{aligned} \Pr(R_i \text{ is an entrepreneur}) = & \\ & \beta_1 FEMALE_i + \beta_2 NONWHITE_i + \beta_3 AGE_i + \beta_4 USBORN_i + \\ & \beta_5 EDUC_i + \beta_6 MARRIED_i + \beta_7 CHILDREN_i + \beta_8 SEPARATE_i + \\ & \beta_9 SEFRIEND_i + \beta_{10} WORKEXP_i + \beta_{11} RESIDE_i + \beta_{12} BETTER_i + \\ & \beta_{13} UNEMP_i + \beta_{14} RETIRE_i + \beta_{15} NETWORTH_i + \beta_{16} OWNHOME_i + \\ & \gamma' REGMEAS_i + \varepsilon_i \end{aligned} \quad (5)$$

Results of probit models of each definition of entrepreneurship, with robust standard errors and marginal effects, are reported in Tables 6 through 8.

In all of the models, a specification without the net worth measures – net worth and its square – is estimated. The potential for endogeneity of net worth in these models makes this specification necessary. This endogeneity is potentially a problem in the self-employment model, since the net worth of the self-employed respondent is clearly related to that respondent's self-employed status. However, net worth is possibly not endogenous to either of the nascent entrepreneur models since the nascent entrepreneur's status may not directly impact the nascent entrepreneur's net worth, since the firm may not produce any wealth to the nascent entrepreneur at the time of the survey. However, this relationship is not guaranteed to either exist or not exist, so specifications with and without net worth are reported.

#### Factors Associated with Self-Employment

Models of self-employment are reported in Table 6. The model in the first column of results (“Full Model”) includes all regressors and types of respondent. Column 2 (“without Net Worth”) reports a model using all respondents in the sample, but has removed the regressors for net worth and its square. The third and final column is a model with all regressors but uses a sample with the nascent entrepreneurs removed. This final model is, then, a comparison between the self-employed and the paid employees within the control group.

The only demographic variable positively associated with being self-employed are having parents that were self-employed. Having a friend that owns a business is insignificant to the probability of being self-employed. Nonwhites and women are less likely to become self-employed, unless nascent entrepreneurs are removed from the sample. The remaining individual demographic variables – age, education, marital status, number of children, and U.S.-born status – are statistically insignificant.

Two personality variables are found to have an effect on self-employment. Having a positive impression of the self-employed increases the probability that an individual is self-employed, while the preference for doing things “better” reduces the probability one becomes self-employed. The *a priori* expectation is that entrepreneurs would prefer doing things “better” as a consequence of their desire for autonomy. However, the flexibility a successful nascent entrepreneur – a self-employed person – needs to run a business may influence this result.

Years of work experience increases the probability an individual is self-

**Table 6. Probit Models of the Self-Employed**

|  | Full Model           | Without Net Worth    | Nascent Ent. Removed |
|--|----------------------|----------------------|----------------------|
| Female                                 | -0.072<br>[0.032]**  | -0.079<br>[0.031]**  | -0.063<br>[0.043]    |
| Nonwhite                               | -0.091<br>[0.034]*** | -0.091<br>[0.034]*** | -0.008<br>[0.049]    |
| Age                                    | 0.001<br>[0.002]     | 0.001<br>[0.002]     | 0<br>[0.003]         |
| Born in the U.S.                       | -0.015<br>[0.061]    | -0.017<br>[0.060]    | 0.004<br>[0.080]     |
| Education                              | -0.003<br>[0.006]    | -0.003<br>[0.006]    | -0.012<br>[0.009]    |
| Married                                | -0.01<br>[0.034]     | -0.015<br>[0.033]    | 0.004<br>[0.046]     |
| Number of Children                     | 0.013<br>[0.013]     | 0.016<br>[0.012]     | 0.018<br>[0.017]     |
| Parent was Self-employed               | 0.086<br>[0.030]***  | 0.098<br>[0.030]***  | 0.125<br>[0.044]***  |
| Friend Owns Business                   | 0.035<br>[0.033]     | 0.041<br>[0.033]     | -0.016<br>[0.044]    |
| Positive Impression of Self-employment | 0.156<br>[0.036]***  | 0.16<br>[0.035]***   | 0.114<br>[0.041]***  |
| Positive Economic Outlook              | 0.001<br>[0.031]     | -0.002<br>[0.031]    | -0.026<br>[0.043]    |
| Years of Work Experience               | 0.005<br>[0.002]**   | 0.005<br>[0.002]**   | 0.005<br>[0.003]     |
| Years Living in Current County         | 0.001<br>[0.001]     | 0.001<br>[0.001]     | 0.001<br>[0.001]     |
| Prefers Doing Things “Better”          | -0.077<br>[0.034]**  | -0.076<br>[0.033]**  | -0.059<br>[0.055]    |
| Unemployed                             | 0.026<br>[0.046]     | 0.012<br>[0.045]     | 0.121<br>[0.075]     |
| Retired                                | -0.091<br>[0.071]    | -0.092<br>[0.070]    | -0.032<br>[0.086]    |
| Net Worth (\$10,000)                   | -0.002<br>[0.001]*   |                      | -0.002<br>[0.001]**  |
| Net Worth Squared/1,000                | 0.01<br>[0.004]**    |                      | 0.015<br>[0.007]**   |
| Homeowner                              | 0.038<br>[0.035]     | 0.025<br>[0.034]     | 0.03<br>[0.048]      |

**Table 6. Probit Models of the Self-Employed, continued**

|                              | Full Model         | Without Net Worth  | Nascent Ent. Removed |
|------------------------------|--------------------|--------------------|----------------------|
| Regional Business Ownership  | 0.497<br>[0.311]   | 0.479<br>[0.308]   | 0.374<br>[0.442]     |
| Regional Population Density  | -0.003<br>[0.003]  | -0.003<br>[0.003]  | 0.002<br>[0.004]     |
| Regional Per Capita Income   | 0<br>[0.003]       | 0.001<br>[0.003]   | -0.002<br>[0.004]    |
| Regional Income Distribution | 0.001<br>[0.004]   | 0<br>[0.004]       | 0.002<br>[0.005]     |
| Regional Age Distribution    | 0.015<br>[0.007]** | 0.015<br>[0.007]** | -0.007<br>[0.010]    |
| Regional Education Level     | -0.005<br>[0.004]  | -0.004<br>[0.004]  | -0.001<br>[0.005]    |
| Regional Population Growth   | -0.01<br>[0.010]   | -0.011<br>[0.010]  | 0.019<br>[0.012]     |
| Regional Unemployment        | 0.008<br>[0.009]   | 0.009<br>[0.009]   | -0.011<br>[0.012]    |
| Observations                 | 1,167              | 1,195              | 416                  |

Coefficients are marginal changes in probability. Robust standard errors in brackets.  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

employed, unless nascent entrepreneurs are removed. However, local residency has no statistically significant effect. Being unemployed and being retired are both insignificant across specifications.

An individual's net worth has a negative and non-linear, but marginally significant, relationship to the probability an individual is self-employed. However, there is the potential for endogeneity of these variables to this specification. Owning a home is insignificant to the probability of self-employment.

The only regional measure that is found to have a significant effect on self-employment is the age distribution of the county in which the respondent resides. The

more youthful the county in which the respondent resides, the more likely that individual is self-employed. However, the significance of this coefficient drops away when nascent entrepreneurs are removed from the sample.

### Factors Associated with Nascent Entrepreneurship

Five specifications of the model of the nascent entrepreneurship are reported in Table 7. The first is again a “Full Model” specification using the full sample and all regressors. The second specification uses the full sample but drops the regressors for net worth and its square. The remaining specifications use all regressors. The third specification uses a sample where the self-employed respondents have been removed. The fourth specification uses a sample without corporate nascent entrepreneurs. The fifth, and final, specification uses a sample without either self-employed or corporate nascent entrepreneurs.

Two demographic variables are generally significant to the probability of being a nascent entrepreneur. These are race and having a friend who owns a business. Nonwhites are approximately 16% less likely to choose nascent entrepreneurship than whites. Having a friend that owns a business increases the probability an individual chooses to be a nascent entrepreneur. However, when the self-employed and corporate nascent entrepreneurs are removed from the sample, the coefficient on this variable is no longer significant. Also, when the self-employed are removed from the sample, the coefficient on this variable is only marginally significant.

**Table 7. Probit Models of Nascent Entrepreneurs**

|  | Full Model           | Without Net Worth    | Self-employed Removed | Corporate Entrep. Removed | Self-emp. & Corp. Entrep. Removed |
|--|----------------------|----------------------|-----------------------|---------------------------|-----------------------------------|
| Female                                 | -0.03<br>[0.030]     | -0.031<br>[0.030]    | -0.02<br>[0.044]      | -0.001<br>[0.033]         | 0.015<br>[0.046]                  |
| Nonwhite                               | -0.161<br>[0.033]*** | -0.163<br>[0.033]*** | -0.166<br>[0.048]***  | -0.18<br>[0.036]***       | -0.167<br>[0.050]***              |
| Age                                    | -0.004<br>[0.002]*   | -0.004<br>[0.002]*   | -0.004<br>[0.003]     | -0.003<br>[0.002]         | -0.005<br>[0.003]                 |
| Born in the U.S.                       | 0.072<br>[0.059]     | 0.067<br>[0.058]     | 0.087<br>[0.080]      | 0.101<br>[0.064]          | 0.116<br>[0.081]                  |
| Education                              | 0.008<br>[0.006]     | 0.008<br>[0.006]     | 0.004<br>[0.009]      | 0.011<br>[0.007]*         | 0.008<br>[0.010]                  |
| Married                                | 0.015<br>[0.033]     | 0.009<br>[0.032]     | 0.02<br>[0.047]       | 0.032<br>[0.036]          | 0.045<br>[0.048]                  |
| Number of Children                     | -0.009<br>[0.012]    | -0.005<br>[0.012]    | -0.013<br>[0.017]     | -0.014<br>[0.013]         | -0.019<br>[0.017]                 |
| Parent was Self-employed               | 0.046<br>[0.030]     | 0.045<br>[0.029]     | 0.065<br>[0.043]      | 0.047<br>[0.032]          | 0.069<br>[0.045]                  |
| Friend Owns Business                   | 0.093<br>[0.032]***  | 0.096<br>[0.032]***  | 0.077<br>[0.045]*     | 0.094<br>[0.035]***       | 0.076<br>[0.047]                  |
| Positive Impression of Self-employment | 0.198<br>[0.038]***  | 0.198<br>[0.038]***  | 0.207<br>[0.048]***   | 0.201<br>[0.040]***       | 0.207<br>[0.049]***               |
| Positive Economic Outlook              | 0.067<br>[0.030]**   | 0.061<br>[0.030]**   | 0.067<br>[0.043]      | 0.079<br>[0.032]**        | 0.085<br>[0.045]*                 |
| Years of Work Experience               | 0.005<br>[0.002]**   | 0.005<br>[0.002]***  | 0.007<br>[0.003]**    | 0.005<br>[0.002]**        | 0.008<br>[0.003]**                |
| Years Living in Current County         | -0.001<br>[0.001]    | -0.002<br>[0.001]    | -0.002<br>[0.002]     | -0.001<br>[0.001]         | -0.002<br>[0.002]                 |
| Prefers Doing Things "Better"          | -0.143<br>[0.031]*** | -0.146<br>[0.031]*** | -0.185<br>[0.046]***  | -0.158<br>[0.034]***      | -0.197<br>[0.049]***              |
| Unemployed                             | -0.064<br>[0.045]    | -0.059<br>[0.044]    | -0.049<br>[0.065]     | -0.063<br>[0.048]         | -0.048<br>[0.067]                 |
| Retired                                | -0.252<br>[0.076]*** | -0.24<br>[0.074]***  | -0.336<br>[0.088]***  | -0.242<br>[0.077]***      | -0.283<br>[0.090]***              |
| Net Worth (\$10,000)                   | -0.001<br>[0.001]*   |                      | -0.002<br>[0.001]*    | -0.001<br>[0.001]         | -0.001<br>[0.001]                 |
| Net Worth Squared/1,000                | 0.006<br>[0.005]     |                      | 0.011<br>[0.007]      | 0.006<br>[0.005]          | 0.003<br>[0.009]                  |

**Table 7. Probit Models of Nascent Entrepreneurs, continued**

|                              | Full Model         | Without Net Worth  | Self-employed Removed | Corporate Entrep. Removed | Self-emp. & Corp. Entrep. Removed |
|------------------------------|--------------------|--------------------|-----------------------|---------------------------|-----------------------------------|
| Homeowner                    | 0.025<br>[0.034]   | 0.015<br>[0.033]   | 0.003<br>[0.049]      | 0.039<br>[0.037]          | -0.009<br>[0.052]                 |
| Regional Business Ownership  | 0.25<br>[0.314]    | 0.258<br>[0.310]   | -0.042<br>[0.453]     | 0.243<br>[0.340]          | -0.018<br>[0.470]                 |
| Regional Population Density  | -0.004<br>[0.003]  | -0.003<br>[0.003]  | -0.001<br>[0.004]     | -0.003<br>[0.003]         | 0<br>[0.004]                      |
| Regional Per Capita Income   | -0.002<br>[0.003]  | -0.003<br>[0.003]  | -0.007<br>[0.005]     | -0.002<br>[0.003]         | -0.006<br>[0.005]                 |
| Regional Income Distribution | -0.005<br>[0.004]  | -0.006<br>[0.004]  | -0.003<br>[0.006]     | -0.006<br>[0.005]         | -0.005<br>[0.006]                 |
| Regional Age Distribution    | 0.009<br>[0.007]   | 0.01<br>[0.006]    | -0.001<br>[0.010]     | 0.011<br>[0.007]          | -0.001<br>[0.010]                 |
| Regional Education Level     | 0.007<br>[0.004]*  | 0.007<br>[0.004]** | 0.013<br>[0.005]**    | 0.007<br>[0.004]*         | 0.012<br>[0.005]**                |
| Regional Population Growth   | -0.016<br>[0.010]* | -0.017<br>[0.009]* | 0.003<br>[0.014]      | -0.016<br>[0.010]         | 0.006<br>[0.014]                  |
| Regional Unemployment        | 0.022<br>[0.010]** | 0.022<br>[0.010]** | 0.017<br>[0.014]      | 0.025<br>[0.010]**        | 0.018<br>[0.014]                  |
| Observations                 | 1,167              | 1,195              | 654                   | 1,060                     | 605                               |

Coefficients are marginal changes in probability. Robust standard errors in brackets.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

All three personality regressors are significant to the probability of being a nascent entrepreneur. Having a positive impression of self-employment increases the probability an individual is a nascent entrepreneur by around 20% in all specifications. Having a positive economic outlook is positively related to being a nascent entrepreneur, unless the self-employed are removed from the sample. However, preferring to do things “better” reduces the probability an individual is a nascent entrepreneur by at least 14%.

Two employment experience regressors are found to have a significant effect

on the probability of being a nascent entrepreneur. First, the years of work experience increases the probability an individual is a nascent entrepreneur by about one-half percent per year of experience. Second, being retired reduces the probability an individual chooses to be a nascent entrepreneur by around 25%. Neither the length of residence nor being unemployed are found to be significant to the model of nascent entrepreneurship.

Financial variables are found to be marginally significant to being a nascent entrepreneur. Net worth is marginally significant in two specifications where it is included, the full sample and the sample without the self-employed. In both cases, higher net worth reduces the probability an individual is a nascent entrepreneur. However, the squared net worth term is not significant in any specification. Owning a home has is also not statistically significant in any specification.

Three regional regressors are found to have at least some degree of significance to the probability an individual is a nascent entrepreneur. The local education level increases the probability an individual is a nascent entrepreneur by over one-half percent for each percentage increase in the number of college-educated individuals in the county. The county unemployment rate is positively related to the probability of nascent entrepreneurship as well, although this coefficient is insignificant in specifications without the self-employed. Finally, the county population growth rate is marginally significant and negative in specifications using the full sample.



## Factors Affecting Corporate Nascent Entrepreneurs

In order to determine whether corporate nascent entrepreneurs – who are starting firms with a recent employer – are different from other nascent entrepreneurs, a separate model is run for this entrepreneurship definition. Three specifications for the model of corporate nascent entrepreneurship are reported in Table 8. Following the other models, the first specification includes all regressors and the full sample. The second specification uses the full sample, but drops the regressors for net worth. Finally, the third specification uses the full set of regressors, but drops the control group from the analysis. This last specification is, then, a model of the difference between being a corporate nascent entrepreneur and being a non-corporate nascent entrepreneur.

