Becoming an Entrepreneur: The Role of Employment History and Risk

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Introduction

Why some choose to become self-employed is a difficult question to answer

- The returns to self-employment could potentially be higher than wage employment
- However, self-employment is much more financially risky
- Does employment history for individuals who are currently self-employed influence their decision to enter self-employment?
- In this study, I investigate the probability of entering self-employment based on one's employment history and attitude towards risk

Introduction

- In the past, researchers have looked at the relationship between risk and self-employment, or between unemployment and self-employment but they have never considered them together (Ahn, 2010a; Ekelund, Johansson, Järvelin, & Lichtermann, 2005; Newman, 2007; Parker, 1997; Rampini, 2004)
- Most studies only look at men's self-employment decisions but in this study, I consider both men and women

Theoretical Motivation

There are opportunity costs involved with choosing your employment medium

- Time is a limited resource so individuals must choose how to use it
- Microeconomic theory suggests that individuals weigh the decision to enter self-employment on the expected financial outcomes, perceived riskiness, and possibility of work-life improvement (a more flexible schedule for example)
- If the perceived riskiness of self-employment outweigh the other factors, then an individual will likely not enter self-employment

Literature Review

- Several theoretical models have been developed that show that individuals with a high risk tolerance are more likely to enter self-employment (Cressy, 2000; Kihlstrom & Laffont, 1979; Knight, 1921; Newman, 2007; Parker, 1996, 1997)
- Previous researchers have mostly centered on either the relationship between risk and self-employment, or between unemployment and self-employment (Ahn, 2010a; Ekelund, Johansson, Järvelin, & Lichtermann, 2005; Newman, 2007; Parker, 1997; Rampini, 2004)
- Researchers have also studied the motivational differences between men and women when deciding to enter self-employment and find that women are typically motivated by quality of life improvements (Allen & Curington, 2014; Biehl, Gurley-Calvez, & Hill, 2013)

Literature Review

- There has been much debate over the “push” and “pull” hypotheses
  - The “push” hypothesis argues that a poor job market will “push” an individual into self-employment
  - The “pull” hypothesis argues that periods of high returns to self-employment “pull” an individual into self-employment
- In line with the “push” hypothesis, researchers have find that longer durations of unemployment are more likely to lead to self-employment (Moore & Mueller, 2002)

Data

- My data comes from the 1979 National Longitudinal Survey of Youth (NLSY79) which is a survey data set that tracks the same individuals over time from 1979 to 2012
- The initial round of the survey included 12,686 individuals between the ages of 14 and 22
- The data on risk tolerance comes from the “gambling” questions included in the survey for the years 1993, 2002, 2004, 2006, 2010, and 2012
- To control for local unemployment rates, I applied for access to the NLSY 79 Geodata

Data

The geodata application process involved:

- Finding a university IT specialist that is authorized to work on the computer with the geodata
- Getting approval from someone at the university who can enter legal agreements on behalf of the university (Dr. Simon Kim)
- Getting approval from the project coordinator (Dr. Ng)
- Stating where the data will be securely stored
- Stating where the data will be analyzed

Data

- Every participant will be asked a total of 2 “gambling” questions:

Question 1:

Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your (family) income and a 50-50 chance that it will cut your (family) income by a third. Would you take the new job?

Yes

Question 2

Suppose the chances were 50-50 that it would double your (family) income and 50-50 that it would cut it in half. Would you still take the new job?

No

Question3

Suppose the chances were 50-50 that it would double your (family) income and 50-50 that it would cut it by 20%. Would you still take the new job?

