Are Entrepreneurs Different?
A Quasi-Experiment using Stock Market Data

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Are Entrepreneurs Different?

- The promotion of entrepreneurship has been a major ***worldwide policy target***:
  - It is *thought* to be associated with the creation of ***wealth***, technological ***innovation***, and increased social ***welfare***.
  - However, entrepreneurship can entail ***real costs***, such as the diversion from more productive careers and often the limited enhancement to social welfare (Baumol, 1990; Murphy, Shleifer, and Vishny, 1991)

- Some of the *stylized facts* in the entrepreneurship literature:
  - Individuals may pursue new ventures and invest high fractions of their private holdings in a ***single private company***, even if the returns are ***predictably meagre***, particularly in the *initial period*, and *highly correlated* with ***human capital returns*** (Camerer and Lovallo, 1999; de Meza and Southey, 1996; Moskowitz & Vissing-Jorgensen, 2002; Hamilton, 2000).
  - Furthermore, the rates of *survival* of new firms suggest that initiating a business is a ***risky venture*** (Heaton and Lucas, 2000), with ***half*** of the new born firms not living up to their ***5th*** birthday and only around ***34%*** surviving over the first ***ten years*** of the firm's life (Moskowitz & Vissing-Jorgensen, 2002).

Motivation and Opportunities

- Explaining why some people are more likely than others to undertake the ***risk*** of becoming entrepreneurs is a question of explaining why some people are more ***able*** to ***perceive*** and ***exploit*** entrepreneurial ***opportunities***, and why some are more ***motivated*** to pursue those opportunities (Shane, 2000; Eckhart & Shane, 2003).
  - The perception of opportunities is a ***necessary*** condition ("*Austrian tradition*"; Aldrich 1999; Shane, 2000; 2003; Eckhardt & Shane, 2003)
  - However, it is not ***sufficient***, as *entrepreneurial motivation accounts for why some people forgo paid employment to pursue entrepreneurial opportunities, while others do not, when confronted with the same opportunities* (Shane, et al., 2003)

- Developments in the "***behavioural entrepreneurship***" literature suggest that :
  - Entrepreneurial motivation is likely to be the outcome of factors, such as lower aversion to: ***risk***, ***ambiguity*** and ***skewness*** in the lure of higher potential payoffs, and ***optimism*** and ***overconfidence***, w.r.t. the chances of success and the accuracy of one's own beliefs, respectively.
  - Entrepreneurs are considered to be either ***socially*** or ***biologically*** "programmed" to overestimate the quality of their own information, and explore their environment (Astebro, 1999, Bernando & Welch, 2001; Shane & Venkataraman, 2000; Nikolaou et al., 2008).
  - Overconfident agents may self-select into entrepreneurship (De Meza & Southey, 1996).

Are Entrepreneurs Different?

- Thus, entrepreneurs & small-scale business owners are often claimed to be ***different*** from non-entrepreneurs, in a number of *features*:
  - Fairlie (2002): *drug-dealers* are 11%-21% more likely to later choose self-employment than non drug-dealers

- However, the *empirical* attempts to examine differences in the motivation of entrepreneurs and non-entrepreneurs are characterised by ***weaknesses*** and ***limitations*** in the ***data*** sources and ***identification*** strategies.
  - ***Selection effects*** are a typical source of error in surveys & experiments (Malmendier, et al., 2006). Examining motivational dispositions upon entry into entrepreneurship is likely to be flawed if agents self-select into the latter.
  - ***Information bias*** is often present, as the literature often needs to rely on self-declared measures as ***proxies*** for motivational aspects. It is typical to use self-reported, hypothetical, subjective and arbitrary measures of proxies for values related to motivation.
  - The presence of ***confounding factors*** makes the disentanglement of motivation and opportunity almost impossible.
  - Researchers are typically unable to ***control for differences in opportunities*** between entrepreneurs and non-entrepreneurs

Ideally...

- An ideal *quasi-experiment* would use information on the entire population of entrepreneurs and non-entrepreneurs.
- Moreover, it would be able to open "*a window in the past*" and observe patterns related to the characteristics of interest several years in the past.
  - The ***psychology*** literature has documented that behavioural traits tend to ***persist through time***, and belief updating takes the form of wishful thinking that reinforces them (e.g. Babcock and Loewenstein, 1997).

- Furthermore, a careful design would ensure that the past actions of entrepreneurs would be compared to those of a ***carefully constructed control group***, statistically identical with respect to the characteristics that are likely to confound the relationship between motivation and outcomes.
  - This similarity would also consider the opportunities individuals are faced with.

Our story

- We use a dataset that covers the ***stock market transactions*** of a large number of individuals to analyze whether (future) entrepreneurs tend to make ***different investment choices*** than non-entrepreneurs.

- Two unique features of our data is that
  - We study the stock market decisions ***several years before entry*** into self-employment
  - We compare entrepreneurial decision-making to the behavior of a carefully constructed ***control group*** of non-entrepreneurs
    - This feature eliminates ***confounding*** caused by other factors, such as education, experience, wealth, etc.
    - It provides similar *case and control groups*, with respect to important factors that are related to the *identification of opportunities*

- Based on recent literature, we use *past investment activity* as a proxy for these entrepreneurial characteristics
  - Exposure of wealth to stock market participation is more attractive to individuals who are *less risk averse*, and more *overconfident* (Barber and Odean, 2001; Puri and Robinson, 2007)
  - Overconfident investors are also more likely to *trade more* frequently (Barber and Odean, 2000; 2001)

- Investors are also more likely to possess other unobservable characteristics that are positively associated with self-employment
  - Investment may represent a useful proxy for entrepreneurial characteristics that are difficult to measure
  - The relationship between the two has not been examined in the literature