Only one demographic regressor is consistently found to have an effect on the probability of corporate nascent entrepreneurship. Women are at least five percent less likely to be corporate nascent entrepreneurs. When the control group is removed, nonwhites are five percent more likely to be corporate nascent entrepreneurs than non-corporate nascent entrepreneurs, while having more children increases the probability of corporate nascent entrepreneurship. Being older reduces the probability of corporate nascent entrepreneurship, unless the control group is removed. Education reduces the probability as well, unless net worth is removed.

No personality variable is consistently significant to corporate nascent entrepreneurship. Having a positive impression of self-employment increases the probability of being a corporate nascent entrepreneur by almost three percent, but is

**Table 8. Probit Models of Corporate Entrepreneurs**

|  | Full Model           | Without Net Worth    | Control Group Removed |
|--|----------------------|----------------------|-----------------------|
| Female                                 | -0.051<br>[0.016]*** | -0.053<br>[0.017]*** | -0.073<br>[0.025]***  |
| Nonwhite                               | 0.01<br>[0.018]      | 0.007<br>[0.018]     | 0.053<br>[0.029]*     |
| Age                                    | -0.002<br>[0.001]*   | -0.002<br>[0.001]**  | -0.002<br>[0.002]     |
| Born in the U.S.                       | -0.033<br>[0.034]    | -0.03<br>[0.034]     | -0.081<br>[0.059]     |
| Education                              | -0.006<br>[0.003]*   | -0.004<br>[0.003]    | -0.012<br>[0.005]**   |
| Married                                | -0.024<br>[0.017]    | -0.022<br>[0.017]    | -0.044<br>[0.028]     |
| Number of Children                     | 0.007<br>[0.006]     | 0.006<br>[0.006]     | 0.016<br>[0.009]*     |
| Parent was Self-employed               | 0.001<br>[0.016]     | 0.005<br>[0.016]     | -0.01<br>[0.024]      |
| Friend Owns Business                   | 0.011<br>[0.016]     | 0.012<br>[0.016]     | -0.005<br>[0.027]     |
| Positive Impression of Self-employment | 0.029<br>[0.016]*    | 0.028<br>[0.017]*    | 0.002<br>[0.032]      |
| Positive Economic Outlook              | -0.004<br>[0.015]    | -0.009<br>[0.016]    | -0.023<br>[0.025]     |
| Years of Work Experience               | 0.001<br>[0.001]     | 0.001<br>[0.001]     | 0<br>[0.002]          |
| Years Living in Current County         | 0<br>[0.001]         | 0<br>[0.001]         | 0<br>[0.001]          |
| Prefers Doing Things “Better”          | 0.013<br>[0.016]     | 0.01<br>[0.017]      | 0.045<br>[0.025]*     |
| Unemployed                             | -0.018<br>[0.021]    | -0.018<br>[0.022]    | -0.013<br>[0.036]     |
| Retired                                | -0.061<br>[0.021]*** | -0.038<br>[0.033]    | -0.082<br>[0.044]*    |
| Net Worth (\$10,000)                   | 0<br>[0.000]         |                      | 0.001<br>[0.001]      |
| Net Worth Squared/1,000                | 0<br>[0.002]         |                      | -0.002<br>[0.003]     |
| Homeowner                              | -0.028<br>[0.019]    | -0.025<br>[0.018]    | -0.049<br>[0.030]     |

**Table 8. Probit Models of Corporate Entrepreneurs, continued**

|                              | Full Model        | Without Net Worth | Control Group Removed |
|------------------------------|-------------------|-------------------|-----------------------|
| Regional Business Ownership  | -0.033<br>[0.158] | -0.078<br>[0.167] | -0.127<br>[0.252]     |
| Regional Population Density  | -0.001<br>[0.001] | -0.001<br>[0.001] | 0<br>[0.002]          |
| Regional Per Capita Income   | -0.002<br>[0.001] | -0.002<br>[0.001] | -0.004<br>[0.002]     |
| Regional Income Distribution | 0.001<br>[0.002]  | 0.001<br>[0.002]  | 0.003<br>[0.003]      |
| Regional Age Distribution    | -0.001<br>[0.004] | -0.001<br>[0.004] | -0.003<br>[0.006]     |
| Regional Education Level     | 0.003<br>[0.002]  | 0.003<br>[0.002]  | 0.003<br>[0.003]      |
| Regional Population Growth   | -0.005<br>[0.005] | -0.005<br>[0.005] | -0.005<br>[0.008]     |
| Regional Unemployment        | -0.001<br>[0.005] | -0.002<br>[0.005] | -0.006<br>[0.008]     |
| Observations                 | 1,167             | 1,195             | 751                   |

Coefficients are marginal changes in probability. Robust standard errors in brackets.  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

only marginally significant when the full sample is used and is insignificant when the control group is removed. Preferring to do things “better” is only significant when the control group is removed. Nascent entrepreneurs with this preference are 4.5% more likely to be corporate nascent entrepreneurs.

Of the experience regressors, only being retired is significant to the probability of being a corporate nascent entrepreneur. Being retired reduces the probability by six percent in the full model and by a marginally significant eight percent without the control group. It should be noted that all corporate nascent entrepreneurs are not retired by construction of the PSED.

No remaining regressors are found to have a significant effect on the probability of being a corporate nascent entrepreneur. Net worth and its square are consistently insignificant across specifications where they are included. Owning a home is also insignificant in all specifications. No regional measure is found to have a statistically significant impact on the probability of corporate nascent entrepreneurship.

#### Are Self-Employed Individuals Different From Nascent Entrepreneurs?

The question of whether the self-employed are different from nascent entrepreneurs is the question of whether past studies of the self-employed suffered from selection bias. Table 9 shows the results of a pair of Chow tests performed on the data to address this question. Both tests are of the nascent entrepreneur definition against the alternative entrepreneurship definitions – self-employment and corporate nascent entrepreneurship. The tests are performed by using a linear probability model of the nascent entrepreneur definition as defined by the Panel Survey of Entrepreneurial Dynamics. Table 9 reports the calculated F statistic for each definition and the rejection level of the statistic.

**Table 9. Chow Tests of Differences Between Nascent Entrepreneurs and Others**

| <b>Entrepreneurship Hypothesis</b>   | <b>Calculated F Statistic</b> | <b>Rejection Level</b> |
|--|-------------------------------|------------------------|
| Nascent Entrepreneurship is equivalent to Self-employment                            | 4.676                         | 1%                     |
| General Nascent Entrepreneurship is equivalent to Corporate Nascent Entrepreneurship | 3.197                         | 1%                     |
| 5% critical $F(27, 1139) = 1.66$ , 1% critical $F(27, 1139) = 2.07$                  |                               |                        |

The self-employed are found to be significantly different from nascent entrepreneurs. The null hypothesis that both definitions are identical is rejected at the one percent level. This supports the contentions of Aldrich (1990), Gartner, et al. (2004), and Burke, et al. (2006) that these groups are different. In other words, selection bias is a problem of past research that examined only the self-employed in their studies of entrepreneurship.

However, none of these authors connects the problems of using a self-employment definition of entrepreneurship with potential selection bias. In particular, Aldrich (1990) and Gartner, et al. (2004) focus on several other problems in earlier entrepreneurship research – such as small samples and the lack of multivariate analysis. These papers support the existence of selection bias due to defining entrepreneurs solely as the self-employed, but they do not draw the same conclusions about selection bias that have been found in this chapter. In this respect, the problems discussed by Aldrich (1990) and others are worse than have been previously identified.

Second, corporate entrepreneurs are found to be different from other nascent entrepreneurs, again at the one percent level. This difference is expected at least in terms of the differences between each group with regard to liquidity constraints. Corporate nascent entrepreneurs do not experience the same difficulties financing a firm that other nascent entrepreneurs do, since corporate nascent entrepreneurs have access to the resources of their employers.

## Conclusions

This chapter examines models of entrepreneurship with data from the Panel Survey of Entrepreneurial Dynamics (PSED). These models utilize different definitions within the PSED, mostly based on either self-employment or nascent entrepreneurship. These various definitions are examined by estimating models with samples adjusted for each separate definition. For instance, the PSED allows the currently self-employed to identify themselves as nascent entrepreneurs, by planning a new venture while working in their current one. Additionally, the PSED identifies some respondents as corporate nascent entrepreneurs, who are planning new businesses with a current employer.

There are several similarities between self-employment and nascent entrepreneurship. Nonwhites are less likely to be either self-employed or a nascent entrepreneur. Having a positive impression of self-employment increases both the probability of being self-employed and the probability of being a nascent entrepreneur, as does work experience. Individuals who prefer doing things “better” are less likely to be either self-employed or a nascent entrepreneur, as are individuals with greater net worth.

Several differences exist between self-employment and nascent entrepreneurship. Women are less likely to be self-employed but are equally likely to be nascent entrepreneurs. Having a parent who was self-employed increases the probability an individual is self-employed, but has no effect on the probability of nascent entrepreneurship. Interestingly, having a friend who owns a business has the

opposite result, by increasing the probability of nascent entrepreneurship but having no effect on self-employment. Individuals with a positive economic outlook are more likely to be nascent entrepreneurs, but a positive economic outlook does not change the probability of being self-employed. Retirees are less likely to be nascent entrepreneurs but being retired has no effect on the probability of self-employment.

A Chow test performed on the hypothesis that the models of self-employment are identical to models of nascent entrepreneurship confirms that the differences outweigh the similarities. The similarity between these models is rejected at the one percent level. This result confirms many of the criticisms that entrepreneurship researchers such as Aldrich (1990), Gartner, et al. (2004), and Burke, et al. (2006) have made that nascent entrepreneurs and the self-employed are different.

Finally, a model of corporate nascent entrepreneurs is run. Corporate nascent entrepreneurs differ from other nascent entrepreneurs in that corporate nascent entrepreneurs are planning firms with an employer. This model finds that very few regressors are significant to the probability of corporate nascent entrepreneurship. Women, in particular, are less likely to be corporate nascent entrepreneurs even though no gender difference is found in nascent entrepreneurship, generally. However, the generally lackluster results of this model may be a result of the small number of corporate nascent entrepreneurs within the PSED. Certainly, the potential difference between corporate nascent entrepreneurs and other nascent entrepreneurs warrants further scrutiny of this group.

The major contribution of this analysis is finding that a clear difference does

exist between the self-employed and nascent entrepreneurs. In fact, studies that use only the self-employed as a measure of entrepreneurship are introducing selection bias in their estimates. The selection bias here is a clear result of the fact that the self-employed are successful nascent entrepreneurs, since the goal of nascent entrepreneurship is to become self-employed. The consequence of this selection bias is that past entrepreneurship studies have been based only on successful entrepreneurs – the self-employed. This point is made by Aldrich (1990) and verified in this analysis.

The selection bias identified by this analysis has both policy and research implications, most notably with regard to gender effects. The policy implications are due to the design of policies intended to overcome differences in overestimated demographic variables such as gender. The research implications are that further examination of the firm formation process, particularly with regard to the relationship between gender and firm establishment, needs to be conducted.

Policies which have been designed to increase the entrepreneurial activities of women need to be redesigned. The expectation that women are less likely to be entrepreneurs has been based on the examination of self-employment. Indeed, this result has been confirmed in this chapter. However, the overestimation of the effect of gender on the probability that an individual chooses to be an entrepreneur, when being an entrepreneur is defined as being self-employed, has also been demonstrated. since gender is statistically insignificant in the model of the probability an individual is a nascent entrepreneur. Therefore, policies which as designed to increase the



participation rate of women in entrepreneurial activities are misplaced, given that there are no gender differences at the nascent entrepreneur stage. Instead, these policies should be targeted at women's chances of establishing a firm (i.e., the chances a woman becomes a successful nascent entrepreneur as is self-employed), since the gender differences in self-employment persist. Thus, policies that assist women in establishing firms may narrow the gender gap in self-employment.

Finally, economists need to conduct further research into firm formation. Since women are no less likely to be nascent entrepreneurs, but are less likely to be self-employed, there remain gender differences at some stage of the establishment of firms. These gender differences may be that women's firms are less likely to be established, possibly due to financing or other economic issues. However, these gender differences could also be due to women's preferences for establishing firms in ways that are not defined as self-employment (e.g., partnerships). This analysis demonstrates that selection bias underlying past studies of entrepreneurship based on a definition of self-employment justify further examination of the process of firm formation.

## CHAPTER THREE

### WHAT DETERMINES NASCENT ENTREPRENEUR OUTCOMES? A DURATION ANALYSIS OF FIRM FORMATION

Nascent entrepreneurs are actively involved in starting a firm. These individuals are interesting and important in terms of the economy (Baumol, et al. 2007). However, not all nascent entrepreneurs are successful at starting firms. In fact, three potential outcomes have been noted for this group: remaining a nascent, starting a firm, or quitting altogether (Carter, et al. 2003, Parker and Belghitar 2006). The Panel Study of Entrepreneurial Dynamics (PSED) contains data on nascent entrepreneurs and what occurs to them over additional three waves. Parker and Belghitar (2006) examine two of these three waves, choosing to remove data from the final wave. This is due to attrition from the data due nascents starting firms or choosing to quit, both of which are the stated targets of their study.

This chapter, in contrast, analyzes the factors that are related to a nascent entrepreneur quitting work on his firm or related to a nascent entrepreneur starting his firm. The data for this research comes from all three waves of the PSED. Since data consistency can be a problem for many panel models, this chapter develops a framework for using a competing risks hazard model. The hazard model has a distinct advantage in cases where data attrition and censoring occurs, particularly when that attrition is caused by the variables of interest. Two hazard models, one of the risks of a nascent entrepreneur quitting and one of the risks of a nascent entrepreneur starting a firm, are estimated.

This chapter finds that the nascent entrepreneur's ability, access to resources, and commitment to the firm formation process significantly affect the nascent entrepreneur's chances of getting a firm operational. Only one measure, the self-employment status of the nascent entrepreneur, has a negative and significant effect on a nascent entrepreneur's hazard of quitting – the result means that nascent entrepreneurs that consider themselves self-employed are less likely to quit their ventures.

A competing risks hazard model of the nascent entrepreneur's possible outcomes – firm operation or quitting – is developed in section two. A discussion of the PSED is provided in section three. Empirical results are reported in section four.

### **Competing Risks Hazard Model of Firm Formation**

The model developed in this section is a competing risks hazard model for each of two possible decisions made by a nascent entrepreneur. A nascent entrepreneur is defined as an individual that is in the early stages of establishing a firm (Gartner, et al. 2004). The competing risks hazard model controls for the attrition of individuals from the data. This section begins by discussing a model by Parker and Belghitar (2006) that uses the PSED data and the problems that paper had in estimating the model because of attrition inherent in the PSED's structure.

Parker and Belghitar (2006) construct a model where a nascent entrepreneur is confronted with a utility maximizing problem in the first of two periods. The choice made by the nascent entrepreneur in this period determines the utility outcome in this

period and in the next. In the first period, the nascent entrepreneur must decide whether to remain a nascent entrepreneur or to quit trying to start a firm. A third possibility, that the venture becomes an operating firm, may occur in the first period. However, the operating firm reduces the problem for the nascent by removing the necessity to choose. These three options were defined by Parker and Belghitar (2006) as

$$Z_i = \begin{cases} 0 & \text{if } i \text{ remains a nascent entrepreneur} \\ 1 & \text{if } i \text{ starts the firm} \\ 2 & \text{if } i \text{ gives up / quits} \end{cases} \quad (6)$$

which they used to estimate a multinomial logit model. However, one particular problem of the PSED is that individuals drop out of the survey if they either choose to end their attempts at firm formation or successfully create operating ventures. The result is that respondents identified as nascent entrepreneurs in the initial wave may not show up in all three subsequent waves. Parker and Belghitar (2006) chose to deal with this problem by estimating a multinomial logit model only on individuals who report in both the second and third waves, while completely ignoring the final fourth wave. This is a helpful, albeit unsatisfactory, method for dealing with missing data points.