Q1	Q2	Q3	Risk category
No	-	No	1 (least risk tolerant)
No	-	Yes	2
Yes	No	-	3
Yes	Yes		4 (most risk tolerant)

Data

Table 1. Summary Statistics

	Men				Women			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Risk Category 1	0.522	0.499	0	1	0.562	0.495	0	1
Risk Category 2	0.150	0.357	0	1	0.149	0.357	0	1
Risk Category 3	0.151	0.358	0	1	0.139	0.346	0	1
Risk Category 4	0.177	0.382	0	1	0.144	0.351	0	1
Number of Observations		7,093				8,386		

Data

- For my dependent variable, I calculate the number of transitions from either wage employment to self-employment or from unemployment to self-employment
- Specifically, I generate an indicator variable with a value of "1" if an individual was wage/unemployed employed in the current year but transitioned to self-employment in the following 2 years

Table 1. Summary Statistics

	Men				Women			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Transition to Self-employment	0.017	0.130	0	1	0.012	0.108	0	1
Number of Observations		7,093				8,386		

Empirical Methodology

To estimate the effect of risk tolerance and unemployment duration on the probability of entering self-employment, I estimate a discrete choice model of the transition to self-employment S_{it}

$$\Pr(S_{it} = 1|\boldsymbol{X}) = \Phi(\gamma_0 + \boldsymbol{\gamma_1}\boldsymbol{\rho} + \gamma_2\omega_{it} + \boldsymbol{\gamma_3}\boldsymbol{X} + \theta_t + u_{it})$$

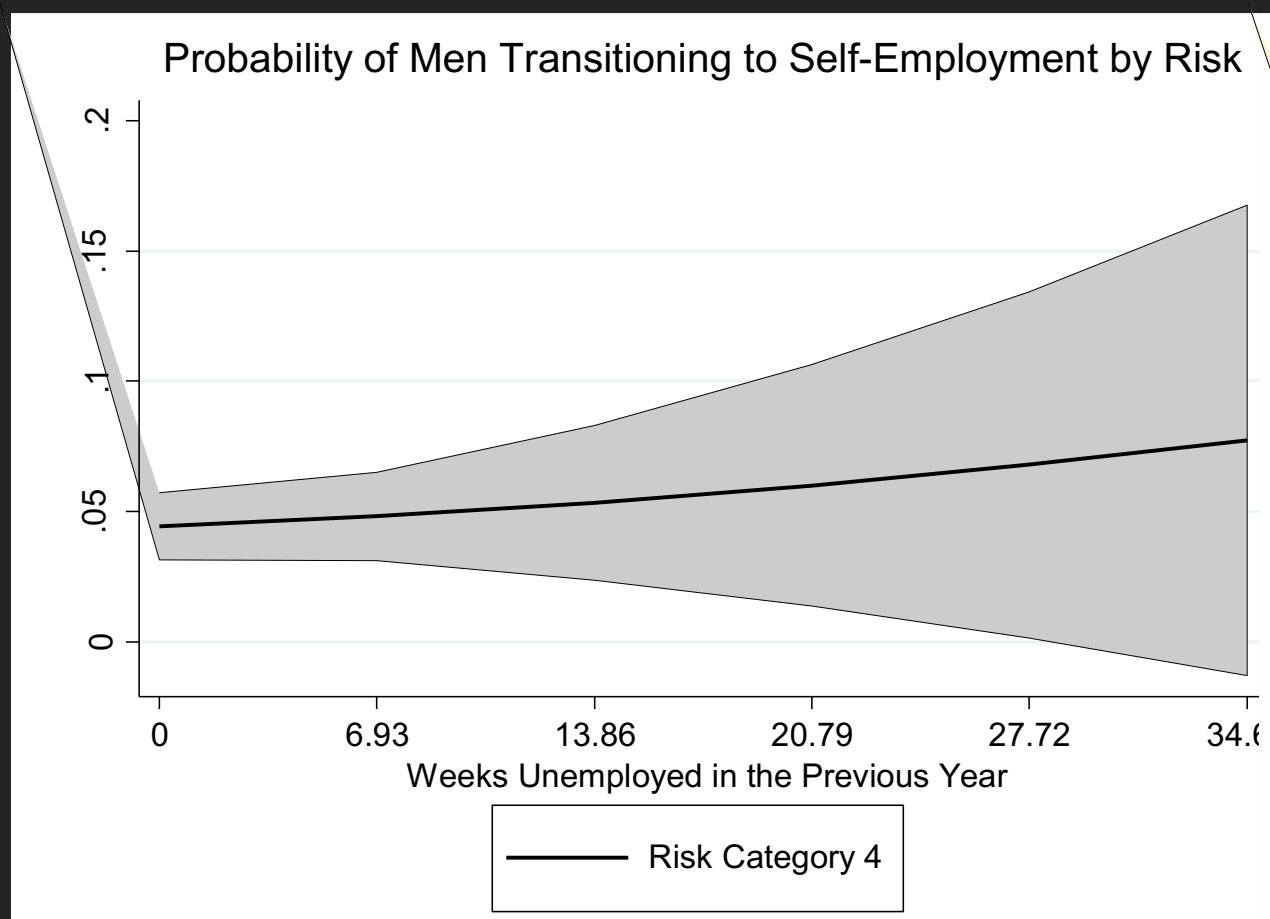
- $\boldsymbol{\rho}$ represents the 3 risk categories (category 1 is omitted)
- ω_{it} is a categorical variable for the duration of unemployment
- $\boldsymbol{X}$ is a set of controls that includes, family net worth, education, marital status, age of youngest child in the household, hourly pay rate, number of hours worked in the previous year, total tenure in weeks at current employer, industry of employment, and local unemployment rate
- θ_t represents time fixed-effects