Main Findings

Overview of Main Findings

	Summary Statistics		Regression Analysis
	Entry	*No Entry*	
Investor	14.4%***	12.6%	12-18% effect
# Trades	3.53***	2.46	16-68% effect
Portfolio Value	51,639***	41,367	Log-Quadratic profile, positive at high levels
# of Stocks	2.18	2.06	
Monthly Returns	0.0065	0.0050	
St. Dev. Of Monthly Returns	0.1071	0.1047	
Beta	1.1301	1.1347	
Market Capitalization	6.95b	6,83b	
Portfolio/Wealth Ratio	7.39%	6.85%	

Notes: Sample means and significance levels from t-tests are presented in the summary statistics. Marginal effects are from conditional logit regressions on the probability of new self-employment entry in 2003-2005. The investor figures are from 1-20 case-control matched samples of entrepreneurs with non-entrepreneurs. The remaining figures are for 1-20 matching of investors in the respective groups.

The Data

- Norwegian Registry Data: 1987 – 2006
- Entire Population of New Self-Employment Entries: 2003 – 2005
- Stock Market Transaction Data: 1994 – 1998

Data Availability:

- Marital Status, Age, Years & Type of Education, Gross Wealth, Earnings, Industry (NACE), Firm Size, Region of Residence
- Investor Account, # Stocks, #Trades, Portfolio Value, Market Capitalization, Monthly Returns & S.D. Of Returns, Market Beta

Sample Inclusion Criteria:

- Male
- Employed during sample life (not in agriculture)
- Aged 25-60 in 2000
- 6-21 Years of Education in 2000
- Without a prior history of self-employment activity between 1987-2002
- Not working in listed or daughter companies (Gompers et al., 2005; 2007)
- For the investor sample, investment activity for 5 years (1994-1998)

The Sample:

- 6,281 New Entries to Self-Employment
  - The entire population satisfying our criteria
- 334,138 Non-Entrants
  - A sample from the population that satisfies our criteria

Appendix Table C
New Self-Employment Entries (2003-2005)

Industry (1-digit NACE 2000 codes)	*# Obs*	*(Frequency)*	*2003*	*2004*	*2005*
Agriculture, forestry and fishing	80	(1.27%)	19	27	34
Mining and quarrying	41	(0.65%)	9	15	17
Manufacturing	629	(10.01%)	226	191	212
Electricity, gas, and water supply	28	(0.45%)	8	9	11
Construction	931	(14.82%)	304	270	357
Wholesale and retail trade; repairs	1,038	(16.53%)	376	313	349
Hotels & Restaurants	147	(2.34%)	34	52	61
Transportation and storage	556	(8.85%)	194	159	203
Financial Intermediation	75	(1.19%)	26	19	30
Real estate & Business activities	1,033	(16.45%)	360	326	347
Public administration and defence; comp	176	(2.80%)	61	58	57
Education	200	(3.18%)	65	60	75
Human health and social work activities	308	(4.90%)	106	93	109
Other community, social and personal services	201	(3.20%)	66	60	75
Missing	838	(13.34%)	294	341	203
Total	6,281	(100.00%)	2,148	1,993	2,140
Matched Total (1-to-20)	6,111		2,090	1,935	2,086

Empirical Strategy

- ***Selection:*** *Registry data* on the entire population of new entrants

⚠ A typical source of error in surveys & experiments, because the association between motivation/opportunity and entry is different for participants and non-participants (Lazear, et al., 2006)

- ***Information :*** *Official data*, rather than self-declared measures

⚠ Another typical source of error in surveys, because the measurement of motivation/opportunity or entry is different between the comparison groups

- ***Confounding:*** *Case-control matching* based on confounders

⚠ Mixing of the effect of motivation/opportunity on entry with the effect of another factor that is associated with motivation/ opportunity

Case-Control Matching

- Commonly implemented in epidemiology, intended to eliminate confounding and gain in efficiency, examining conditional rather than causal associations (Mortensen et al., 2000; 2004; Rose and van der Laan, 2008)
  - Use of ***all the new cases***, *i.e.* the ***entire population*** of newly self-employed in 2003-2005 (ideal situation)
  - Recruitment of ***several control subjects*** without the ex post feature from the population
  - ***Matching*** of cases to the controls, based on ***confounders***, i.e. variables that affect both investment and entry:
  - Natural candidates from the entry literature: ***Age*** (3 groups); *Years of* ***Education*** (3); ***Marital*** *status* (3); ***Wealth*** *Centiles* (1994-1998 average); ***Earnings*** *Centiles* (1994-1998 average)
    - 1-to-20 matching implemented
    - Results robust to other orders: 1-to-5; 1-to-10; 1-to-30; 1-to-50
  - Then one can examine differences between cases and controls for *prior exposure* to the factor being evaluated, *i.e.* investment activity and performance