Instead, this chapter utilizes a Cox proportional hazard model to estimate the probability an individual PSED respondent chooses to quit being a nascent entrepreneur. The Cox proportional hazard model estimates the probability an event occurs to an individual given that individual was engaged in activity that could lead to

that event (Cox 1972). In this chapter, the two separate events are whether a nascent decides to quit trying to start a firm and whether a nascent is successful in starting a firm. In the data, each event is a distinct reason for a respondent to drop out of the survey so each reason is modeled separately.

Models are estimated for a nascent successfully starting an operating firm and for a nascent who quits the process. The Cox proportional hazard models for each of these possibilities are competing risks models – that is, the probability of operating a firm is estimated given both that the respondent is actually a nascent and that they have not exited the data for some other reason. The competing risks hazard model for an event  $j$  among possible events  $Z$  occurring at time  $t$  to individual  $i$  is estimated according to a hazard function such as the following:

$$h_{jv}(t) = \lim_{\Delta t \rightarrow 0} \frac{\Pr\{t \leq T_i < t + \Delta t, Z_i = j \mid T_i \geq t\}}{\Delta t}, \quad j = 1, \dots, J \quad (7)$$

(Allison 1990, 186). Following Parker and Belghitar (2006),  $J = 2$  since two possible outcomes lead to a nascent entrepreneur leaving the data – operating a firm and quitting as a nascent entrepreneur. In terms of conditioning variables, detailed in Table 10, the model estimated here is the following:

$$\begin{aligned}
h_{ij} = & \beta_1 FEMALE_{ij} + \beta_2 NONWHITE_{ij} + \beta_3 AGE_{ij} + \beta_4 USBORN_{ij} + \\
& \beta_5 EDUCATION_{ij} + \beta_6 MARRIED_{ij} + \beta_7 CHILDREN_{ij} + \\
& \beta_8 SEPARENT_{ij} + \beta_9 SEFRIEND_{ij} + \beta_{10} OUTLOOK_{ij} + \\
& \beta_{11} WORKEXP_{ij} + \beta_{12} RESIDENCE_{ij} + \beta_{13} BETTER_{ij} + \\
& \beta_{14} UNEMP_{ij} + \beta_{15} RETIRED_{ij} + \beta_{16} \log(INCOME)_{ij} + \\
& \beta_{17} NETWORTH_{ij} + \beta_{18} NETWORTH_{ij}^2 + \\
& \beta_{19} HOMEOWNER_{ij} + \beta_{20} PAIDEMP_{ij} + \beta_{21} CORPENT_{ij} + \\
& \beta_{22} SERIALENT_{ij} + \beta_{23} BUSPLAN_{ij} + \beta_{24} BUSASSIST_{ij} + \\
& \beta_{25} MIDWEST_{ij} + \beta_{26} SOUTH_{ij} + \beta_{27} WEST_{ij} + \\
& \beta_{28} MICRO_{ij} + \beta_{29} RURAL_{ij} + \varepsilon_{ij}
\end{aligned} \tag{8}$$

For this chapter, two possible events exist – operating a business or quitting the effort to start a firm. These two competing risks describe the possible means by which a nascent entrepreneur leaves these data. Each of these models is estimated separately, however the nature of the competing risks model is such that estimating separately is statistically the same as estimating them simultaneously (Allison 1990, 187-188). The models adjust for a number of measures that can influence the likelihood of an individual’s success or failure.

For instance, consider the case of an increase in the nascent’s wealth. This increase will change the nascent entrepreneur’s perceived likelihood of success in forming his firm or the amount of resources he can invest in firm formation (Evans and Jovanovic 1989, Evans and Leighton 1989, Holtz-Eakin, et al. 1994a, Holtz-Eakin, et al. 1994b, Blanchflower and Oswald 1998). When this perception changes, the nascent will update his estimation of his probability of success, since wealth has

changed. The resulting probability will be higher than before, so the nascent will be more likely to choose to either stay a nascent and less likely to choose to quit. In the case of a change in wealth, the wealth effect on the utility function does not impact the subjective determination of the probability of success. Except for income, any other considerations will alter the choice of whether to remain a nascent through the subjective determination of that probability in the same manner. Examples of these considerations are education, participation in a business assistance program, and experience.

Now instead consider an increase in the nascent's potential income from employed work. In this case, the effect of a higher income on utility makes a great difference to the nascent's subjective probability determination. If the higher income causes the nascent's utility calculation to remain such that remaining a nascent is better than being employed, then the subjective probability of success estimate will not necessarily change. If, however, the nascent now perceives the utility difference between remaining a nascent and quitting for employed work to be in favor of working for others, the subjective probability of the potential firm formation will change in such a way that the nascent will quit trying to form a firm.

These known differences between related states make it possible to use a competing risks model to estimate the probability an individual quits being a nascent for potentially competing reasons. In the case of this chapter, the competing reasons are that the nascent chooses either quitting the effort of firm formation or successfully founds an operating firm.

This chapter includes data from all waves of the PSED. The complete PSED includes only those respondents who were identified as nascent entrepreneurs in the initial wave. The competing risks hazard model for nascent entrepreneur success in operating a firm, as an example, estimates the competing risks of an individual nascent entrepreneur operating a firm versus the possibility that nascent decides to quit or otherwise remains in the data. While the multinomial logit model requires a complete panel, the competing risks hazard model actually utilizes the fact that nascent entrepreneurs drop out of the data for identifiable reasons. In the competing risks hazard model, modeling the nascent entrepreneur's success at having an operating firm (or, alternatively, the nascent entrepreneur's choice of quitting) in a given period is similar to modeling the probability of an instantaneous risk occurring at time  $t$  prior to a known end time  $T$  according to the hazard function:

$$h(t) = \lim_{\Delta t \rightarrow 0} \frac{\Pr(t \leq T < t + \Delta t \mid T \geq t)}{\Delta t} \quad (8)$$

This function describes the chance an event occurs between observed time periods conditional on the individual being observed at time  $t$ .

Allison (1990, ch. 6) states that the general form for the Cox proportional competing risks hazard function,  $h(t)$ , with  $k$  coefficients and baseline hazard  $\alpha(t)$ , is the following:

$$\log h(t) = \alpha(t) + \beta_0 x_0(t) + \beta_1 x_1(t) + \dots + \beta_k x_k(t) \quad (9)$$

It should be noted that not all of the  $x_k(t)$  need to vary over time. Additionally, the



Cox proportional hazard model is semi-parametric since the baseline hazard,  $\alpha(t)$ , is estimated without specifying any distributional assumptions about its form.

Regressors for the models estimated in this chapter have been chosen to reflect items that could affect the success or failure of the nascent entrepreneur. The primary regressors of interest in the model are the ability of the nascent entrepreneur to establish a firm, the resources that the nascent entrepreneur has available, the commitment the nascent entrepreneur demonstrates in establishing the firm, and the management decisions the nascent entrepreneur has made in developing the firm. In general, any regressor that increases the hazard that a nascent entrepreneur has an operating firm will decrease the hazard that a nascent entrepreneur decides to quit. A list of these regressors can be found in Table 10 and the summary statistics for these regressors can be found in Table 11.

The ability of the nascent entrepreneur in operating a firm is represented by having a parent that was self-employed, having a friend that owns a business, self-employed during the initial wave of surveying, and the work experience of the nascent entrepreneur. These variables are intended to proxy for the nascent entrepreneur's skills in operating a firm, since direct measures of these skills are unavailable. In particular, being self-employed during the initial wave is a proxy for serial entrepreneurship. Serial entrepreneurs are found to be different from other entrepreneurs in their abilities to create operating firms (Westhead, et al. 2005), due to the experience these individuals have gained from past entrepreneurial ventures. It is expected that all of these regressors except work experience increase the hazard of the

**Table 10. Definitions of Variables Used in the Analysis**

| <b>Variable Name</b>              | <b>Definition</b>  |
|-----------------------------------|--|
| Female                            | Female = 1   |
| Nonwhite                          | Nonwhite = 1   |
| Age                               | Age at time of survey  |
| Born in the U.S.                  | Born in the U.S. = 1   |
| Education                         | Years of education   |
| Married                           | Married = 1  |
| Number of Children                | Number of children under age 18                              |
| Parent was Self-employed          | At least one parent of respondent was self-employed = 1      |
| Friend Owns Business              | At least one friend of respondent owns a business = 1        |
| Positive Economic Outlook         | Has positive economic outlook at initial wave = 1            |
| Years of Work Experience          | Total Years of Work Experience                               |
| Years Living in Current County    | Years Living in Current County                               |
| Prefers Doing Things “Better”     | Prefers doing things “better” = 1                            |
| Unemployed at Initial Wave        | Unemployed at initial wave = 1                               |
| Retired at Initial Wave           | Retired at initial wave = 1                                  |
| ln(Initial Wave Income)           | Natural log of income at initial wave                        |
| Initial Wave Net Worth (\$10,000) | Net Worth (\$10,000) at initial wave                         |
| Homeowner                         | Homeowner = 1  |
| Employed by Others                | Employed by others = 1                                       |
| Venture with Employer             | Venture planned with initial wave employer = 1               |
| Self-employed at Initial Wave     | Self-employed at initial wave = 1                            |
| Venture has Business Plan         | Some form of business plan for venture exists = 1            |
| Business Assistance Requested     | Some business assistance program has been contacted = 1      |
| Midwest                           | Respondent lives in the Midwest = 1                          |
| South                             | Respondent lives in the South = 1                            |
| West                              | Respondent lives in the West = 1                             |
| Micropolitan County               | County population exceeds 10,000 but is less than 50,000 = 1 |
| Rural County                      | County population less than 10,000 = 1                       |

**Table 11. Summary Statistics (\* are time invariant)**

| Variable Name                         | Obs.  | Mean   | Std. Dev. | Min   | Max    |
|---------------------------------------|-------|--------|-----------|-------|--------|
| Female*                               | 3,320 | 0.486  | 0.5       | 0     | 1      |
| Nonwhite*                             | 3,300 | 0.378  | 0.485     | 0     | 1      |
| Age                                   | 3,312 | 39.581 | 11.168    | 18    | 74     |
| Born in the U.S.*                     | 3,204 | 0.916  | 0.277     | 0     | 1      |
| Education*                            | 3,304 | 15.067 | 2.604     | 8     | 20     |
| Married                               | 2,375 | 0.581  | 0.493     | 0     | 1      |
| Number of Children*                   | 3,284 | 1.119  | 1.316     | 0     | 7      |
| Parent was Self-employed*             | 3,320 | 0.5    | 0.5       | 0     | 1      |
| Friend Owns Business*                 | 3,320 | 0.728  | 0.445     | 0     | 1      |
| Positive Economic Outlook*            | 3,320 | 0.51   | 0.5       | 0     | 1      |
| Years of Work Experience*             | 3,252 | 17.443 | 10.705    | 0     | 60     |
| Years Living in Current County*       | 3,224 | 17.398 | 14.441    | 0.167 | 64     |
| Prefers Doing Things “Better”         | 2,375 | 0.674  | 0.469     | 0     | 1      |
| Unemployed*                           | 3,320 | 0.12   | 0.326     | 0     | 1      |
| Retired*                              | 3,320 | 0.031  | 0.174     | 0     | 1      |
| ln(Initial Wave Income)*              | 3,176 | 10.726 | 0.721     | 8.006 | 14.403 |
| Initial Wave Net Worth (\$10,000)*    | 3,168 | 2.532  | 4.079     | -3.8  | 26     |
| Initial Wave Net Worth Squared/1,000* | 3,168 | 0.023  | 0.08      | 0     | 0.676  |
| Homeowner                             | 2,355 | 0.708  | 0.455     | 0     | 1      |
| Employed by Others                    | 2,359 | 0.614  | 0.487     | 0     | 1      |
| Venture with Initial Wave Employer*   | 3,320 | 0.142  | 0.349     | 0     | 1      |
| Self-Employed at Initial Wave*        | 2,375 | 0.648  | 0.478     | 0     | 1      |
| Venture has Business Plan             | 3,320 | 0.665  | 0.472     | 0     | 1      |
| Business Assistance Requested         | 3,320 | 0.194  | 0.396     | 0     | 1      |
| Midwest*                              | 3,320 | 0.214  | 0.411     | 0     | 1      |
| South*                                | 3,320 | 0.36   | 0.48      | 0     | 1      |
| West*                                 | 3,320 | 0.234  | 0.423     | 0     | 1      |
| Micropolitan County*                  | 3,320 | 0.086  | 0.281     | 0     | 1      |
| Rural County*                         | 3,320 | 0.297  | 0.457     | 0     | 1      |

nascent entrepreneur establishing a firm and reduce the hazard of the nascent entrepreneur choosing to quit. The effect of work experience may increase the hazard of having an operating firm due to the business knowledge this may reflect, as indicated by Lazear's (2005) theoretical model. However, it may instead reduce the hazard of having an operating firm due to the potential for other opportunities for the nascent entrepreneur due to this experience, or have no effect at all. Lazear (2005) found no effect.

The resources available to the entrepreneur are modeled using two separate approaches. First, the financial resources of the nascent entrepreneur are represented by the natural log of the initial wave income of the nascent entrepreneur, the initial wave net worth and its square, and whether the nascent entrepreneur owns a home. Second, the resource network available for the nascent entrepreneur to draw upon is represented in the model by the number of years the nascent entrepreneur has lived in the county they reside and whether the nascent entrepreneur is establishing a firm with the employer the nascent entrepreneur had in the initial wave.

The initial wave income and net worth are used in order to avoid possible endogeneity of these measures in the model, since these measures are affected by the potential operation of a firm and the potential return to employed work by the nascent entrepreneur. The nascent entrepreneur with greater financial resources is expected to be more likely to establish a firm (Holtz-Eakin, et al. 1994b), just as a self-employed individual with greater financial resources is found to remain self-employed longer (Georgellis, et al. 2007). However, the expectation of the initial income and wealth

on the hazard of quitting is not necessarily obvious. In part, a greater amount of financial resources may reduce the hazard of quitting by increasing the hazard of having an operating firm. However, a larger amount of either income or net worth may increase the hazard of the nascent entrepreneur choosing to quit because the higher wealth may represent a more valuable option to the nascent entrepreneur than the possibility of self-employment (Amit, et al. 1995).

The potential size of the nascent entrepreneur's resource network is represented both by whether the nascent entrepreneur is planning the firm with a recent employer and by the length of time the nascent entrepreneur has been a resident of the county where the firm will be established. The nascent entrepreneur with the larger resource network is expected to be the nascent entrepreneur with the higher hazard of having an operating firm (Shane and Cable 2002). The nascent entrepreneur that is planning a firm with a recent employer is expected to be more likely to establish a firm due to the access to the recent employer's resources. The nascent entrepreneur who has lived in the county where the firm is to be established is reasonably believed to have a access to a larger number of local resources as the result of the longer residency – that is, it is expected that residing in one place allows the nascent entrepreneur to find more friends and have a greater knowledge of local resources. Thus, a nascent entrepreneur with a longer local residency is expected to be more likely to have the firm operating and, conversely, to be less likely to quit the firm formation effort.

The commitment of the nascent entrepreneur to establishing a firm is

represented by whether the nascent entrepreneur has a positive outlook for the local economy, whether the nascent entrepreneur was unemployed or retired during the initial wave of the survey, and whether the nascent entrepreneur is employed by others in a given wave of the survey. Perceptual and demographic variables such as these have been found to be important determinants of a nascent entrepreneur's success (Arenius and Minniti 2005). It is expected that a nascent entrepreneur with a positive outlook for the economy is more optimistic about the potential firm's opportunities and, therefore, more likely to be committed to establishing the firm. An unemployed nascent entrepreneur may have a lower hazard of establishing a firm – and a higher hazard of quitting – if another opportunity is presented to the nascent entrepreneur (Amit, et al. 1995). A retired nascent entrepreneur may have a similar hazard as the unemployed nascent entrepreneur due to the known option for this nascent entrepreneur of returning to retirement. If the nascent entrepreneur continues to be employed by others, or returns to such employment, then that nascent entrepreneur may be less committed to establishing the firm as a result of this employment. Vivarelli (2004) finds that the entrepreneur's commitment to the venture is an important determinant of the firm's success. The preference for doing things "better" is the final perceptual variable included.

Finally, two measures of firm management are expected to have an effect on both the hazard of establishing a firm and the hazard of quitting. First, a regressor for whether a business plan has been created for the firm is included and this regressor is expected to have a positive effect on the establishment of an operating firm. Second,

a regressor for whether a business assistance program has been contacted is included. In part, these regressors are measures of the strategic choices the nascent entrepreneur has made toward the establishment of the firm. Littunen (2000) finds that strategy has an effect on the growth of a firm. Both regressors are expected to increase the hazard of establishing a firm and reduce the hazard of quitting.