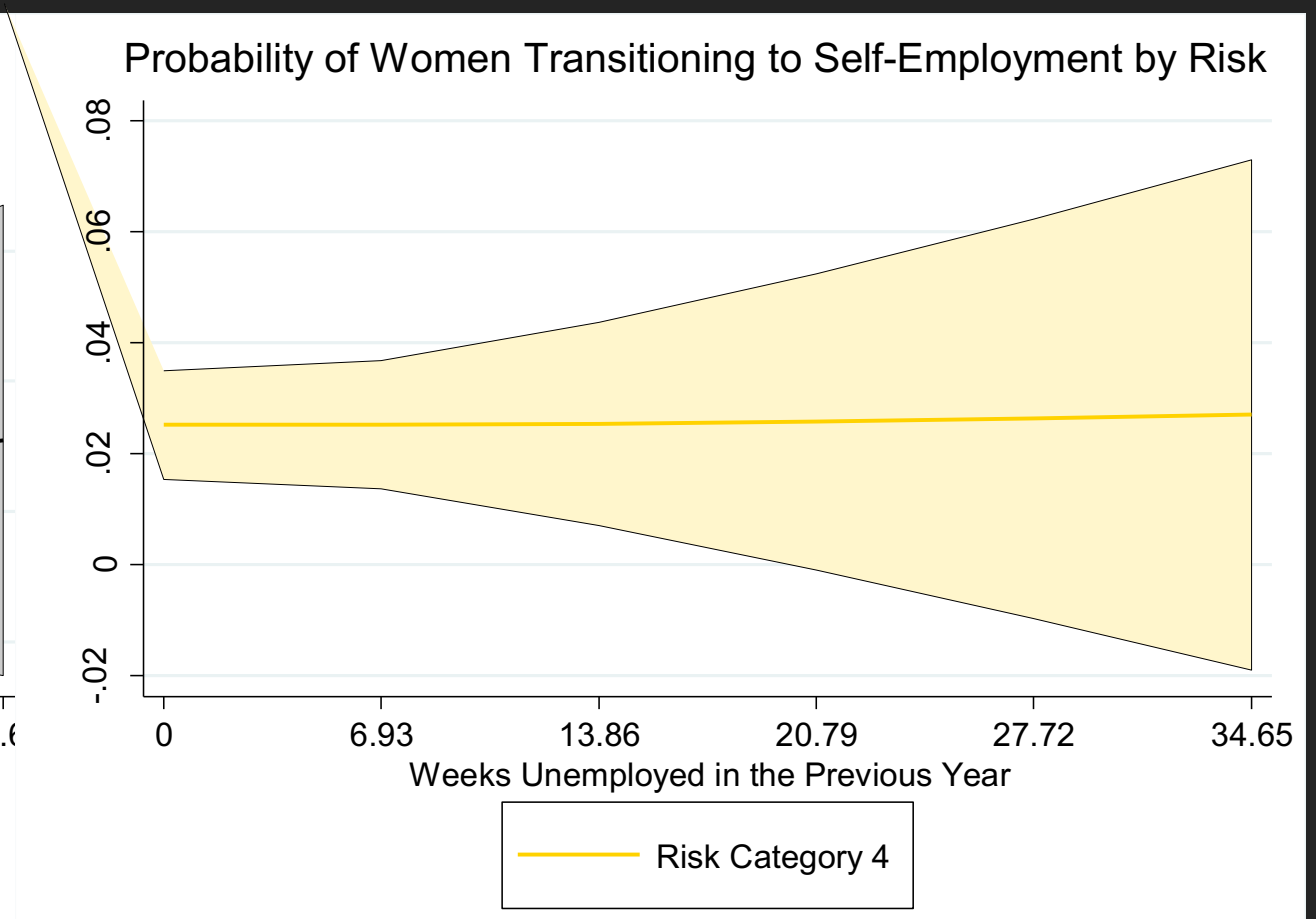
Results

Table 2. Probit Estimation of the Likelihood of Entering Self-employment

- Includes all control variables in estimation
- Standard errors are clustered at the individual level

Dependent Variable: Indicator Variable for Making the Transition from to Self-employment				
	Men		Women	
	Coefficients	Marginal Effects	Coefficients	Marginal Effects
Independent Variables	(1)	(2)	(3)	(4)
Risk Category 2	0.0823	0.00336	-0.135	-0.00437
	(0.108)	(0.00589)	(0.122)	(0.00349)
Risk Category 3	0.338***	0.0212***	0.349***	0.0176***
	(0.0957)	(0.00722)	(0.0984)	(0.00564)
Risk Category 4	0.399***	0.0264***	0.271***	0.0116**
	(0.0872)	(0.00676)	(0.100)	(0.00508)
Risk Category 4 × Weeks Unemployed Last Year	0.0103		-0.00226	
	(0.0151)		(0.0141)	
Weeks Unemployed Last Year	0.00340	0.000102	-0.000692	5.84e-05
	(0.0131)	(0.000387)	(0.0105)	(0.000241)
Unemployed in the Week of Taking the Survey	0.704***	0.0633**	0.0454	0.000860
	(0.210)	(0.0305)	(0.271)	(0.0100)
Unemployed in the Week of Taking the Survey × Weeks Unemployed Last Year	-0.0371**		-0.0177	
	(0.0156)		(0.0183)	
Observations	7,093		8,386	


Probability of Men Transitioning to Self-Employment by Risk
0
.05
.1
.15
.2
0
6.93
13.86
20.79
27.72
34.6
Weeks Unemployed in the Previous Year
Risk Category 4


Probability of Women Transitioning to Self-Employment by Risk
-.02
0
.02
.04
.06
.08
0
6.93
13.86
20.79
27.72
34.65
Weeks Unemployed in the Previous Year
Risk Category 4

Risk Estimation

There are better ways to measure risk

- Kimball et al (2008) developed a method to measure risk tolerance from survey questions identical to the those in the NLSY survey
  - Their methodology requires several steps
  - I use equations form Kimball et al (2008) and Light and Ahn (2010)

Risk Estimation

Step 1: Assume that individuals have constant relative risk aversion in lifetime income

$$U(I_i) = \frac{C_i^{1-\frac{1}{\rho_{it}}}}{1-\frac{1}{\rho_{it}}}$$

- ρ_{it} is the coefficient of relative risk tolerance (higher means more willing to take risks)