Table 1
Case-Control Matching based on individual characteristics

Sample	*Registry*		*Matched (1-20)*		*Registry Investor*		*Matched Investor (1-20)*	
	Entry	No Entry	Cases	Controls	Entry	No Entry	Cases	Controls
# Individuals	6,281	334,138	6,111	122,220	904	38,345	731	14,620
Marital Status:								
Married	51.4%***	49.1%	51.9%	51.9%	64.1%	61.7%	68.5%	68.5%
Single	38.5%	40.8%***	38.9%	38.9%	26.0%	27.8%	23.5%	23.5%
Separated	10.1%	10.1%	9.2%	9.2%	10.0%	10.5%	7.9%	7.9%
Years of Education:	12.37***	12.22	12.34	12.37	13.13*	12.97	13.08	13.13
6-12 Years	68.7%	68.4%	69.1%	69.1%	51.9%	54.0%	52.5%	52.5%
13-16 Years	21.8%	23.1%**	21.8%	21.8%	32.3%	32.0%	32.6%	32.6%
17-21 Years	9.5%***	8.5%	9.1%	9.1%	15.8%	14.1%	14.9%	14.9%
Years of Age:								
25-35 Years	40.7%***	35.8%	40.2%	40.2%	24.0%**	20.8%	18.2%	18.2%
35-45 Years	33.8%***	27.9%	33.9%	33.9%	33.6%***	26.4%	32.7%	32.7%
45-60 Years	25.5%	36.3%***	25.9%	25.9%	42.4%	52.9%***	49.1%	49.1%
Wealth 1994-1998:								
1st Centile	25.7%***	19.9%	25.3%	25.3%	53.0%***	44.4%	58.6%	58.6%
2nd Centile	18.6%	20.1%***	18.7%	18.7%	17.7%	22.3%***	18.3%	18.3%
3rd Centile:	19.7%	20.0%	19.9%	19.9%	13.6%	16.5%**	12.7%	12.7%
4th Centile	19.7%	20.0%	19.8%	19.8%	10.3%	11.6%	7.5%	7.5%
5th Centile	16.3%	20.0%***	16.3%	16.3%	5.4%	5.3%	2.9%	2.9%
Wages 1994-1998:								
1st Centile	29.4%***	19.8%	29.3%	29.3%	51.3%***	39.5%	56.1%	56.1%
2nd Centile	18.4%	20.0%***	18.4%	18.4%	19.9%	22.0%	18.9%	18.9%
3rd Centile:	20.4%	20.0%	20.6%	20.6%	11.6%	15.7%***	10.3%	10.3%
4th Centile	22.2%***	20.0%	22.0%	22.0%	11.6%	11.5%	8.9%	8.9%
5th Centile	9.6%	20.2%***	9.7%	9.7%	5.5%	11.2%***	5.9%	5.9%
Investor	14.4%***	11.5%	14.4%***	12.6%				

Notes:
p<0.10, ** p<0.05, *** p<0.01: From a t-test of differences between averages

Table 2
Summary Statistics for Past Investment Activity
Averages (S.D.) for the years 1994-1998; Case-Control 1-20 Matching

	Matched Investors (1-20)				Original Sample			
	Cases		***Controls***		***Entrants***		***Non-Entrants***	
	731		14,620		904		38,345	
# of Stocks	2.18	(3.77)	2.06	(2.26)	2.08	(3.43)	1.97	(2.20)
1 - 2	57.2%	(0.50)	56.9%	(0.50)	58.4%	(0.49)	58.1%	(0.49)
2 - 3	25.0%	(0.43)	26.0%	(0.44)	25.0%	(0.43)	26.4%	(0.44)
3 - 4	8.3%	(0.28)	7.7%	(0.27)	8.0%	(0.27)	7.1%	(0.26)
4 - 5	3.6%	(0.19)	3.6%	(0.19)	3.4%	(0.18)	3.3%	(0.18)
5 - 10	4.4%	(0.20)	4.7%	(0.21)	4.0%	(0.20)	4.2%	(0.20)
10 - 20	1.2%	(0.11)	1.0%	(0.10)	1.0%	(0.10)	0.8%	(0.09)
>20	0.3%	(0.05)	0.2%	(0.05)	0.2%	(0.05)	0.2%	(0.04)
# Trades	3.53***	(13.13)	2.46	(8.96)	3.37***	(12.17)	2.27	(8.37)
0 - 1	54.2%	(0.50)	57.3%	(0.49)	54.3%	(0.50)	61.0%***	(0.49)
1 - 2	16.6%	(0.37)	17.5%	(0.38)	17.4%	(0.38)	16.2%	(0.37)
2 - 3	7.6%	(0.27)	7.4%	(0.26)	7.4%	(0.26)	6.7%	(0.25)
3 - 4	4.2%	(0.20)	4.4%	(0.20)	4.1%	(0.20)	3.9%	(0.19)
4 - 5	2.5%	(0.15)	2.4%	(0.15)	2.5%	(0.15)	2.3%	(0.15)
5 - 10	7.5%*	(0.26)	5.8%	(0.23)	6.8%**	(0.25)	5.2%	(0.22)
10 - 20	3.3%	(0.18)	3.2%	(0.18)	3.4%	(0.18)	2.8%	(0.16)
20 - 50	2.9%**	(0.17)	1.6%	(0.13)	3.2%***	(0.17)	1.6%	(0.12)
>50	1.3%***	(0.11)	0.5%	(0.07)	1.1%**	(0.10)	0.5%	(0.07)
Monthly Returns	0.0065	(0.03)	0.0050	(0.03)	0.0053	(0.03)	0.005	(0.03)
St. Dev. Of Monthly Returns	0.1071	(0.05)	0.1047	(0.05)	0.1072	(0.05)	0.1064	(0.05)
Beta	1.1301	(0.40)	1.1347	(0.38)	1.1341	(0.41)	1.1461	(0.38)
Market Capitalization	6.95b	(12,24b)	6,83b	(11,97b)	6,72b	(11,73b)	6,75b	(11,73b)
Portfolio Value	51,639***	(108,029)	41,367	(96,681)	48,286***	(105,207)	35,671	(88,915)
Portfolio/Wealth Ratio	7.39%	(0.12)	6.85%	(0.12)	7.91%	(0.13)	7.30%	(0.13)

Notes:
p<0.10, ** p<0.05, *** p<0.01: From a t-test of differences between averages & a Mann-Whitney test of differences in the distributions