Additionally, regional measures and demographic measures are included in the model to reflect the effects of local area characteristics and demographics on the hazards of either establishing a firm or quitting the effort. Storey and Wyncarczyk (1996) find that local and regional characteristics are important to a firm's success. Three indicator measures of the nascent entrepreneur's location are included – midwest, south, and west. The base measure of the model is for a nascent entrepreneur located in the northeastern United States. In addition, two area size indicators are included in the model – micropolitan and rural. The base measure is for a metropolitan nascent entrepreneur, that is, one that resides in a county with a population greater than 50,000. A micropolitan area is defined as a county with a population between 10,000 and 50,000, while a rural county has a population of less than 10,000. Measures for demographic characteristics of the nascent entrepreneur are if the nascent entrepreneur is female, the age of the nascent entrepreneur, whether the nascent entrepreneur was born in the United States, the education of the nascent entrepreneur, the marital status of the nascent entrepreneur, and the nascent entrepreneur's number of children.

## Data

This chapter uses data from the Panel Survey of Entrepreneurial Dynamics (PSED) to evaluate the competing risks hazard model of a nascent entrepreneur having an operating firm and the competing risks hazard model of a nascent entrepreneur choosing to quit planning a firm. Gartner, et al., 2004 explain that the PSED was developed in response to the need for data that identifies entrepreneurs at stages earlier than self-employment. Nascent entrepreneurs are individuals who are in the planning stages of creating a firm. While there is some discussion of the definition of the entrepreneur and how best to study entrepreneurship (e.g., Venkataraman 1998), this chapter will use the nascent entrepreneurship definition in order to stay true to the data from the survey.

The PSED contains responses from 830 nascent entrepreneurs over four waves taken between 1998 and 2003. For each respondent, each subsequent wave of the survey was conducted approximately twelve months following the previous wave. The first wave contains observations from surveys conducted between 1998 and 2000. It should be noted that the first opportunity in the PSED for a nascent to be identified either as having an operating firm or as choosing to quit is in the second wave.

The measures for region location – midwest, south, and west – are taken directly from the PSED, however the population-based measures are from a different source. The PSED includes state and county Federal Information Processing Standards (FIPS) identifiers for each respondent. The inclusion of the state and county FIPS number provides a means of matching outside data with the PSED. In



the case of the population-based measures – micropolitan and rural – the state and county population for each respondent is taken from the Regional Economic Accounts of the U.S. Bureau of Economic Analysis. The county-level population for each given wave of the data is matched to the respondent for the year in which the respondent completed that particular wave of the survey.

Summary statistics of the data used in the analysis are found in Table 11. The varying number of observations with non-missing data for each regressor is a result of the attrition of nascent entrepreneurs from the data. Relevant observation counts for each model are provided with the empirical results, which are discussed in the following section.

### **Empirical Results**

Three specifications are estimated for each of the competing risks hazard models – nascent entrepreneur operating and nascent entrepreneur quitting. The first specification of each model is the full model, with all regressors included. The second model removes the potentially endogenous measures of income and net worth. These regressors are defined using the initial wave measures for income and net worth in order to reduce possible endogeneity, which would bias the estimates of the model. However, since it is possible for a nascent entrepreneur either to attain firm operation or choose to quit prior to the second wave, the measures of income and net worth even in this wave may be directly linked to the firm being started. Therefore, the analysis estimates a second specification, which removes income and net worth

measures. The final specification removes the regressors for marital status, homeownership, whether one is employed by others, whether the venture has a business plan, and whether business assistance has been requested. These regressors, too, may be endogenous to the hazards of operating or quitting.

The results of the models of nascent entrepreneur operating are reported in Table 12 and the results of the models of nascent entrepreneur quitting are reported in Table 13. Coefficients for each specification are reported, rather than the hazard ratios, for the benefit of readers less familiar with competing risks hazard models. In general, a model's hazard ratio is estimated, however this requires the reader to compare the value to unity, rather than interpreting the sign. When the coefficients are reported, it is possible to follow the more natural interpretation of effects by using the sign of the coefficient. Additionally, robust standard errors are used in all specifications.

It must be noted that a number of respondents are dropped from the sample due to non-response. These cases are not treated as either operating or quitting, but are instead removed from the analysis. These respondents all have net worth below \$25,000, therefore it is expected that they are more likely to have quit early than to have operated early. If these respondents had been included, they would likely reduce the timing of quitting and possibly increase the timing of operating and may have an impact on the wealth and income estimates. Other than their net worth being lower than the rest of the sample, these respondents do not pool in any other variable. Thus, these respondents' impact on the remaining coefficients is unclear.

**Table 12. Cox Proportional Hazard Models of Nascent Entrepreneur Operation**

|                                      | <b>Operating 1</b>   | <b>Operating 2</b>   | <b>Operating 3</b>   |
|--------------------------------------|----------------------|----------------------|----------------------|
| Female                               | -0.118<br>[0.107]    | -0.086<br>[0.106]    | -0.086<br>[0.105]    |
| Nonwhite                             | -0.391<br>[0.134]*** | -0.429<br>[0.135]*** | -0.508<br>[0.131]*** |
| Age                                  | -0.018<br>[0.009]**  | -0.018<br>[0.008]**  | -0.015<br>[0.008]*   |
| Born in the U.S.                     | -0.043<br>[0.237]    | -0.051<br>[0.235]    | -0.028<br>[0.235]    |
| Education                            | 0.017<br>[0.020]     | 0.014<br>[0.019]     | 0.017<br>[0.019]     |
| Married                              | 0.117<br>[0.121]     | 0.198<br>[0.114]*    |                      |
| Number of Children                   | -0.030<br>[0.045]    | -0.035<br>[0.042]    | -0.009<br>[0.041]    |
| Parent was Self-employed             | -0.049<br>[0.099]    | -0.026<br>[0.097]    | -0.02<br>[0.098]     |
| Friend Owns Business                 | -0.041<br>[0.112]    | -0.023<br>[0.112]    | -0.025<br>[0.110]    |
| Positive Economic Outlook            | -0.203<br>[0.103]**  | -0.172<br>[0.102]*   | -0.156<br>[0.102]    |
| Years of Work Experience             | 0.017<br>[0.008]**   | 0.017<br>[0.008]**   | 0.017<br>[0.008]**   |
| Years Living in Current County       | -0.001<br>[0.004]    | -0.001<br>[0.004]    | -0.001<br>[0.004]    |
| Prefers Doing Things “Better”        | 0.111<br>[0.113]     | 0.094<br>[0.112]     | 0.063<br>[0.110]     |
| Unemployed                           | -0.047<br>[0.159]    | -0.122<br>[0.151]    | -0.053<br>[0.153]    |
| Retired                              | -0.291<br>[0.284]    | -0.375<br>[0.266]    | -0.284<br>[0.270]    |
| ln(Initial Wave Income)              | 0.099<br>[0.089]     |                      |                      |
| Initial Wave Net Worth (\$10,000)    | 0.019<br>[0.030]     |                      |                      |
| Initial Wave Net Worth Squared/1,000 | -1.273<br>[1.500]    |                      |                      |
| Homeowner                            | 0.029<br>[0.130]     | 0.067<br>[0.124]     |                      |

**Table 12. Hazard Models of Nascent Entrepreneur Operation, continued**

|                                    | <b>Operating 1</b>   | <b>Operating 2</b>   | <b>Operating 3</b>  |
|------------------------------------|----------------------|----------------------|---------------------|
| Employed by Others                 | -0.354<br>[0.101]*** | -0.353<br>[0.100]*** |                     |
| Venture with Initial Wave Employer | 0.355<br>[0.130]***  | 0.367<br>[0.125]***  | 0.336<br>[0.125]*** |
| Self-Employed at Initial Wave      | 1.478<br>[0.212]***  | 1.524<br>[0.213]***  | 1.549<br>[0.199]*** |
| Venture has Business Plan          | 0.103<br>[0.109]     | 0.088<br>[0.106]     |                     |
| Business Assistance Requested      | 0.19<br>[0.115]*     | 0.207<br>[0.110]*    |                     |
| Midwest                            | -0.022<br>[0.145]    | -0.044<br>[0.146]    | -0.055<br>[0.147]   |
| South                              | -0.02<br>[0.135]     | -0.005<br>[0.133]    | 0.026<br>[0.139]    |
| West                               | -0.015<br>[0.155]    | -0.05<br>[0.156]     | -0.069<br>[0.154]   |
| Micropolitan County                | -0.121<br>[0.169]    | -0.131<br>[0.162]    | -0.131<br>[0.162]   |
| Rural County                       | 0.313<br>[0.231]     | 0.283<br>[0.227]     | 0.293<br>[0.221]    |
| Number of Observations             | 1,833                | 1,911                | 1,915               |
| Number of Subjects                 | 734                  | 767                  | 767                 |
| Number of Failures <sup>1</sup>    | 265                  | 273                  | 276                 |

Coefficients, not hazard ratios, are reported. Robust standard errors in parentheses.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

1. Defined as the number of subjects that leave the data for the reason modeled.

### **Model of Nascent Entrepreneur Operation**

Several demographic variables have a statistically insignificant effect on firm operation. First, women are found to be the same as men in terms of getting a firm operational. Second, being born in the United States does not affect the chances of a nascent entrepreneur having an operational firm. Third, education does not have an

effect on getting a firm operational, neither does the nascent entrepreneur's number of children. Fourth, marital status is, at best, marginally significant to firm operation.

However, nonwhites have a lower hazard of having an operating firm. This result is similar to Fairlie and Meyer (1996), who find that nonwhites are less likely to be self-employed than whites. Additionally, older nascent entrepreneurs have a lower hazard of having an operating firm.

In terms of the ability of the nascent entrepreneur, the results are mixed. Having either a self-employed parent or friend has no effect on whether the firm is operational. However, a nascent entrepreneur with more work experience is more likely to have a firm operate. Being self-employed during the initial wave of the PSED also increases the nascent entrepreneur's chances of getting a firm operating, supporting the serial entrepreneurship results of Westhead, et al. (2005).

The effect of resources on the hazard of firm operation are also mixed. None of the financial resource measures – log of income, net worth, square of net worth, or owning a home – have a significant effect on firm operation. Neither does the network resource measure of the nascent entrepreneur's time of residence. These results are in contrast to past research on the self-employed, such as Evans and Jovanovic (1989) who found that assets significantly increase an individual's probability of self-employment. Here, though, an individual nascent entrepreneur's financial resources have no significant effect on that nascent entrepreneur's hazard of having an operating firm (i.e., becoming self-employed). This further supports the contentions of chapter two, that defining entrepreneurs exclusively as those

individuals who are self-employed creates selection bias in the estimates of models of entrepreneurship.

The network resource measure of starting the venture with a previous employer does increase the likelihood the nascent entrepreneur's firm becomes operational. However, as noted in chapter two, these corporate entrepreneurs are quite different from other nascent entrepreneurs precisely because of the corporate entrepreneur's access to his former employers resources. The result that starting a venture with a previous employer increases the hazard of an operating firm further substantiates that earlier finding.

The commitment variables are mostly insignificant to the hazard of firm operation. Neither being unemployed nor being retired prior to becoming a nascent entrepreneur have an effect on the hazard of firm formation. Neither does preferring to do things "better" have an effect on the probability of having an operating firm. However, nascent entrepreneurs with a positive economic outlook have a reduced hazard of firm operation. Possibly, this result reflects other opportunities when the local economy is good, or it reflects the overconfidence of the respondent nascent entrepreneur. Unfortunately, testing either of these economic outlook theories requires data that are not available in the Panel Survey of Entrepreneurial Dynamics.

The management strategy variables, too, have differing results on the hazard of firm formation. Creating a business plan has an insignificant effect on the nascent entrepreneur's chances of operating a firm. However, requesting assistance from a business assistance program at any level – federal, state, or county – is marginally

significant and positive to the hazard of operating a firm. Thus, firms that receive assistance are more likely to operate. This suggests that the government may play a role in fostering entrepreneurial ventures.

The most parsimonious specification of the competing risks hazard model of firm operation has only two differences in its results when compared with the other two specifications. First, the age coefficient in this specification only significant at the ten percent level, where it is significant at the five percent level in the other two specifications. However, its sign is still negative. Second, the coefficient for positive economic outlook is no longer significant at all. The significance of this variable is also lower in the specification without income and wealth variables than in the full specification. The sign on this coefficient is negative in all three specifications. All but one of the remaining coefficients in this parsimonious specification have the same significance and signs across all three specifications.

Finally, none of the regional measures are significant in the competing risks hazard model of firm operation. It should be noted that these are geographic and population measures, rather than economic condition measures. In this respect, these results cannot be interpreted as meaning that economic conditions do not affect an individual nascent entrepreneur's hazard of creating an operating firm, only that location and the size of the local population do not affect the nascent entrepreneur's chances of operating a firm.<sup>2</sup> There are no differences among the northeastern,

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<sup>2</sup> An example of this difference is that New York City and Philadelphia are both considered base cities in that both are in the northeast and are metropolitan areas. However, most observers would recognize that the economic conditions in both cities are not necessarily the same.

midwestern, southern, or western states. Neither are there differences among metropolitan, micropolitan, or rural areas. In all cases, neither the location nor the population of the county where the nascent entrepreneur operates changes that nascent entrepreneur's probability of having an operating firm.

### **Model of Nascent Entrepreneur Quitting**

Very few regressors are significant in the competing risks hazard model of a nascent entrepreneur choosing to quit (Table 13). In fact, only the regressor for self-employed at the initial PSED wave is more than marginally significant. Being self-employed reduces the hazard of quitting just as it increased the probability of operating a firm. This result implies that serial entrepreneurs are more persistent in trying to get new firms started.

Beyond this variable, only being born in the U.S., the years of residence, and requesting business assistance are significant in the quitting model. None from this list are statistically significant at better than the ten percent level. As it happens, all of these reduce the probability of the nascent choosing to quit. Even though the results for both years of residence and business assistance are marginally significant, they nonetheless bear some explanation.