Step 2: Solve for the upper and lower bounds for each individual's risk tolerance

$$\frac{1}{2}U(2I) + \frac{1}{2}U(1-\pi)I) \geq U(I)$$

- π is the downside of the outcome

Risk Estimation

- Then solve for the upper and lower bounds, $\overline{\rho}$ and $\underline{\rho}$ respectively.
  - If we say the downside of accepting the risky job is one-fifth and declining when the downside is one-third, our bounds are:

$$0.5\frac{2^{1-1/\underline{\rho}}}{1-1/\underline{\rho}}+0.5\frac{(4/5)^{1-1/\underline{\rho}}}{1-1/\underline{\rho}}=\frac{1^{1-1/\underline{\rho}}}{1-1/\underline{\rho}}$$

$$\underline{\rho}=0.27$$

$$0.5\frac{2^{1-1/\overline{\rho}}}{1-1/\overline{\rho}}+0.5\frac{(2/3)^{1-1/\overline{\rho}}}{1-1/\overline{\rho}}=\frac{1^{1-1/\overline{\rho}}}{1-1/\overline{\rho}}$$

$$\overline{\rho}=0.50$$

Risk Estimation

Step 3: Assuming true risk tolerance follows a log-normal distribution, $\log(\rho) = \boldsymbol{X}_i\boldsymbol{\beta} + \alpha_i + u_{it}$

- We can use MLE to estimate $\overline{\alpha}$, $\boldsymbol{\beta}$, σ_α, and σ_u
- For an individual who answers the gambling questions in a single year the probability that their risk category is j (j =1,2,3,4) is:

$$P(c = j|\boldsymbol{X}_i) = P(\log \underline{\rho}_j < \log \rho_{it} < \log \overline{\rho}_j)$$

$$= \Phi\left(\frac{\log \overline{\rho}_j - \overline{\alpha} - \boldsymbol{X}_i\boldsymbol{\beta}}{\sqrt{\sigma_\alpha^2 + \sigma_u^2}}\right) - \Phi\left(\frac{\log \underline{\rho}_j - \overline{\alpha} - \boldsymbol{X}_i\boldsymbol{\beta}}{\sqrt{\sigma_\alpha^2 + \sigma_u^2}}\right)$$

Risk Estimation

- For an individual who answers the gambling questions in 2 different years, *t* and *s*, the probability that their risk category is *j* in year *t* and *k* in year *s* is:

$$P(C_{it} = j, C_{is} = k | \boldsymbol{X}_{it}, \boldsymbol{X}_{is}) = P(\log \underline{\rho}_j < \log \rho_{it} < \log \overline{\rho}_j, \log \underline{\rho}_k < \log \rho_{is} < \log \overline{\rho}_k)$$

$$= \int \left[\left\{ \Phi\left(\frac{\log \overline{\rho}_j - \alpha_i - \boldsymbol{X}_i \boldsymbol{\beta}}{\sigma_u} \right) - \Phi\left(\frac{\log \underline{\rho}_j - \alpha_i - \boldsymbol{X}_i \boldsymbol{\beta}}{\sigma_u} \right) \right\} \times \left\{ \Phi\left(\frac{\log \overline{\rho}_k - \alpha_i - \boldsymbol{X}_i \boldsymbol{\beta}}{\sigma_u} \right) - \Phi\left(\frac{\log \underline{\rho}_k - \alpha_i - \boldsymbol{X}_i \boldsymbol{\beta}}{\sigma_u} \right) \right\} \right] dF(\alpha_i)$$

Risk Estimation

Step 4: Estimate the individual's relative risk tolerance

- For an individual who answers the gambling questions in 2 different years, *t* and *s*, their expected relative risk tolerance is:

$$E(\rho_{it}|C_{it}=j, C_{is}=k, \boldsymbol{X}_{it}, \boldsymbol{X}_{is}) = \exp(\hat{\alpha} + \boldsymbol{X}_i\widehat{\boldsymbol{\beta}} + \frac{1}{2}\hat{\sigma}_\alpha^2) \frac{P(\log \underline{\rho}_j < \log \rho_{it} + \hat{\sigma}_\alpha^2 < \log \overline{\rho}_j, \log \underline{\rho}_k < \log \rho_{is} + \hat{\sigma}_\alpha^2 < \log \overline{\rho}_k)}{P(\log \underline{\rho}_j < \log \rho_{it} < \log \overline{\rho}_j, \log \underline{\rho}_k < \log \rho_{is} < \log \overline{\rho}_k)}$$

Risk Estimation

So far, I have only been able to use this methodology for one year of data (I use 2006) which means that I am unable to distinguish between the individual variation and measurement error