Appendix Table B
The Impact of Matching

	Entrant			Non-Entrant				
Matching	*Mean*	*(S.D.)*	*#Obs*	*Mean*	*(S.D.)*	*#Obs*	*t-test*	
				Investor (Individual data)				
None	14.39%	(0.35)	6,281	11.48%	(0.32)	334,138	7.17	***
1-to-5	14.36%	(0.35)	6,275	12.53%	(0.33)	31,375	3.96	***
1-to-10	14.39%	(0.35)	6,255	12.63%	(0.33)	62,550	3.97	***
1-to-20	14.42%	(0.35)	6,111	12.56%	(0.33)	122,220	4.27	***
1-to-30	14.29%	(0.35)	5,774	12.53%	(0.33)	173,220	3.97	***
1-to-50	13.74%	(0.34)	4,483	12.03%	(0.33)	224,150	3.49	***
				Number of Trades (Average 1994-1998)				
None	3.37	(12.17)	855	2.27	(8.37)	36,242	3.78	***
1-to-5	3.41	(12.33)	828	2.51	(9.15)	4,152	2.43	**
1-to-10	3.41	(12.49)	796	2.44	(7.24)	7,966	3.34	***
1-to-20	3.53	(13.13)	695	2.46	(8.96)	13,904	3.00	***
1-to-30	3.31	(12.87)	599	2.36	(8.40)	17,827	2.65	***
1-to-50	3.69	(15.70)	369	2.29	(8.27)	18,243	3.13	***
				Number of Trades (Longitudinal 1994-1998)				
None	2.88	(13.98)	2,626	1.94	(9.27)	116,671	5.09	***
1-to-5	2.92	(14.15)	2,549	2.23	(10.25)	13,170	2.92	***
1-to-10	2.93	(14.32)	2,453	2.09	(7.97)	25,083	4.51	***
1-to-20	3.08	(15.08)	2,155	2.17	(10.08)	44,212	3.98	***
1-to-30	2.76	(14.39)	1,876	2.09	(9.46)	57,476	2.95	***
1-to-50	3.32	(17.80)	1,186	2.02	(9.47)	59,190	4.54	***

Regression Analysis

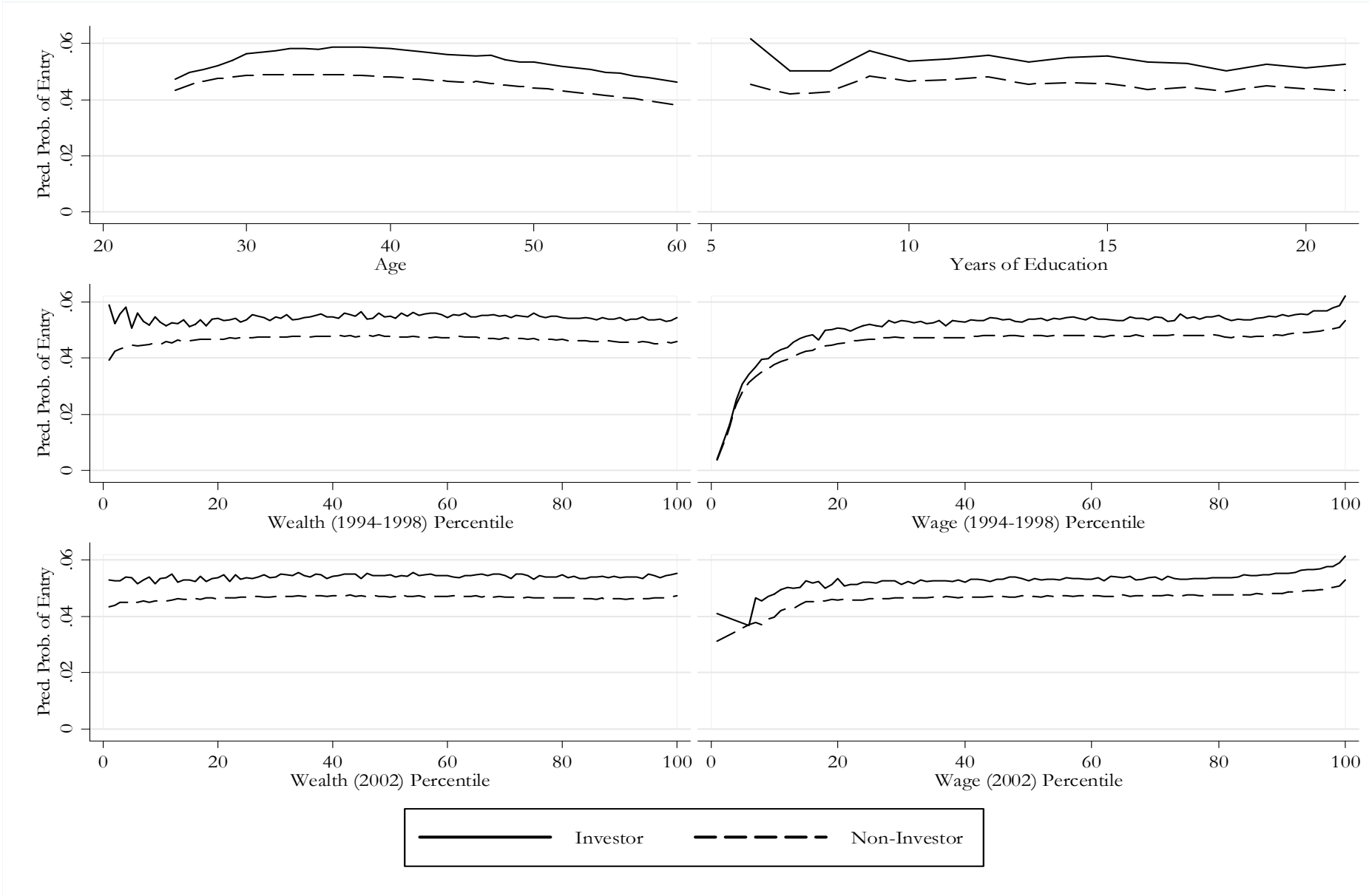
- **Methodology**: Conditional logistic models for ***entry*** into self-employment (2003-2005), accounting for a fixed unobserved effect among matched individuals
- **Main explanatory variables**: Marital status and ***continuous*** variables for age and age squared, years of education, log(wealth), and log(earnings) to account for ***non-linearities*** not captured by the matching
  - Key variable (1): ***Investor Account*** (active during 1994-1998)
- **Additional Controls**: For non-linearities and *differences in opportunities*
  - Quadratic Wealth and Wage terms: Non-linear effects
  - Region of Residence {7} (Giannetti & Simonov, 2008)
  - 1-digit Industry Codes {14 – NACE} (Gompers et al., 2009)
  - Type of Education {10} (Lerner & Malmendier, 2008)
  - Firm Size {7} (Nanda & Sorensen, 2007)
- **Results:**
  - Investors are ***12% - 16%*** more likely to enter self-employment in the future, compared to their control group of employees that are not exposing their wealth into stock-market participation
  - The predicted probability of entry is ***persistently higher*** for investors, across years of age, education, wealth and earnings percentiles
  - The predicted probability of entry is higher for investors across ***groups stratified*** by education type, industry, firm size & municipality (as controls for *environment and opportunities*)