First, nascent entrepreneurs that have lived in an area longer are more likely to persist in firm formation. This result may be due to the long-resident nascent entrepreneur's wider access to local networks, which results in that nascent entrepreneur's greater persistence. However, it may also be due to the long-resident



**Table 13. Cox Proportional Hazard Models of Nascent Entrepreneur Quitting**

|                                      | Quitting 1         | Quitting 2         | Quitting 3         |
|--------------------------------------|--------------------|--------------------|--------------------|
| Female                               | 0.055<br>[0.123]   | 0.052<br>[0.118]   | 0.037<br>[0.119]   |
| Nonwhite                             | 0.144<br>[0.136]   | 0.168<br>[0.130]   | 0.129<br>[0.127]   |
| Age                                  | 0.007<br>[0.008]   | 0.007<br>[0.008]   | 0.008<br>[0.008]   |
| Born in the U.S.                     | -0.387<br>[0.217]* | -0.367<br>[0.212]* | -0.385<br>[0.203]* |
| Education                            | -0.031<br>[0.025]  | -0.03<br>[0.023]   | -0.042<br>[0.023]* |
| Married                              | 0.096<br>[0.128]   | 0.030<br>[0.119]   |                    |
| Number of Children                   | 0.005<br>[0.049]   | 0.030<br>[0.045]   | 0.031<br>[0.044]   |
| Parent was Self-employed             | 0.125<br>[0.118]   | 0.148<br>[0.113]   | 0.152<br>[0.113]   |
| Friend Owns Business                 | 0.140<br>[0.134]   | 0.068<br>[0.127]   | 0.015<br>[0.128]   |
| Positive Economic Outlook            | 0.186<br>[0.116]   | 0.128<br>[0.112]   | 0.106<br>[0.112]   |
| Years of Work Experience             | -0.001<br>[0.008]  | -0.001<br>[0.008]  | -0.002<br>[0.008]  |
| Years Living in Current County       | -0.008<br>[0.004]* | -0.007<br>[0.004]* | -0.008<br>[0.004]* |
| Prefers Doing Things “Better”        | 0.096<br>[0.127]   | 0.091<br>[0.120]   | 0.121<br>[0.120]   |
| Unemployed                           | -0.017<br>[0.189]  | 0.067<br>[0.173]   | 0.08<br>[0.167]    |
| Retired                              | -0.114<br>[0.348]  | -0.183<br>[0.330]  | -0.156<br>[0.331]  |
| ln(Initial Wave Income)              | -0.097<br>[0.096]  |                    |                    |
| Initial Wave Net Worth (\$10,000)    | -0.031<br>[0.035]  |                    |                    |
| Initial Wave Net Worth Squared/1,000 | 0.968<br>[1.743]   |                    |                    |
| Homeowner                            | -0.01<br>[0.132]   | -0.071<br>[0.124]  |                    |

**Table 13. Hazard Models of Nascent Entrepreneur Quitting, continued**

|                                    | Quitting 1           | Quitting 2           | Quitting 3           |
|------------------------------------|----------------------|----------------------|----------------------|
| Employed by Others                 | -0.056<br>[0.142]    | -0.056<br>[0.136]    |                      |
| Venture with Initial Wave Employer | -0.095<br>[0.200]    | -0.119<br>[0.190]    | -0.109<br>[0.189]    |
| Self-Employed at Initial Wave      | -1.522<br>[0.137]*** | -1.544<br>[0.133]*** | -1.572<br>[0.125]*** |
| Venture has Business Plan          | -0.179<br>[0.114]    | -0.174<br>[0.108]    |                      |
| Business Assistance Requested      | -0.339<br>[0.176]*   | -0.355<br>[0.166]**  |                      |
| Midwest                            | -0.078<br>[0.172]    | -0.063<br>[0.166]    | -0.045<br>[0.167]    |
| South                              | -0.039<br>[0.155]    | -0.043<br>[0.149]    | -0.057<br>[0.149]    |
| West                               | 0.002<br>[0.159]     | 0.007<br>[0.154]     | 0.055<br>[0.152]     |
| Micropolitan County                | 0.155<br>[0.181]     | 0.157<br>[0.174]     | 0.167<br>[0.173]     |
| Rural County                       | 0.045<br>[0.457]     | 0.066<br>[0.438]     | -0.053<br>[0.414]    |
| Number of Observations             | 2,015                | 2,101                | 2,105                |
| Number of Subjects                 | 734                  | 767                  | 767                  |
| Number of Failures <sup>1</sup>    | 228                  | 239                  | 239                  |

Coefficients, not hazard ratios, are reported. Robust standard errors in parentheses.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

1. Defined as the number of subjects that leave the data for the reason modeled.

nascent entrepreneur’s greater commitment to the local community in seeing his firm to operation. Regardless of explanation, it should be noted that in the model of firm operation, this variable was insignificant. Thus, it may be that nascent entrepreneurs with longer residence are less likely to quit being nascent entrepreneurs, they are no more likely to actually establish an operating firm.

Second, nascent entrepreneurs that have requested assistance from some kind

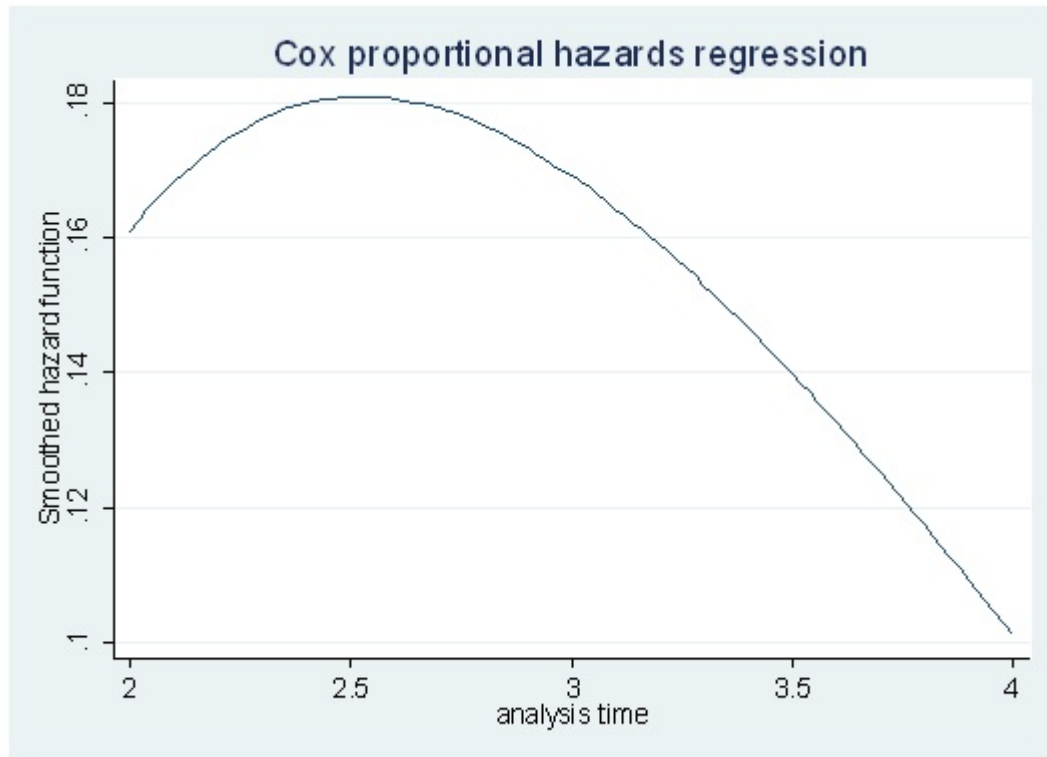
of business assistance program – be it local, state, or federal – are more likely to persist in their firm formation efforts. It should be noted that this measures only that business assistance was requested, not that assistance was granted. However, it is clear that nascent entrepreneurs who at least make an effort to gain assistance from some level of program are more likely to persist and, as found by the models of firm operation, more likely to establish a firm as well. Clearly, effort on the part of the nascent entrepreneur towards firm formation is a determinant of the success of that effort.

A few differences are found between the specifications of the competing risks hazard model of quitting. In the third specification, the coefficient on education is now slightly significant. However, the sign is still negative. Also, the sign on the unemployed coefficient changes sign once the income and wealth measures are removed. In the full specification this coefficient is negative, but in the other two specifications this coefficient is positive. However, the coefficient is insignificant in all three specifications. Finally, the sign for rural counties is negative in the third specification but is positive in the other specifications. Again, this coefficient is insignificant in all models. There are no other differences in significance or sign among the three specifications.

### **A Comparison of the Timing of Firm Formation and Quitting**

The hazard function describes the rate at which respondents exit the data for a particular reason—the hazard of firm formation or quitting. Figures 2 and 3 are

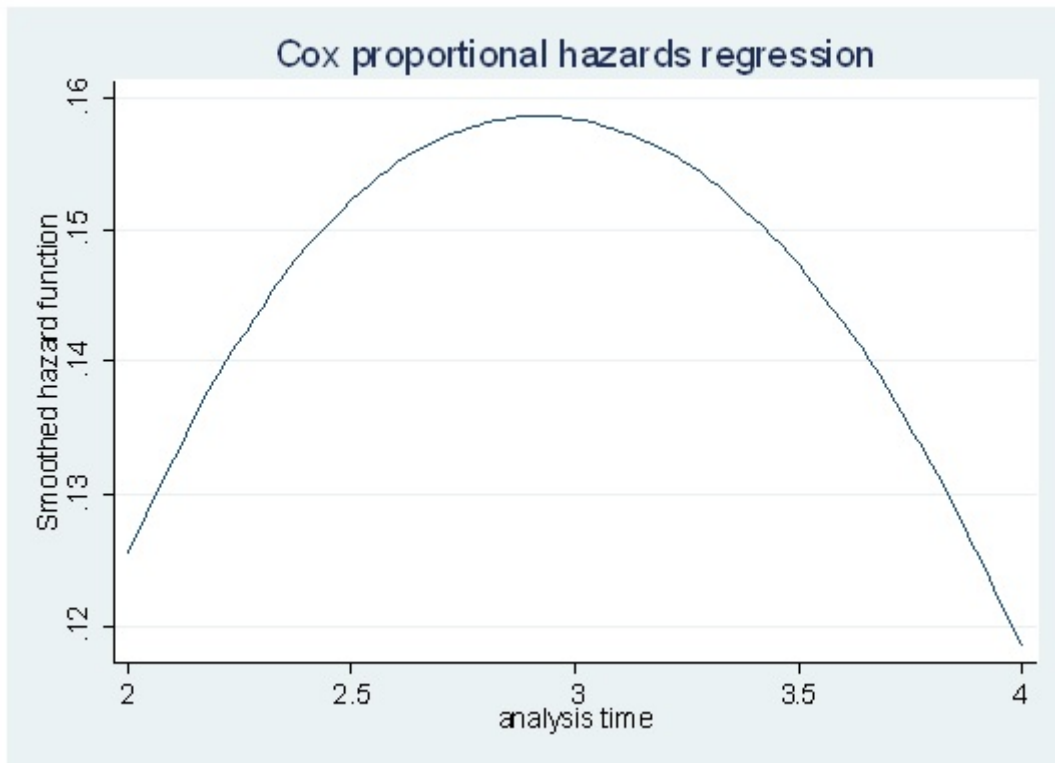
Figure 2. Graph of the Hazard Function of Firm Operation



graphs of the hazard functions of nascent entrepreneurs leaving the data for each particular reason – operating a firm and quitting as nascent entrepreneurs. Each of these graphs is the baseline hazard function evaluated at the mean of the covariates in the full specification. The hazard function of firm operating nascent entrepreneurs is in Figure 2 while the hazard function of quitting nascent entrepreneurs is in Figure 3.

Nascent entrepreneurs leave the data at a faster rate due to operating than due to quitting. Comparing figures 2 and 3, the graph of the hazard function of operating reaches its maximum earlier than does the hazard function of quitting. Figure 2 shows that the timing of operation is mostly between the second and third waves. The largest number of quitting nascent entrepreneurs, on the other hand, leave the data at the third wave (Figure 3).

Figure 3. Graph of the Hazard Function of Nascent Entrepreneur Quitting



### Conclusion

This chapter examines the eventual outcomes of nascent entrepreneurs who are trying to start businesses. A model is developed to describe the competing risks of a nascent entrepreneur becoming successful by having an operating firm or deciding to stop trying to form a business. This competing risks hazard model is then analyzed using data from the Panel Survey of Entrepreneurial Dynamics (PSED). The competing risks hazard model has the advantage of being able to analyze data where observations are lost due to attrition from the data for identifiable reasons. This attrition has been a problem in earlier studies, such as Parker and Belghitar (2005).

Similar to Parker and Belghitar (2005), it is found that nonwhites are less likely to start operating firms and that business plans seem to have no effect on

operating a firm. However, unlike Parker and Belghitar (2005) it is also found that the nascent entrepreneur's ability, access to resources, and commitment to the firm formation process significantly affect the nascent entrepreneur's chances of getting a firm operational. Only one measure, the self-employment status of the nascent entrepreneur, has a significant effect on a nascent entrepreneur's hazard of quitting.

The nascent entrepreneur's ability measures that have a significant effect on the hazard model of firm operation are the years of work experience and the self-employment status of the nascent entrepreneur. Both of these regressors increase the probability of a nascent entrepreneur having an operational firm. Being self-employed also reduces the chances of the nascent entrepreneur deciding to quit trying to establish a firm.

One resource measure is found to have a significant effect on the hazard of firm operation. Starting a venture with a previous employer is found to increase the chances that the firm will become operational. Nascent entrepreneurs who are working with a former employer have access to financial and other resources that are not available to others. No other resource measures – particularly, income and net worth – are found to have a significant effect on firm formation in this model. This appears to be at odds with self-employment literature such as Evans and Jovanovic (1989), who find that assets are significantly related to the probability an individual is self-employed. The fact that the hazard model used in this chapter finds that assets have no effect on a nascent entrepreneur's chances of operating a firm further supports the contentions made in chapter two that using the self-employed as the sole

measure of entrepreneurship causes selection bias.

In terms of the commitment or perceptions of the nascent entrepreneur, having a positive economic outlook reduces the hazard of having an operating firm. The effect of a positive economic outlook on the potential for firm operating may be due to the overconfidence of a positive nascent entrepreneur or to the existence of other opportunities available to a nascent entrepreneur when the economic outlook is good. Unfortunately, neither of these possibilities can be tested with these data.

The competing risks hazard model that has been used in this chapter demonstrates a useful tool for studying entrepreneurs. As noted by Aldrich (1990), entrepreneurship is a dynamic phenomenon where individuals choose to become entrepreneurs or not at a variety of points of time. This entering and exiting of individuals from entrepreneurship means that any data on entrepreneurs will exhibit this entry and, especially, exit of individuals from the data. This chapter demonstrates that competing risks hazard models are a useful tool for studying entrepreneurship due to their modeling of the attrition of individuals from a dataset.

## CHAPTER 4

### CONCLUSION

This dissertation uses the Panel Survey of Entrepreneurial Dynamics (PSED), a relatively new dataset on entrepreneurship, to study two questions about nascent entrepreneurs. The first of these questions, addressed in chapter 2, is about the identity of these nascent entrepreneurs and whether they differ from the self-employed. The second question, covered in chapter 3, is about what happens to these nascent entrepreneurs over the course of the firm's potential formation.

The PSED uses a different definition of entrepreneurship than past studies in economics, which have used self-employment (e.g., Evans and Jovanovic 1989, Evans and Leighton 1989, Lindh and Ohlsson 1996, Blanchflower and Oswald 1998, Hamilton 2000, Fairlie 2002, Lazear 2004, Lazear 2005). In contrast, the PSED identifies nascent entrepreneurs, defined as those who are involved in the planning of a new firm, rather than as individuals that currently operate a firm (Gartner, et al. 2004). The advantage of the nascent entrepreneur definition is that a wider variety of entrepreneurs can be studied, in particular those entrepreneurs that do not succeed in forming a new firm. Studies that use the self-employed as the definition of entrepreneurship suffer from selection bias, since the self-employed are successful nascent entrepreneurs (Venkataraman 1998, Reynolds 1997).

### **Summary**



Chapter 2 of the dissertation compares the nascent entrepreneur with the self-employed by using probit models that estimate the probability of becoming a nascent entrepreneur or self-employed. I find that nascent entrepreneurs do, in fact, differ from the self-employed in several ways. First, women are less likely to be self-employed but are equally likely to be nascent entrepreneurs. Second, having a parent who was self-employed increases the probability an individual is self-employed, but has no effect on the probability of nascent entrepreneurship. However, having a friend who owns a business has the opposite result, by increasing the probability of nascent entrepreneurship but having no effect on self-employment. Third, individuals with a positive economic outlook are more likely to be nascent entrepreneurs, but a positive economic outlook does not change the probability of being self-employed. Finally, retirees are less likely to be nascent entrepreneurs but retirement has no effect on the probability of self-employment.

Chapter 2 contributes to the literature by demonstrating that a clear difference does exist between the self-employed and nascent entrepreneurs. Therefore, studies that use only the self-employed as a measure of entrepreneurship have introduced selection bias in their results. The consequence of this selection bias is that past entrepreneurship studies of the self-employed have been based only on the successful entrepreneurs, a point made clear by Aldrich (1990). Thus, nascent entrepreneurship is a more accurate definition to self-employment.

The results of chapter two imply that future research on entrepreneurship must either utilize a much wider definition of entrepreneurship – such as the nascent

entrepreneur definition used here – or must adjust to the existence of selection bias in models of the self-employed. Additionally, it is clear that better dynamic datasets are needed to study these important questions, since the PSED follows only the nascent entrepreneurs from the initial wave over time. Several entrepreneurship researchers, most notably Aldrich (1990) and Venkataraman (1998), state that entrepreneurship is a dynamic decision that individuals are constantly choosing to enter and to exit. As a result, true longitudinal datasets are necessary to reflect this reality. The PSED is a good start in this effort.

Chapter 3 analyzes two possible outcomes for nascent entrepreneurs – succeeding in starting a firm or choosing to quit the attempt. A model is developed to describe the competing risks of a nascent entrepreneur becoming successful by having an operating firm or deciding to stop trying to form a business. The competing risks hazard model has the advantage of being able to analyze data where observations are lost due to attrition from the data for identifiable reasons. It is found that the nascent entrepreneur’s ability, access to resources, and commitment to the firm formation process significantly affect the nascent entrepreneur’s chances of getting a firm operational. Only one measure, the self-employment status of the nascent entrepreneur, has a negative and significant effect on a nascent entrepreneur’s hazard of quitting.