Thus, I modify the equation in Step 3 (Assuming true risk tolerance follows a log-normal distribution, $\log(\rho) = x \sim N(\mu, \sigma_x^2)$ we can use maximum likelihood estimation to estimate $\overline{\alpha}$, β, σ_α^2, and σ_u^2) based on Kimball et al (2008):

So the probability of being in category *j* becomes:

$$P(C_i = j_i) = P(\log \underline{\rho}_j < \boldsymbol{x}_i < \log \overline{\rho}_j$$

$$= \Phi\left(\frac{(\log \overline{\rho}_j - \alpha - \boldsymbol{X}_i\boldsymbol{\beta})}{\sigma}\right) - \Phi\left(\frac{\left(\log \underline{\rho}_j - \alpha - \boldsymbol{X}_i\boldsymbol{\beta}\right)}{\sigma}\right)$$

Risk Estimation

After estimating α, β, and σ with MLE, I also modify Step 4 (Estimate the individual's relative risk tolerance) to:

$$E(\rho_i | C_i = j_i, \boldsymbol{X}_i)$$

$$= \exp(\hat{\alpha} + \boldsymbol{X}_i\hat{\boldsymbol{\beta}} + \frac{\hat{\sigma}^2}{2}) \frac{\Phi\left(\frac{\log\overline{\rho} - \hat{\alpha} - \boldsymbol{X}_i\hat{\boldsymbol{\beta}} - \hat{\sigma}^2}{\hat{\sigma}}\right) - \Phi\left(\frac{\log\underline{\rho} - \hat{\alpha} - \boldsymbol{X}_i\hat{\boldsymbol{\beta}} - \hat{\sigma}^2}{\hat{\sigma}}\right)}{\Phi\left(\frac{\log\overline{\rho} - \hat{\alpha} - \boldsymbol{X}_i\hat{\boldsymbol{\beta}}}{\hat{\sigma}}\right) - \Phi\left(\frac{\log\underline{\rho} - \hat{\alpha} - \boldsymbol{X}_i\hat{\boldsymbol{\beta}}}{\hat{\sigma}}\right)}$$

Risk Estimation

Table 3. MLE Estimation of Risk Preference Parameters

- Estimates include all covariates

Maximum Likelihood Estimates of Risk Preference Parameters				
	Women		Men	
Parameter	Estimate	SE	Estimate	SE
α	4.61	64.57	4.85	105.54
σ	0.86	0.03	0.86	0.03
Log-Likelihood	-2,525.76		-2,525.76	
Observations	3,218		3,218	

Results

Table 4. Probit Estimation of the Likelihood of Entering Self-employment

- Includes all control variables in estimation

Dependent Variable: Indicator Variable for Making the Transition from Wage to Self-employment	Men Coefficients	Women Coefficients
Independent Variables	(1)	(2)
Male's Relative Risk Tolerance	-0.230	
	(0.441)	
Female's Relative Risk Tolerance		0.839*
		(0.444)
Weeks Unemployed Last Year	-0.0234	-0.0391
	(0.0750)	(0.0679)
Male's Relative Risk Tolerance × Weeks Unemployed Last Year	-0.0123	
	(0.196)	
Female's Relative Risk Tolerance × Weeks Unemployed Last Year		0.0484
		(0.134)
Unemployed in the Week of Taking the Survey	2.596***	
	(0.820)	
Constant	-0.845	0.396
	(1.723)	(2.012)
Observations	1,396	1,611

Conclusions

Risk Tolerance and the Decision to Enter Self-employment

- Higher levels of risk tolerance are associated with an increase in the probability of self-employment
- When only looking at one year, risk tolerance is not significant

Unemployment Duration and the Decision to Enter Self-employment

- As unemployment duration increases, men become more likely to enter self-employment

Conclusions

Implications

- Individual risk perceptions are very important in the decision to enter self-employment, thus it will be difficult for governments to incentivize individuals to pursue this path
  - Perhaps this means that encouraging self-employment (with tax incentives, for example) is not a good strategy to lower unemployment rates

Thank you.