Table 3
Conditional Logit Regressions for Transition to Self-Employment
Matched Case-Control Sample: 1-to-20 Matching; Coefficients & Robust Standard Errors

Dep. Var.: New Entry 2003-2005	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Age in year 2000	0.001	0.001	0.001	0.012	0.011	0.012
	[0.02]	[0.07]	[0.02]	[0.87]	[0.80]	[0.81]
Age Squared in year 2000/1,000	-0.122	-0.143	-0.117	-0.211	-0.214	-0.213
	[0.74]	[0.85]	[0.71]	[1.28]	[1.29]	[1.28]
Married in year 2002	0.003	-0.007	-0.003	-0.009	-0.010	-0.010
	[0.08]	[0.20]	[0.09]	[0.25]	[0.28]	[0.31]
Widowed/Separated in year 2002	0.016	0.025	-0.009	-0.013	-0.012	-0.013
	[0.29]	[0.47]	[0.17]	[0.25]	[0.22]	[0.24]
Years of Education in year 2002	-0.013**	-0.011*	-0.014**	0.004	-0.016**	-0.014*
	[2.34]	[1.93]	[2.49]	[0.59]	[2.17]	[1.86]
Log(Average Wage 1994-1998)	-0.014	-0.178***	-0.013	-0.018*	-0.014	-0.016*
	[1.45]	[5.83]	[1.29]	[1.89]	[1.49]	[1.66]
Log(Average Wealth 1994-1998)	0.215***	0.965***	0.198***	0.202***	0.218***	0.216***
	[10.56]	[4.44]	[10.53]	[9.29]	[9.71]	[9.46]
Investor in years 1994-1998	0.164***	0.152***	0.138***	0.137***	0.124***	0.127***
	[4.22]	[3.85]	[3.52]	[3.47]	[3.12]	[3.19]
Log(Average Wage 1994-1998) squared	-	-0.034***	-	-	-	-
		[3.40]				
Log(Average Wealth 1994-1998) squared	-	0.009***	-	-	-	-
		[5.29]				
Region Controls (7)	-	-	+	+	+	+
Industry Controls (14)	-	-	-	+	+	+
Education Type Controls (10)	-	-	-	-	+	+
Firm Size Controls (4)	-	-	-	-	-	+
Odds Ratio	1.1783	1.1639	1.1484	1.1475	1.1324	1.1354
Marginal Effect	0.0073	0.0066	0.0061	0.0058	0.0052	0.0052
Percentage Effect	15.64%	14.48%	13.20%	13.16%	11.90%	12.15%
Average Predicted Probability	0.0468	0.0457	0.0460	0.0440	0.0434	0.0432
Derivative Adjustment Factor	0.0446	0.0436	0.0439	0.0421	0.0416	0.0413
No. of Observations	128,331	128,331	128,331	128,331	128,331	128,331
No. of Groups	6,111	6,111	6,111	6,111	6,111	6,111
Log-Likelihood	-18,524.2	-18,507.9	-18,408.6	-18,141.3	-18,056.1	-18,018.5
LR χ^2	157.7***	185.3***	390.1***	870.9***	1064.7***	1124.3***

Notes:
* p<0.10, ** p<0.05, *** p<0.01
The calculated marginal effect serves in quantifying the association between the two variables, rather than as a causal effect.

Figure 1
Average Predicted Probabilities of Self-Employment Entry



Notes:
Predicted probabilities of a positive outcome from estimation of a specification as in Column (1) of Table 3