Chapter 3 demonstrates that the competing risks hazard model is a useful tool for studying entrepreneurs. As has been noted by Aldrich (1990), entrepreneurship is a dynamic phenomenon where individuals choose to become entrepreneurs or not at a

variety of points of time. This entering and exiting of individuals from entrepreneurship means that any data on entrepreneurs will exhibit this entry and, especially, exit of individuals from the data. This chapter demonstrates that competing risks hazard models are helpful for studying entrepreneurship due to their modeling of the attrition of individuals from a dataset.

This dissertation demonstrates that research on entrepreneurship continues to add knowledge about this important economic activity. First, this dissertation shows that potential entrepreneurs choose to become entrepreneurs even when the income from doing so is less than they might enjoy from paid work. In short, the entrepreneurial decision is a comparison of utilities and not incomes, as has been done in the past. Second, this dissertation establishes how a competing risks hazard model can be used to analyze this dynamic decision. In these two important ways, this dissertation provides a stronger foundation for further work in this important field of research.

APPENDIX A

FIGURES

Figure A1. The Entrepreneurship Process

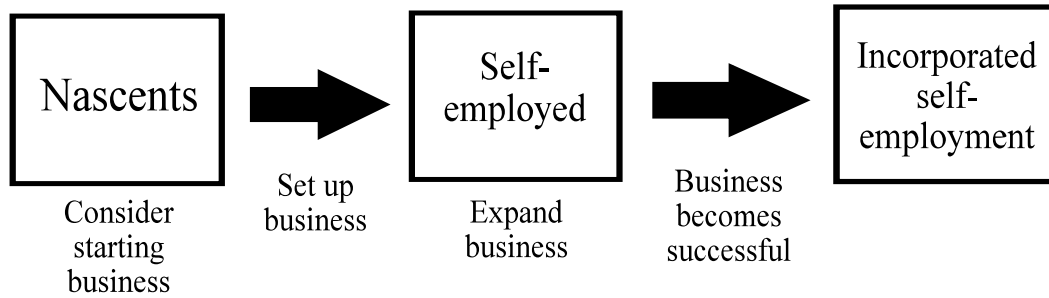


Figure A2. Graph of the Hazard Function of Firm Operation

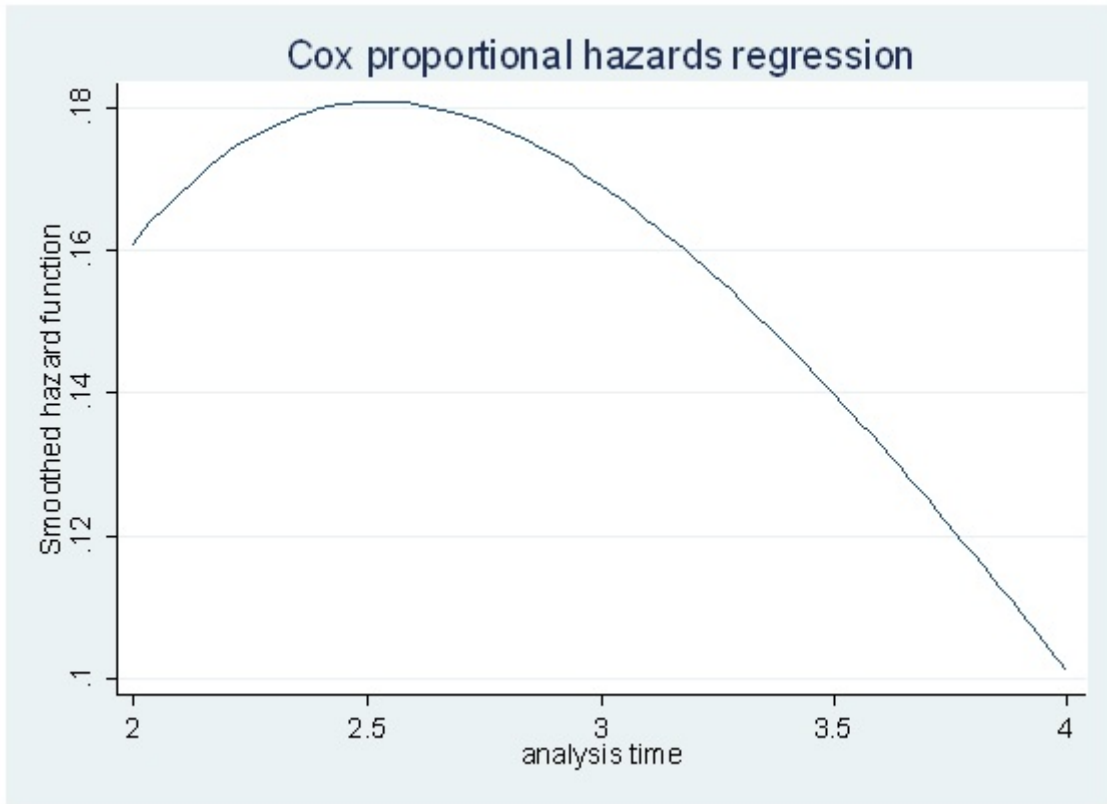
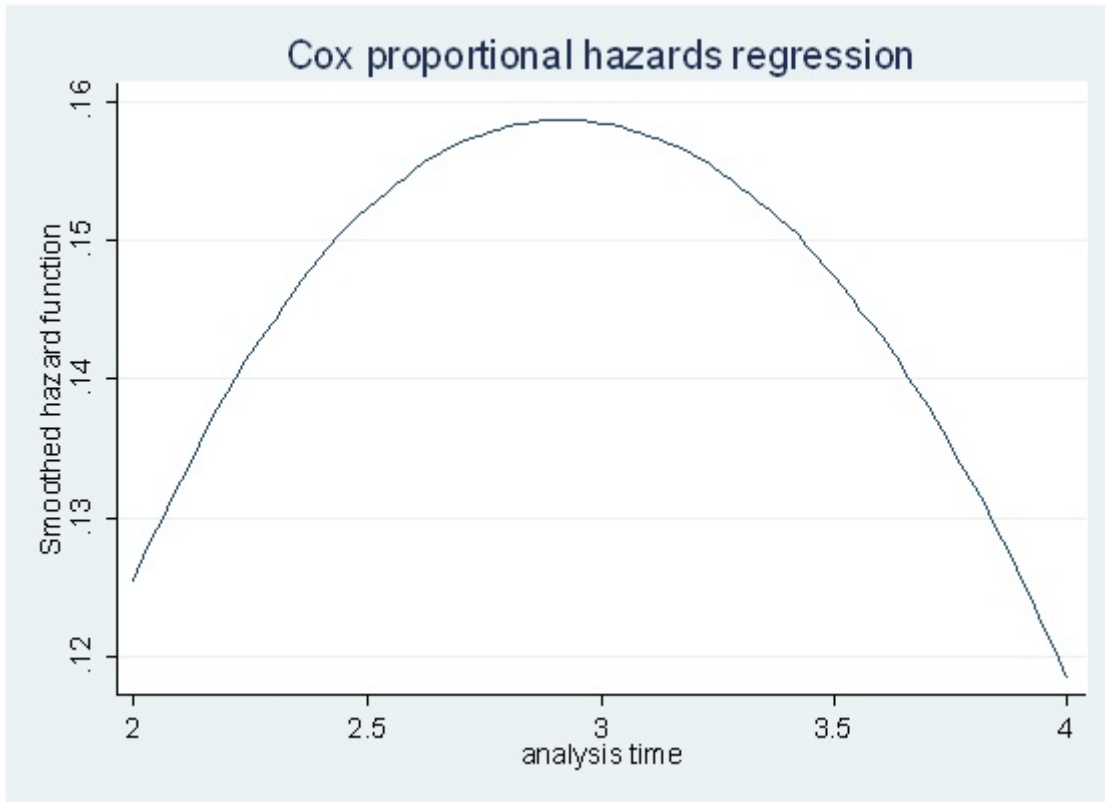


Figure A3. Graph of the Hazard Function of Nascent Entrepreneur Quitting



## APPENDIX B

### TABLES

**Table B1. Samples From Panel Survey of Entrepreneurial Dynamics**

|   | <b>Total PSED</b> | <b>Full Model Sample</b> |
|---|-------------------|--------------------------|
| Total Number of Respondents                                   | 1,261             | 1,167                    |
| Nascent Entrepreneur  | 830               | 751                      |
| Control (Not Nascent Entrepreneurs)                           | 431               | 416                      |
| <i>Self-employed Samples</i>                                  | <i>1,261</i>      | <i>1,167</i>             |
| Self-employed (Both Nascent Entrepreneurs and Control)        | 555               | 513                      |
| Not Self-employed (Both Nascent Entrepreneurs and Control)    | 706               | 654                      |
| <i>Nascent Entrepreneur Sub-samples</i>                       | <i>830</i>        | <i>751</i>               |
| Nascent Entrepreneur and Self-employed                        | 457               | 418                      |
| Nascent Entrepreneur and not Self-employed                    | 373               | 333                      |
| Corporate Nascent Entrepreneur                                | 118               | 107                      |
| Nascent Entrepreneur and not a Corporate Nascent Entrepreneur | 712               | 644                      |
| Nascent Entrepreneur and either Self-employed or Corporate    | 513               | 467                      |
| Nascent Entrepreneur and neither Self-employed nor Corporate  | 317               | 284                      |
| <i>Control Group Sub-samples</i>                              | <i>431</i>        | <i>416</i>               |
| Self-employed and not a Nascent Entrepreneur                  | 98                | 95                       |
| Neither Self-Employed nor a Nascent Entrepreneur              | 333               | 321                      |

**Table B2. Definitions of Variables Used in the Analysis**

| <b>Variable Name</b>             | <b>Definition</b>   |
|----------------------------------|---|
| Female                           | Female = 1  |
| Nonwhite                         | Nonwhite = 1  |
| Age                              | Age at time of survey   |
| Born in the U.S.                 | Born in the U.S. = 1  |
| Education                        | Years of education  |
| Married                          | Married = 1   |
| Number of children               | Number of children under age 18                                       |
| Parent was Self-employed         | At least one parent of respondent was self-employed = 1               |
| Friend Owns Business             | At least one friend of respondent owns a business = 1                 |
| Positive Impression of Self-emp. | Has positive impression of the self-employed = 1                      |
| Positive Economic Outlook        | Has positive economic outlook = 1                                     |
| Years of Work Experience         | Total Years of Work Experience  |
| Years Living in Current County   | Years Living in Current County  |
| Prefers Doing Things “Better”    | Prefers doing things “better” = 1                                     |
| Unemployed                       | Unemployed = 1  |
| Retired                          | Retired = 1   |
| Net Worth                        | Net Worth (\$10,000)  |
| Homeowner                        | Homeowner = 1   |
| Regional Business Ownership      | Regional proportion of non-farm proprietors to number of households   |
| Regional Population Density      | Regional population density (1,000/square mile)                       |
| Regional Per Capita Income       | Regional per capita total personal income (\$1,000)                   |
| Regional Income Distribution     | Regional percentage of households with income \$75K or more           |
| Regional Age Distribution        | Regional percentage of population ages 25-44                          |
| Regional Education Level         | Regional percentage of population age 25 or older with college degree |
| Regional Population Growth       | Annualized percentage change in regional population                   |
| Regional Unemployment            | Regional unemployment rate  |



**Table B3. Summary Statistics, Total PSED**

| <b>Variable Name</b>             | <b>Obs.</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|----------------------------------|-------------|-------------|------------------|------------|------------|
| Female                           | 1,261       | 0.509       | 0.5              | 0          | 1          |
| Nonwhite                         | 1,261       | 0.443       | 0.497            | 0          | 1          |
| Age                              | 1,258       | 39.893      | 12.18            | 18         | 93         |
| Born in the U.S.                 | 1,230       | 0.915       | 0.278            | 0          | 1          |
| Education                        | 1,257       | 14.866      | 2.623            | 8          | 20         |
| Married                          | 1,261       | 0.549       | 0.498            | 0          | 1          |
| Number of Children               | 1,250       | 1.13        | 1.314            | 0          | 7          |
| Parent was Self-employed         | 1,261       | 0.47        | 0.499            | 0          | 1          |
| Friend Owns Business             | 1,261       | 0.698       | 0.459            | 0          | 1          |
| Positive Impression of Self-emp. | 1,261       | 0.8         | 0.4              | 0          | 1          |
| Positive Economic Outlook        | 1,261       | 0.49        | 0.5              | 0          | 1          |
| Years of Work Experience         | 1,242       | 17.08       | 11.105           | 0          | 60         |
| Years Living in Current County   | 1,236       | 18.31       | 15.477           | 0.011      | 93         |
| Prefers Doing Things “Better”    | 1,261       | 0.712       | 0.453            | 0          | 1          |
| Unemployed                       | 1,260       | 0.132       | 0.338            | 0          | 1          |
| Retired                          | 1,260       | 0.054       | 0.226            | 0          | 1          |
| Net Worth (\$10,000)             | 1,214       | 25.189      | 39.418           | -38        | 260        |
| Homeowner                        | 1,257       | 0.656       | 0.475            | 0          | 1          |
| Regional Business Ownership      | 1,261       | 0.213       | 0.06             | 0.07       | 0.6        |
| Regional Population Density      | 1,261       | 2.426       | 7.065            | 0.001      | 53.181     |
| Regional Per Capita Income       | 1,261       | 20.305      | 6.824            | 2.185      | 52.498     |
| Regional Income Distribution     | 1,261       | 9.306       | 5.56             | 0.876      | 33.345     |
| Regional Age Distribution        | 1,261       | 32.718      | 3.219            | 21.1       | 49.1       |
| Regional Education Level         | 1,261       | 20.712      | 7.817            | 4.795      | 52.299     |
| Regional Population Growth       | 1,261       | 1.342       | 1.814            | -2.041     | 11.827     |
| Regional Unemployment            | 1,261       | 4.395       | 1.927            | 1.1        | 23.6       |

**Table B4. Summary Statistics, Full Model Sample**

| <b>Variable Name</b>             | <b>Obs.</b> | <b>Mean</b> | <b>Std. Dev.</b> | <b>Min</b> | <b>Max</b> |
|----------------------------------|-------------|-------------|------------------|------------|------------|
| Female                           | 1,167       | 0.51        | 0.5              | 0          | 1          |
| Nonwhite                         | 1,167       | 0.436       | 0.496            | 0          | 1          |
| Age                              | 1,167       | 39.922      | 12.165           | 18         | 93         |
| Born in the U.S.                 | 1,167       | 0.928       | 0.259            | 0          | 1          |
| Education                        | 1,167       | 14.877      | 2.597            | 8          | 20         |
| Married                          | 1,167       | 0.556       | 0.497            | 0          | 1          |
| Number of Children               | 1,167       | 1.141       | 1.318            | 0          | 7          |
| Parent was Self-employed         | 1,167       | 0.47        | 0.499            | 0          | 1          |
| Friend Owns Business             | 1,167       | 0.706       | 0.456            | 0          | 1          |
| Positive Impression of Self-emp. | 1,167       | 0.8         | 0.4              | 0          | 1          |
| Positive Economic Outlook        | 1,167       | 0.494       | 0.5              | 0          | 1          |
| Years of Work Experience         | 1,167       | 17.015      | 11.086           | 0          | 60         |
| Years Living in Current County   | 1,167       | 18.360      | 15.48            | 0.011      | 93         |
| Prefers Doing Things “Better”    | 1,167       | 0.721       | 0.449            | 0          | 1          |
| Unemployed                       | 1,167       | 0.129       | 0.336            | 0          | 1          |
| Retired                          | 1,167       | 0.055       | 0.228            | 0          | 1          |
| Net Worth (\$10,000)             | 1,167       | 25.228      | 39.601           | -38        | 260        |
| Homeowner                        | 1,167       | 0.658       | 0.475            | 0          | 1          |
| Regional Business Ownership      | 1,167       | 0.213       | 0.061            | 0.07       | 0.6        |
| Regional Population Density      | 1,167       | 2.296       | 6.68             | 0.001      | 53.181     |
| Regional Per Capita Income       | 1,167       | 20.3        | 6.657            | 2.185      | 52.498     |
| Regional Income Distribution     | 1,167       | 9.256       | 5.566            | 0.876      | 33.345     |
| Regional Age Distribution        | 1,167       | 32.683      | 3.228            | 21.1       | 49.1       |
| Regional Education Level         | 1,167       | 20.676      | 7.83             | 4.795      | 52.299     |
| Regional Population Growth       | 1,167       | 1.352       | 1.835            | -2.041     | 11.827     |
| Regional Unemployment            | 1,167       | 4.394       | 1.935            | 1.1        | 23.6       |