Table 5
Stratified Entry Frequencies

	Probability of Entry				***Investment Frequency***	
	Investor		*Non-Investor*		*Entrant*	*Non-Entrant*
	Predicted	Observed	Predicted	Observed		
Industry						
Agriculture, forestry and fishing	5.81%	{6.01%}	4.94%	{4.91%}	12.73%	10.54%
Mining and quarrying	1.69%	{1.85%}	1.48%	{1.43%}	30.77%	25.50%
Manufacturing	4.36%	{4.44%}	3.63%	{3.62%}	13.88%	11.52%
Electricity, gas, and water supply	3.00%	{2.76%}	2.52%	{2.55%}	14.00%	13.08%
Construction	7.79%	{6.75%}	6.86%	{6.95%}	8.01%	8.25%
Wholesale & retail trade; repair of motor vehicles	7.21%	{8.26%}	6.00%	{5.85%}	16.49%	12.00%
Hotels & Restaurants	7.34%	{7.59%}	6.49%	{6.47%}	10.06%	8.61%
Transportation and storage	5.08%	{4.59%}	4.33%	{4.39%}	11.68%	11.20%
Financial Intermediation, Business Activity	7.35%	{4.87%}	6.13%	{3.55%}	42.47%	34.71%
Real Estate & Business Activities	6.60%	{6.62%}	5.56%	{6.02%}	19.82%	18.23%
Public administration & defence; social security	3.33%	{3.19%}	2.81%	{2.83%}	14.42%	12.97%
Education	3.66%	{3.44%}	3.20%	{3.24%}	14.22%	13.48%
Human health and social work activities	5.75%	{7.23%}	4.59%	{4.44%}	14.51%	9.18%
Other community, social and personal services	7.50%	{5.41%}	6.12%	{6.40%}	10.22%	11.97%
Education Type						
General programmes	5.59%	{5.45%}	4.79%	{4.80%}	12.59%	11.20%
Humanities and Arts	7.08%	{7.96%}	6.01%	{5.90%}	14.74%	11.13%
Teacher Training and Pedagogy	3.42%	{3.40%}	2.87%	{2.88%}	14.69%	12.64%
Social Sciences and Law	7.28%	{5.83%}	6.04%	{6.37%}	17.22%	18.60%
Business & Administration	6.78%	{7.02%}	5.75%	{5.68%}	24.38%	20.48%
Natural Sciences, Vocational & Technical subjects	4.65%	{4.68%}	4.31%	{4.31%}	11.93%	11.05%
Health, Welfare and Sport	7.46%	{8.15%}	6.47%	{6.38%}	14.71%	11.70%
Primary Industries	5.55%	{4.38%}	4.90%	{5.04%}	9.49%	10.85%
Transport and Communications, Safety & Security	4.36%	{4.49%}	3.96%	{3.94%}	14.71%	13.08%
Unspecified broad field of education	8.95%	{4.65%}	6.65%	{6.99%}	5.00%	7.50%

Firm Size						
1-10 Employees	6.67%	{8.46%}	5.69%	{7.55%}	12.41%	11.12%
10-25 Employees	6.70%	{7.30%}	5.62%	{5.55%}	14.35%	11.11%
25-100 Employees	4.82%	{5.09%}	4.02%	{3.98%}	15.93%	12.77%
More than 500 Employees	4.22%	{4.09%}	3.70%	{3.71%}	14.15%	12.97%
Municipality						
Ostfold	5.94%	{4.64%}	5.44%	{5.10%}	9.33%	10.21%
Akershus	6.79%	{6.92%}	5.85%	{5.69%}	17.02%	14.28%
Oslo	7.12%	{7.36%}	6.02%	{6.18%}	17.74%	15.16%
Hedmark	5.65%	{5.40%}	4.93%	{4.46%}	9.33%	7.78%
Oppland	5.66%	{4.56%}	4.97%	{5.59%}	7.55%	9.20%
Buskerud	6.35%	{5.89%}	5.63%	{6.13%}	14.84%	15.40%
Vestfold	5.32%	{4.93%}	4.83%	{6.01%}	21.56%	25.31%
Telemark	5.13%	{4.47%}	4.77%	{4.39%}	21.57%	21.25%
AustAgder	4.89%	{4.97%}	4.47%	{4.08%}	13.11%	10.93%
VestAgder	5.06%	{5.77%}	4.63%	{4.16%}	15.92%	11.85%
Rogaland	4.10%	{4.64%}	3.94%	{3.67%}	16.67%	13.54%
Hordaland	4.46%	{4.72%}	4.07%	{4.18%}	13.10%	11.73%
SognOgFjordane	4.60%	{6.75%}	3.94%	{4.14%}	13.68%	8.64%
MoreOgRomsdal	4.29%	{3.98%}	3.86%	{3.73%}	13.25%	12.50%
SorTrondelag	4.35%	{5.48%}	3.83%	{3.77%}	12.71%	8.95%
NordTrondelag	4.17%	{3.70%}	3.75%	{3.66%}	8.55%	8.45%
Nordland	3.73%	{4.22%}	3.37%	{2.95%}	11.54%	8.26%
Troms	3.77%	{2.87%}	3.45%	{3.85%}	4.14%	5.53%
Finnmark	3.83%	{1.87%}	3.41%	{3.92%}	2.35%	4.91%

Notes: The estimated probabilities are from the specification of Column (6) in Table 3

Robustness Tests

- Additional ***Exclusion*** Restrictions (implemented one-by-one prior to matching), to ensure the results are not driven by opportunity recognition and groups with higher risk-taking propensities.
  - ☑ *Business & Administration* ***Education*** : Recognition of opportunities
  - ☑ *Employed in* ***Financial*** *Intermediation, Real Estate & Business Activity* : Information about opportunities
  - ☑ *Employed in* ***High-tech*** *Industries* : Lower risk-aversion and higher opportunity recognition
  - ☑ *Employed in* ***Small*** *Firms* (*i.e.* 1-10 employees): Conformism
  - ☑ ***Oslo*** *Residents* : Potentially greater investment & entry opportunities

- The results are robust to all the exclusion restrictions, and the interpretations are strengthened.
  - The risk-taking aspect of stock market participation is related to entry into self-employment in the future
  - The magnitude of the effect is 13-19%
  - Groups with higher risk-taking propensities and ability for opportunity recognition are not driving the effect

Table 4

Robustness Checks: Conditional Logit Regressions for Transition to Self-Employment

Matched Case-Control Sample: 1-to-20 Matching; Robust Standard Errors

Sub-Sample Exclusions	*- Business Ed.*	*- Financial Ind.*	*- High-Tech Ind.*	*- Small Firms*	*- Oslo*
Dep. Var.: New Entry 2003-2005	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***
Age in year 2000	-0.003	-0.004	-0.022	-0.004	-0.006
	[0.20]	[0.25]	[1.30]	[0.26]	[0.38]
Age Squared in year 2000/1,000	-0.068	-0.067	0.152	-0.071	-0.045
	[0.39]	[0.38]	[0.75]	[0.37]	[0.25]
Married in year 2002	0.011	0.006	0.013	0.007	0.001
	[0.31]	[0.18]	[0.31]	[0.18]	[0.01]
Widowed/Separated in year 2002	0.012	0.02	0.036	0.014	0.016
	[0.20]	[0.35]	[0.53]	[0.22]	[0.28]
Years of Education in year 2002	-0.012**	-0.014**	-0.021**	-0.010*	-0.012**
	[2.00]	[2.27]	[2.51]	[1.67]	[2.01]
Log(Average Wage 1994-1998)	0.202***	0.195***	0.192***	0.245***	0.195**
	[9.98]	[10.21]	[9.23]	[10.04]	[9.30]
Log(Average Wealth 1994-1998)	-0.018*	-0.009	-0.004	-0.032***	-0.006
	[1.71]	[0.88]	[0.34]	[2.82]	[0.50]
Investor in years 1994-1998	0.134***	0.150***	0.186***	0.177***	0.145**
	[3.03]	[3.47]	[3.69]	[3.96]	[3.38]
Odds Ratio	1.1431	1.1628	1.2045	1.1943	1.1562
Marginal Effect	0.0060	0.0067	0.0083	0.0079	0.0065
Percentage Effect	12.74%	14.38%	17.73%	16.93%	13.83%
Average Predicted Probability	0.0469	0.0468	0.0468	0.0465	0.0469
Derivative Adjustment factor	0.0447	0.0446	0.0446	0.0443	0.0447
No. of Observations	109,578	110,670	82,572	94,059	108,801
No. of Groups	5,218	5,270	3,932	4,479	5,181
Log-Likelihood	-15,825.7	-15,980.4	-11,920.3	-13,561.5	-15,715.9
LR χ^2	127.4***	140.5***	118.9***	133.9***	121.2**

Notes:

* p<0.10, ** p<0.05, *** p<0.01

The groups in each category are excluded prior to matching

The Volume of Trading

- The previous results establish that stock market participation is related to a great extend to later entry in business activity
  - This result is robust to differences in the environment and opportunities
  - The risk taking aspect of stock market participation is the candidate explanation
- At the *2nd stage*, we examine differences in the ***trading activity*** between those later self-employed and those not
  - By incorporating controls for number of trades in the previous specifications
    - Both continuous (Log(#Trades)) and categorical (3+, 5+, 10+, 20+)
    - Controlling for #Stocks held, and Portfolio Value
- The association of the volume of trading in the stock market and later entry into self-employment becomes much stronger for active traders
  - Overall: 27% (3+ trades), 36% (5+ trades), 44% (10+ trades) and 73% (20+ trades)
  - Among investors only: 16% (3+ trades), 27% (5+ & 10+ trades), 58% (20+ trades)
  - The pattern is robust when incorporating the log(trades) in the specification, instead of categorical trading measures (controlling for #Stocks held, and Portfolio Value)

Table 6

Trading and the Transition to Self-Employment

Matched Case-Control Sample: 1-to-20 Matching; Robust Standard Errors

	All Matched (1-20)				*Matched Investors (1-20)*			
Dep. Var.: New Entry 2003-2005	***(1)***	***(2)***	***(3)***	***(4)***	***(1)***	***(2)***	***(3)***	***(4)***
Age in year 2000	-0.001	-0.001	-0.001	-0.001	-0.068	-0.067	-0.071	-0.072
	[0.01]	[0.02]	[0.03]	[0.05]	[1.40]	[1.38]	[1.47]	[1.48]
Age Squared in year 2000/1,000	-0.108	-0.105	-0.103	-0.1	0.627	0.619	0.655	0.663
	[0.65]	[0.64]	[0.62]	[0.61]	[1.19]	[1.18]	[1.25]	[1.26]
Married in year 2002	0.001	0.001	0.001	0.001	-0.004	0.001	-0.007	-0.006
	[0.03]	[0.04]	[0.01]	[0.01]	[0.03]	[0.01]	[0.06]	[0.05]
Widowed/Separated in year 2002	-0.019	-0.019	-0.02	-0.021	-0.058	-0.054	-0.06	-0.063
	[0.36]	[0.36]	[0.37]	[0.39]	[0.31]	[0.29]	[0.32]	[0.34]
Years of Education in year 2002	-0.014**	-0.014**	-0.013**	-0.013**	-0.037**	-0.036**	-0.035**	-0.035**
	[2.49]	[2.45]	[2.36]	[2.35]	[2.33]	[2.31]	[2.25]	[2.26]
Log(Average Wage 1994-1998)	0.198***	0.198***	0.199***	0.199***	0.214***	0.217***	0.219***	0.223***
	[10.54]	[10.55]	[10.53]	[10.53]	[2.61]	[2.64]	[2.63]	[2.64]
Log(Average Wealth 1994-1998)	-0.013	-0.013	-0.012	-0.012	0.097*	0.089	0.100*	0.092*
	[1.37]	[1.37]	[1.27]	[1.25]	[1.74]	[1.61]	[1.83]	[1.72]
Investor who traded 3+ times	0.280***	-	-	-	0.169*	-	-	-
	[3.49]				[1.68]			
Investor who traded 5+ times	-	0.376***	-	-	-	0.285**	-	-
		[3.87]				[2.45]		
Investor who traded 10+ times	-	-	0.457***	-	-	-	0.278*	-
			[3.43]				[1.80]	
Investor who traded 20+ times	-	-	-	0.765***	-	-	-	0.606***
				[4.25]				[2.96]
Region Controls	+	+	+	+	+	+	+	+
Odds Ratio	1.323	1.456	1.580	2.148	1.185	1.330	1.320	1.833
Marginal Effect	0.0128	0.0171	0.0209	0.0349	0.0080	0.0135	0.0132	0.0288
Percentage Effect	26.67%	35.77%	43.55%	72.80%	16.10%	27.10%	26.37%	57.58%
Average Predicted Probability	0.0479	0.0479	0.0479	0.0479	0.0499	0.0499	0.0499	0.0499
Derivative Adjustment factor	0.0456	0.0456	0.0456	0.0456	0.0475	0.0475	0.0475	0.0475