**Table B5. Regressor Statistics by Entrepreneurship Definition, Full Model Sample**

| Variable Name                          | Self-Employed<br>(N=513) |           | Nascent Ent.<br>(N=751) |           | Corporate Ent.<br>(N=107) |           |
|--|--------------------------|-----------|-------------------------|-----------|---------------------------|-----------|
|  | Mean                     | Std. Dev. | Mean                    | Std. Dev. | Mean                      | Std. Dev. |
| Female                                 | 0.466                    | 0.499     | 0.485                   | 0.5       | 0.336                     | 0.475     |
| Nonwhite                               | 0.365                    | 0.482     | 0.368                   | 0.482     | 0.523                     | 0.502     |
| Age                                    | 41.207                   | 11.922    | 39.63                   | 11.103    | 35.72                     | 9.725     |
| Born in the U.S.                       | 0.932                    | 0.252     | 0.936                   | 0.245     | 0.888                     | 0.317     |
| Education                              | 14.945                   | 2.676     | 15.085                  | 2.55      | 14.374                    | 2.486     |
| Married                                | 0.583                    | 0.494     | 0.574                   | 0.495     | 0.458                     | 0.501     |
| Number of children                     | 1.146                    | 1.32      | 1.125                   | 1.317     | 1.252                     | 1.304     |
| Parent was Self-employed               | 0.526                    | 0.5       | 0.502                   | 0.5       | 0.458                     | 0.501     |
| Friend Owns Business                   | 0.735                    | 0.442     | 0.743                   | 0.437     | 0.720                     | 0.451     |
| Positive Impression of Self-employment | 0.854                    | 0.354     | 0.846                   | 0.362     | 0.85                      | 0.358     |
| Positive Economic Outlook              | 0.507                    | 0.5       | 0.518                   | 0.5       | 0.514                     | 0.502     |
| Years of Work Experience               | 18.661                   | 11.531    | 17.369                  | 10.64     | 14.794                    | 9.192     |
| Years Living in Current County         | 18.959                   | 15.62     | 17.405                  | 14.421    | 16.397                    | 13.254    |
| Prefers Doing Things “Better”          | 0.694                    | 0.461     | 0.679                   | 0.467     | 0.729                     | 0.447     |
| Unemployed                             | 0.129                    | 0.335     | 0.119                   | 0.323     | 0.103                     | 0.305     |
| Retired                                | 0.051                    | 0.22      | 0.031                   | 0.172     | 0.009                     | 0.097     |
| Net Worth (\$10,000)                   | 26.97                    | 44.798    | 25.301                  | 41.067    | 25.311                    | 43.293    |
| Homeowner                              | 0.694                    | 0.461     | 0.672                   | 0.47      | 0.551                     | 0.5       |
| Regional Business Ownership            | 0.219                    | 0.061     | 0.218                   | 0.061     | 0.215                     | 0.065     |
| Regional Population Density            | 1.878                    | 5.791     | 2.114                   | 6.35      | 2.367                     | 5.207     |
| Regional Per Capita Income             | 20.165                   | 6.534     | 20.354                  | 6.598     | 20.18                     | 6.762     |
| Regional Income Distribution           | 9.262                    | 5.518     | 9.314                   | 5.404     | 10.033                    | 5.743     |
| Regional Age Distribution              | 32.735                   | 3.365     | 32.784                  | 3.247     | 33.033                    | 3.312     |
| Regional Education Level               | 20.561                   | 7.844     | 21.013                  | 7.844     | 22.056                    | 7.957     |
| Regional Population Growth             | 1.392                    | 1.845     | 1.372                   | 1.74      | 1.282                     | 1.647     |
| Regional Unemployment                  | 4.38                     | 1.879     | 4.387                   | 1.874     | 4.273                     | 1.773     |

**Table B6. Probit Models of the Self-Employed**

|  | Full Model           | Without Net Worth    | Nascent Ent. Removed |
|--|----------------------|----------------------|----------------------|
| Female                                 | -0.072<br>[0.032]**  | -0.079<br>[0.031]**  | -0.063<br>[0.043]    |
| Nonwhite                               | -0.091<br>[0.034]*** | -0.091<br>[0.034]*** | -0.008<br>[0.049]    |
| Age                                    | 0.001<br>[0.002]     | 0.001<br>[0.002]     | 0<br>[0.003]         |
| Born in the U.S.                       | -0.015<br>[0.061]    | -0.017<br>[0.060]    | 0.004<br>[0.080]     |
| Education                              | -0.003<br>[0.006]    | -0.003<br>[0.006]    | -0.012<br>[0.009]    |
| Married                                | -0.01<br>[0.034]     | -0.015<br>[0.033]    | 0.004<br>[0.046]     |
| Number of Children                     | 0.013<br>[0.013]     | 0.016<br>[0.012]     | 0.018<br>[0.017]     |
| Parent was Self-employed               | 0.086<br>[0.030]***  | 0.098<br>[0.030]***  | 0.125<br>[0.044]***  |
| Friend Owns Business                   | 0.035<br>[0.033]     | 0.041<br>[0.033]     | -0.016<br>[0.044]    |
| Positive Impression of Self-employment | 0.156<br>[0.036]***  | 0.16<br>[0.035]***   | 0.114<br>[0.041]***  |
| Positive Economic Outlook              | 0.001<br>[0.031]     | -0.002<br>[0.031]    | -0.026<br>[0.043]    |
| Years of Work Experience               | 0.005<br>[0.002]**   | 0.005<br>[0.002]**   | 0.005<br>[0.003]     |
| Years Living in Current County         | 0.001<br>[0.001]     | 0.001<br>[0.001]     | 0.001<br>[0.001]     |
| Prefers Doing Things “Better”          | -0.077<br>[0.034]**  | -0.076<br>[0.033]**  | -0.059<br>[0.055]    |
| Unemployed                             | 0.026<br>[0.046]     | 0.012<br>[0.045]     | 0.121<br>[0.075]     |
| Retired                                | -0.091<br>[0.071]    | -0.092<br>[0.070]    | -0.032<br>[0.086]    |
| Net Worth (\$10,000)                   | -0.002<br>[0.001]*   |                      | -0.002<br>[0.001]**  |
| Net Worth Squared/1,000                | 0.01<br>[0.004]**    |                      | 0.015<br>[0.007]**   |
| Homeowner                              | 0.038<br>[0.035]     | 0.025<br>[0.034]     | 0.03<br>[0.048]      |

**Table B6. Probit Models of the Self-Employed, continued**

|                              | <b>Full Model</b>  | <b>Without Net Worth</b> | <b>Nascent Ent. Removed</b> |
|------------------------------|--------------------|--------------------------|-----------------------------|
| Regional Business Ownership  | 0.497<br>[0.311]   | 0.479<br>[0.308]         | 0.374<br>[0.442]            |
| Regional Population Density  | -0.003<br>[0.003]  | -0.003<br>[0.003]        | 0.002<br>[0.004]            |
| Regional Per Capita Income   | 0<br>[0.003]       | 0.001<br>[0.003]         | -0.002<br>[0.004]           |
| Regional Income Distribution | 0.001<br>[0.004]   | 0<br>[0.004]             | 0.002<br>[0.005]            |
| Regional Age Distribution    | 0.015<br>[0.007]** | 0.015<br>[0.007]**       | -0.007<br>[0.010]           |
| Regional Education Level     | -0.005<br>[0.004]  | -0.004<br>[0.004]        | -0.001<br>[0.005]           |
| Regional Population Growth   | -0.01<br>[0.010]   | -0.011<br>[0.010]        | 0.019<br>[0.012]            |
| Regional Unemployment        | 0.008<br>[0.009]   | 0.009<br>[0.009]         | -0.011<br>[0.012]           |
| Observations                 | 1,167              | 1,195                    | 416                         |

Coefficients are marginal changes in probability. Robust standard errors in brackets.  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table B7. Probit Models of Nascent Entrepreneurs**

|  | Full Model           | Without Net Worth    | Self-employed Removed | Corporate Entrep. Removed | Self-emp. & Corp. Entrep. Removed |
|--|----------------------|----------------------|-----------------------|---------------------------|-----------------------------------|
| Female                                 | -0.03<br>[0.030]     | -0.031<br>[0.030]    | -0.02<br>[0.044]      | -0.001<br>[0.033]         | 0.015<br>[0.046]                  |
| Nonwhite                               | -0.161<br>[0.033]*** | -0.163<br>[0.033]*** | -0.166<br>[0.048]***  | -0.18<br>[0.036]***       | -0.167<br>[0.050]***              |
| Age                                    | -0.004<br>[0.002]*   | -0.004<br>[0.002]*   | -0.004<br>[0.003]     | -0.003<br>[0.002]         | -0.005<br>[0.003]                 |
| Born in the U.S.                       | 0.072<br>[0.059]     | 0.067<br>[0.058]     | 0.087<br>[0.080]      | 0.101<br>[0.064]          | 0.116<br>[0.081]                  |
| Education                              | 0.008<br>[0.006]     | 0.008<br>[0.006]     | 0.004<br>[0.009]      | 0.011<br>[0.007]*         | 0.008<br>[0.010]                  |
| Married                                | 0.015<br>[0.033]     | 0.009<br>[0.032]     | 0.02<br>[0.047]       | 0.032<br>[0.036]          | 0.045<br>[0.048]                  |
| Number of Children                     | -0.009<br>[0.012]    | -0.005<br>[0.012]    | -0.013<br>[0.017]     | -0.014<br>[0.013]         | -0.019<br>[0.017]                 |
| Parent was Self-employed               | 0.046<br>[0.030]     | 0.045<br>[0.029]     | 0.065<br>[0.043]      | 0.047<br>[0.032]          | 0.069<br>[0.045]                  |
| Friend Owns Business                   | 0.093<br>[0.032]***  | 0.096<br>[0.032]***  | 0.077<br>[0.045]*     | 0.094<br>[0.035]***       | 0.076<br>[0.047]                  |
| Positive Impression of Self-employment | 0.198<br>[0.038]***  | 0.198<br>[0.038]***  | 0.207<br>[0.048]***   | 0.201<br>[0.040]***       | 0.207<br>[0.049]***               |
| Positive Economic Outlook              | 0.067<br>[0.030]**   | 0.061<br>[0.030]**   | 0.067<br>[0.043]      | 0.079<br>[0.032]**        | 0.085<br>[0.045]*                 |
| Years of Work Experience               | 0.005<br>[0.002]**   | 0.005<br>[0.002]***  | 0.007<br>[0.003]**    | 0.005<br>[0.002]**        | 0.008<br>[0.003]**                |
| Years Living in Current County         | -0.001<br>[0.001]    | -0.002<br>[0.001]    | -0.002<br>[0.002]     | -0.001<br>[0.001]         | -0.002<br>[0.002]                 |
| Prefers Doing Things "Better"          | -0.143<br>[0.031]*** | -0.146<br>[0.031]*** | -0.185<br>[0.046]***  | -0.158<br>[0.034]***      | -0.197<br>[0.049]***              |
| Unemployed                             | -0.064<br>[0.045]    | -0.059<br>[0.044]    | -0.049<br>[0.065]     | -0.063<br>[0.048]         | -0.048<br>[0.067]                 |
| Retired                                | -0.252<br>[0.076]*** | -0.24<br>[0.074]***  | -0.336<br>[0.088]***  | -0.242<br>[0.077]***      | -0.283<br>[0.090]***              |
| Net Worth (\$10,000)                   | -0.001<br>[0.001]*   |                      | -0.002<br>[0.001]*    | -0.001<br>[0.001]         | -0.001<br>[0.001]                 |
| Net Worth Squared/1,000                | 0.006<br>[0.005]     |                      | 0.011<br>[0.007]      | 0.006<br>[0.005]          | 0.003<br>[0.009]                  |

**Table B7. Probit Models of Nascent Entrepreneurs, continued**

|                              | Full Model         | Without Net Worth  | Self-employed Removed | Corporate Entrep. Removed | Self-emp. & Corp. Entrep. Removed |
|------------------------------|--------------------|--------------------|-----------------------|---------------------------|-----------------------------------|
| Homeowner                    | 0.025<br>[0.034]   | 0.015<br>[0.033]   | 0.003<br>[0.049]      | 0.039<br>[0.037]          | -0.009<br>[0.052]                 |
| Regional Business Ownership  | 0.25<br>[0.314]    | 0.258<br>[0.310]   | -0.042<br>[0.453]     | 0.243<br>[0.340]          | -0.018<br>[0.470]                 |
| Regional Population Density  | -0.004<br>[0.003]  | -0.003<br>[0.003]  | -0.001<br>[0.004]     | -0.003<br>[0.003]         | 0<br>[0.004]                      |
| Regional Per Capita Income   | -0.002<br>[0.003]  | -0.003<br>[0.003]  | -0.007<br>[0.005]     | -0.002<br>[0.003]         | -0.006<br>[0.005]                 |
| Regional Income Distribution | -0.005<br>[0.004]  | -0.006<br>[0.004]  | -0.003<br>[0.006]     | -0.006<br>[0.005]         | -0.005<br>[0.006]                 |
| Regional Age Distribution    | 0.009<br>[0.007]   | 0.01<br>[0.006]    | -0.001<br>[0.010]     | 0.011<br>[0.007]          | -0.001<br>[0.010]                 |
| Regional Education Level     | 0.007<br>[0.004]*  | 0.007<br>[0.004]** | 0.013<br>[0.005]**    | 0.007<br>[0.004]*         | 0.012<br>[0.005]**                |
| Regional Population Growth   | -0.016<br>[0.010]* | -0.017<br>[0.009]* | 0.003<br>[0.014]      | -0.016<br>[0.010]         | 0.006<br>[0.014]                  |
| Regional Unemployment        | 0.022<br>[0.010]** | 0.022<br>[0.010]** | 0.017<br>[0.014]      | 0.025<br>[0.010]**        | 0.018<br>[0.014]                  |
| Observations                 | 1,167              | 1,195              | 654                   | 1,060                     | 605                               |

Coefficients are marginal changes in probability. Robust standard errors in brackets.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table B8. Probit Models of Corporate Entrepreneurs**

|  | Full Model           | Without Net Worth    | Control Group Removed |
|--|----------------------|----------------------|-----------------------|
| Female                                 | -0.051<br>[0.016]*** | -0.053<br>[0.017]*** | -0.073<br>[0.025]***  |
| Nonwhite                               | 0.01<br>[0.018]      | 0.007<br>[0.018]     | 0.053<br>[0.029]*     |
| Age                                    | -0.002<br>[0.001]*   | -0.002<br>[0.001]**  | -0.002<br>[0.002]     |
| Born in the U.S.                       | -0.033<br>[0.034]    | -0.03<br>[0.034]     | -0.081<br>[0.059]     |
| Education                              | -0.006<br>[0.003]*   | -0.004<br>[0.003]    | -0.012<br>[0.005]**   |
| Married                                | -0.024<br>[0.017]    | -0.022<br>[0.017]    | -0.044<br>[0.028]     |
| Number of Children                     | 0.007<br>[0.006]     | 0.006<br>[0.006]     | 0.016<br>[0.009]*     |
| Parent was Self-employed               | 0.001<br>[0.016]     | 0.005<br>[0.016]     | -0.01<br>[0.024]      |
| Friend Owns Business                   | 0.011<br>[0.016]     | 0.012<br>[0.016]     | -0.005<br>[0.027]     |
| Positive Impression of Self-employment | 0.029<br>[0.016]*    | 0.028<br>[0.017]*    | 0.002<br>[0.032]      |
| Positive Economic Outlook              | -0.004<br>[0.015]    | -0.009<br>[0.016]    | -0.023<br>[0.025]     |
| Years of Work Experience               | 0.001<br>[0.001]     | 0.001<br>[0.001]     | 0<br>[0.002]          |
| Years Living in Current County         | 0<br>[0.001]         | 0<br>[0.001]         | 0<br>[0.001]          |
| Prefers Doing Things “Better”          | 0.013<br>[0.016]     | 0.01<br>[0.017]      | 0.045<br>[0.025]*     |
| Unemployed                             | -0.018<br>[0.021]    | -0.018<br>[0.022]    | -0.013<br>[0.036]     |
| Retired                                | -0.061<br>[0.021]*** | -0.038<br>[0.033]    | -0.082<br>[0.044]*    |
| Net Worth (\$10,000)                   | 0<br>[0.000]         |                      | 0.001<br>[0.001]      |
| Net Worth Squared/1,000                | 0<br>[0.002]         |                      | -0.002<br>[0.003]     |
| Homeowner                              | -0.028<br>[0.019]    | -0.025<br>[0.018]    | -0.049<br>[0.030]     |



**Table B8. Probit Models of Corporate Entrepreneurs, continued**

|                              | <b>Full Model</b> | <b>Without Net Worth</b> | <b>Control Group Removed</b> |
|------------------------------|-------------------|--------------------------|------------------------------|
| Regional Business Ownership  | -0.033<br>[0.158] | -0.078<br>[0.167]        | -0.127<br>[0.252]            |
| Regional Population Density  | -0.001<br>[0.001] | -0.001<br>[0.001]        | 0<br>[0.002]                 |
| Regional Per Capita Income   | -0.002<br>[0.001] | -0.002<br>[0.001]        | -0.004<br>[0.002]            |
| Regional Income Distribution | 0.001<br>[0.002]  | 0.001<br>[0.002]         | 0.003<br>[0.003]             |
| Regional Age Distribution    | -0.001<br>[0.004] | -0.001<br>[0.004]        | -0.003<br>[0.006]            |
| Regional Education Level     | 0.003<br>[0.002]  | 0.003<br>[0.002]         | 0.003<br>[0.003]             |
| Regional Population Growth   | -0.005<br>[0.005] | -0.005<br>[0.005]        | -0.005<br>[0.008]            |
| Regional Unemployment        | -0.001<br>[0.005] | -0.002<br>[0.005]        | -0.006<br>[0.008]            |
| Observations                 | 1,167             | 1,195                    | 751                          |

Coefficients are marginal changes in probability. Robust standard errors in brackets.  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table B9. Chow Tests of Differences Between Nascent Entrepreneurs and Others**

| <b>Entrepreneurship Hypothesis</b>   | <b>Calculated F Statistic</b> | <b>Rejection Level</b> |
|--|-------------------------------|------------------------|
| Nascent Entrepreneurship is equivalent to Self-employment                            | 4.676                         | 1%                     |
| General Nascent Entrepreneurship is equivalent to Corporate Nascent Entrepreneurship | 3.197                         | 1%                     |

5% critical  $F(27, 1139) = 1.66$ , 1% critical  $F(27, 1139) = 2.07$

**Table B10. Definitions of Variables Used in the Analysis**

| <b>Variable Name</b>              | <b>Definition</b>  |
|-----------------------------------|--|
| Female                            | Female = 1   |
| Nonwhite                          | Nonwhite = 1   |
| Age                               | Age at time of survey  |
| Born in the U.S.                  | Born in the U.S. = 1   |
| Education                         | Years of education   |
| Married                           | Married = 1  |
| Number of Children                | Number of children under age 18                              |
| Parent was Self-employed          | At least one parent of respondent was self-employed = 1      |
| Friend Owns Business              | At least one friend of respondent owns a business = 1        |
| Positive Economic Outlook         | Has positive economic outlook at initial wave = 1            |
| Years of Work Experience          | Total Years of Work Experience                               |
| Years Living in Current County    | Years Living in Current County                               |
| Prefers Doing Things “Better”     | Prefers doing things “better” = 1                            |
| Unemployed at Initial Wave        | Unemployed at initial wave = 1                               |
| Retired at Initial Wave           | Retired at initial wave = 1                                  |
| ln(Initial Wave Income)           | Natural log of income at initial wave                        |
| Initial Wave Net Worth (\$10,000) | Net Worth (\$10,000) at initial wave                         |
| Homeowner                         | Homeowner = 1  |
| Employed by Others                | Employed by others = 1                                       |
| Venture with Employer             | Venture planned with initial wave employer = 1               |
| Self-employed at Initial Wave     | Self-employed at initial wave = 1                            |
| Venture has Business Plan         | Some form of business plan for venture exists = 1            |
| Business Assistance Requested     | Some business assistance program has been contacted = 1      |
| Midwest                           | Respondent lives in the Midwest = 1                          |
| South                             | Respondent lives in the South = 1                            |
| West                              | Respondent lives in the West = 1                             |
| Micropolitan County               | County population exceeds 10,000 but is less than 50,000 = 1 |
| Rural County                      | County population less than 10,000 = 1                       |

**Table B11. Summary Statistics (\* are time invariant)**

| Variable Name                         | Obs.  | Mean   | Std. Dev. | Min   | Max    |
|---------------------------------------|-------|--------|-----------|-------|--------|
| Female*                               | 3,320 | 0.486  | 0.5       | 0     | 1      |
| Nonwhite*                             | 3,300 | 0.378  | 0.485     | 0     | 1      |
| Age                                   | 3,312 | 39.581 | 11.168    | 18    | 74     |
| Born in the U.S.*                     | 3,204 | 0.916  | 0.277     | 0     | 1      |
| Education*                            | 3,304 | 15.067 | 2.604     | 8     | 20     |
| Married                               | 2,375 | 0.581  | 0.493     | 0     | 1      |
| Number of Children*                   | 3,284 | 1.119  | 1.316     | 0     | 7      |
| Parent was Self-employed*             | 3,320 | 0.5    | 0.5       | 0     | 1      |
| Friend Owns Business*                 | 3,320 | 0.728  | 0.445     | 0     | 1      |
| Positive Economic Outlook*            | 3,320 | 0.51   | 0.5       | 0     | 1      |
| Years of Work Experience*             | 3,252 | 17.443 | 10.705    | 0     | 60     |
| Years Living in Current County*       | 3,224 | 17.398 | 14.441    | 0.167 | 64     |
| Prefers Doing Things “Better”         | 2,375 | 0.674  | 0.469     | 0     | 1      |
| Unemployed*                           | 3,320 | 0.12   | 0.326     | 0     | 1      |
| Retired*                              | 3,320 | 0.031  | 0.174     | 0     | 1      |
| ln(Initial Wave Income)*              | 3,176 | 10.726 | 0.721     | 8.006 | 14.403 |
| Initial Wave Net Worth (\$10,000)*    | 3,168 | 2.532  | 4.079     | -3.8  | 26     |
| Initial Wave Net Worth Squared/1,000* | 3,168 | 0.023  | 0.08      | 0     | 0.676  |
| Homeowner                             | 2,355 | 0.708  | 0.455     | 0     | 1      |
| Employed by Others                    | 2,359 | 0.614  | 0.487     | 0     | 1      |
| Venture with Initial Wave Employer*   | 3,320 | 0.142  | 0.349     | 0     | 1      |
| Self-Employed at Initial Wave*        | 2,375 | 0.648  | 0.478     | 0     | 1      |
| Venture has Business Plan             | 3,320 | 0.665  | 0.472     | 0     | 1      |
| Business Assistance Requested         | 3,320 | 0.194  | 0.396     | 0     | 1      |
| Midwest*                              | 3,320 | 0.214  | 0.411     | 0     | 1      |
| South*                                | 3,320 | 0.36   | 0.48      | 0     | 1      |
| West*                                 | 3,320 | 0.234  | 0.423     | 0     | 1      |
| Micropolitan County*                  | 3,320 | 0.086  | 0.281     | 0     | 1      |
| Rural County*                         | 3,320 | 0.297  | 0.457     | 0     | 1      |

**Table B12. Cox Proportional Hazard Models of Nascent Entrepreneur Operation**

|                                      | <b>Operating 1</b>   | <b>Operating 2</b>   | <b>Operating 3</b>   |
|--------------------------------------|----------------------|----------------------|----------------------|
| Female                               | -0.118<br>[0.107]    | -0.086<br>[0.106]    | -0.086<br>[0.105]    |
| Nonwhite                             | -0.391<br>[0.134]*** | -0.429<br>[0.135]*** | -0.508<br>[0.131]*** |
| Age                                  | -0.018<br>[0.009]**  | -0.018<br>[0.008]**  | -0.015<br>[0.008]*   |
| Born in the U.S.                     | -0.043<br>[0.237]    | -0.051<br>[0.235]    | -0.028<br>[0.235]    |
| Education                            | 0.017<br>[0.020]     | 0.014<br>[0.019]     | 0.017<br>[0.019]     |
| Married                              | 0.117<br>[0.121]     | 0.198<br>[0.114]*    |                      |
| Number of Children                   | -0.030<br>[0.045]    | -0.035<br>[0.042]    | -0.009<br>[0.041]    |
| Parent was Self-employed             | -0.049<br>[0.099]    | -0.026<br>[0.097]    | -0.02<br>[0.098]     |
| Friend Owns Business                 | -0.041<br>[0.112]    | -0.023<br>[0.112]    | -0.025<br>[0.110]    |
| Positive Economic Outlook            | -0.203<br>[0.103]**  | -0.172<br>[0.102]*   | -0.156<br>[0.102]    |
| Years of Work Experience             | 0.017<br>[0.008]**   | 0.017<br>[0.008]**   | 0.017<br>[0.008]**   |
| Years Living in Current County       | -0.001<br>[0.004]    | -0.001<br>[0.004]    | -0.001<br>[0.004]    |
| Prefers Doing Things “Better”        | 0.111<br>[0.113]     | 0.094<br>[0.112]     | 0.063<br>[0.110]     |
| Unemployed                           | -0.047<br>[0.159]    | -0.122<br>[0.151]    | -0.053<br>[0.153]    |
| Retired                              | -0.291<br>[0.284]    | -0.375<br>[0.266]    | -0.284<br>[0.270]    |
| ln(Initial Wave Income)              | 0.099<br>[0.089]     |                      |                      |
| Initial Wave Net Worth (\$10,000)    | 0.019<br>[0.030]     |                      |                      |
| Initial Wave Net Worth Squared/1,000 | -1.273<br>[1.500]    |                      |                      |
| Homeowner                            | 0.029<br>[0.130]     | 0.067<br>[0.124]     |                      |

**Table B12. Hazard Models of Nascent Entrepreneur Operation, continued**

|                                    | <b>Operating 1</b>   | <b>Operating 2</b>   | <b>Operating 3</b>  |
|------------------------------------|----------------------|----------------------|---------------------|
| Employed by Others                 | -0.354<br>[0.101]*** | -0.353<br>[0.100]*** |                     |
| Venture with Initial Wave Employer | 0.355<br>[0.130]***  | 0.367<br>[0.125]***  | 0.336<br>[0.125]*** |
| Self-Employed at Initial Wave      | 1.478<br>[0.212]***  | 1.524<br>[0.213]***  | 1.549<br>[0.199]*** |
| Venture has Business Plan          | 0.103<br>[0.109]     | 0.088<br>[0.106]     |                     |
| Business Assistance Requested      | 0.19<br>[0.115]*     | 0.207<br>[0.110]*    |                     |
| Midwest                            | -0.022<br>[0.145]    | -0.044<br>[0.146]    | -0.055<br>[0.147]   |
| South                              | -0.02<br>[0.135]     | -0.005<br>[0.133]    | 0.026<br>[0.139]    |
| West                               | -0.015<br>[0.155]    | -0.05<br>[0.156]     | -0.069<br>[0.154]   |
| Micropolitan County                | -0.121<br>[0.169]    | -0.131<br>[0.162]    | -0.131<br>[0.162]   |
| Rural County                       | 0.313<br>[0.231]     | 0.283<br>[0.227]     | 0.293<br>[0.221]    |
| Number of Observations             | 1,833                | 1,911                | 1,915               |
| Number of Subjects                 | 734                  | 767                  | 767                 |
| Number of Failures <sup>1</sup>    | 265                  | 273                  | 276                 |

Coefficients, not hazard ratios, are reported. Robust standard errors in parentheses.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

1. Defined as the number of subjects that leave the data for the reason modeled.

**Table B13. Cox Proportional Hazard Models of Nascent Entrepreneur Quitting**

|                                      | Quitting 1         | Quitting 2         | Quitting 3         |
|--------------------------------------|--------------------|--------------------|--------------------|
| Female                               | 0.055<br>[0.123]   | 0.052<br>[0.118]   | 0.037<br>[0.119]   |
| Nonwhite                             | 0.144<br>[0.136]   | 0.168<br>[0.130]   | 0.129<br>[0.127]   |
| Age                                  | 0.007<br>[0.008]   | 0.007<br>[0.008]   | 0.008<br>[0.008]   |
| Born in the U.S.                     | -0.387<br>[0.217]* | -0.367<br>[0.212]* | -0.385<br>[0.203]* |
| Education                            | -0.031<br>[0.025]  | -0.03<br>[0.023]   | -0.042<br>[0.023]* |
| Married                              | 0.096<br>[0.128]   | 0.030<br>[0.119]   |                    |
| Number of Children                   | 0.005<br>[0.049]   | 0.030<br>[0.045]   | 0.031<br>[0.044]   |
| Parent was Self-employed             | 0.125<br>[0.118]   | 0.148<br>[0.113]   | 0.152<br>[0.113]   |
| Friend Owns Business                 | 0.140<br>[0.134]   | 0.068<br>[0.127]   | 0.015<br>[0.128]   |
| Positive Economic Outlook            | 0.186<br>[0.116]   | 0.128<br>[0.112]   | 0.106<br>[0.112]   |
| Years of Work Experience             | -0.001<br>[0.008]  | -0.001<br>[0.008]  | -0.002<br>[0.008]  |
| Years Living in Current County       | -0.008<br>[0.004]* | -0.007<br>[0.004]* | -0.008<br>[0.004]* |
| Prefers Doing Things “Better”        | 0.096<br>[0.127]   | 0.091<br>[0.120]   | 0.121<br>[0.120]   |
| Unemployed                           | -0.017<br>[0.189]  | 0.067<br>[0.173]   | 0.08<br>[0.167]    |
| Retired                              | -0.114<br>[0.348]  | -0.183<br>[0.330]  | -0.156<br>[0.331]  |
| ln(Initial Wave Income)              | -0.097<br>[0.096]  |                    |                    |
| Initial Wave Net Worth (\$10,000)    | -0.031<br>[0.035]  |                    |                    |
| Initial Wave Net Worth Squared/1,000 | 0.968<br>[1.743]   |                    |                    |
| Homeowner                            | -0.01<br>[0.132]   | -0.071<br>[0.124]  |                    |

**Table B13. Hazard Models of Nascent Entrepreneur Quitting, continued**

|                                    | Quitting 1           | Quitting 2           | Quitting 3           |
|------------------------------------|----------------------|----------------------|----------------------|
| Employed by Others                 | -0.056<br>[0.142]    | -0.056<br>[0.136]    |                      |
| Venture with Initial Wave Employer | -0.095<br>[0.200]    | -0.119<br>[0.190]    | -0.109<br>[0.189]    |
| Self-Employed at Initial Wave      | -1.522<br>[0.137]*** | -1.544<br>[0.133]*** | -1.572<br>[0.125]*** |
| Venture has Business Plan          | -0.179<br>[0.114]    | -0.174<br>[0.108]    |                      |
| Business Assistance Requested      | -0.339<br>[0.176]*   | -0.355<br>[0.166]**  |                      |
| Midwest                            | -0.078<br>[0.172]    | -0.063<br>[0.166]    | -0.045<br>[0.167]    |
| South                              | -0.039<br>[0.155]    | -0.043<br>[0.149]    | -0.057<br>[0.149]    |
| West                               | 0.002<br>[0.159]     | 0.007<br>[0.154]     | 0.055<br>[0.152]     |
| Micropolitan County                | 0.155<br>[0.181]     | 0.157<br>[0.174]     | 0.167<br>[0.173]     |
| Rural County                       | 0.045<br>[0.457]     | 0.066<br>[0.438]     | -0.053<br>[0.414]    |
| Number of Observations             | 2,015                | 2,101                | 2,105                |
| Number of Subjects                 | 734                  | 767                  | 767                  |
| Number of Failures <sup>1</sup>    | 228                  | 239                  | 239                  |

Coefficients, not hazard ratios, are reported. Robust standard errors in parentheses.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

1. Defined as the number of subjects that leave the data for the reason modeled.



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