Table 7
Trading and the Transition to Self-Employment
Matched Case-Control Sample: 1-to-20 Matching; Robust Standard Errors

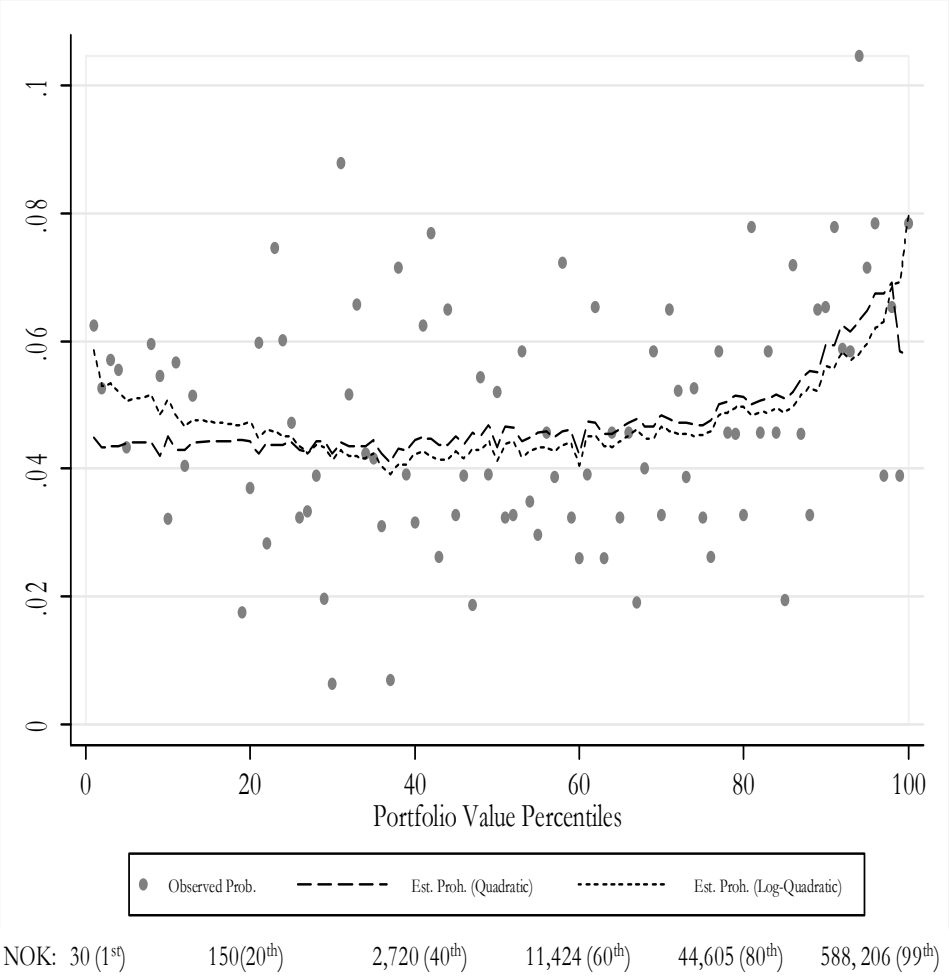
	All Matched (1-20)			*Matched Investors (1-20)*		
Dep. Var.: New Entry 2003-2005	***(1)***	***(2)***	***(3)***	***(1)***	***(2)***	***(3)***
Age in year 2000	0.001	0.001	-0.001	-0.065	-0.064	-0.072
	[0.06]	[0.01]	[0.04]	[1.34]	[1.32]	[1.47]
Age Squared in year 2000/1,000	-0.122	-0.111	-0.104	0.599	0.606	0.688
	[0.74]	[0.67]	[0.63]	[1.14]	[1.15]	[1.30]
Married in year 2002	0.004	0.003	0.002	0.001	-0.007	-0.03
	[0.10]	[0.10]	[0.06]	[0.01]	[0.06]	[0.24]
Widowed/Separated in year 2002	-0.017	-0.018	-0.019	-0.056	-0.063	-0.078
	[0.32]	[0.33]	[0.35]	[0.30]	[0.34]	[0.42]
Years of Education in year 2002	-0.015***	-0.015***	-0.014***	-0.038**	-0.035**	-0.032**
	[2.68]	[2.64]	[2.58]	[2.38]	[2.21]	[2.00]
Log(Average Wage 1994-1998)	0.195***	0.196***	0.196***	0.214***	0.212***	0.214***
	[10.54]	[10.54]	[10.53]	[2.61]	[2.59]	[2.58]
Log(Average Wealth 1994-1998)	-0.015	-0.015	-0.015	0.087	0.103*	0.116**
	[1.60]	[1.59]	[1.52]	[1.52]	[1.77]	[1.99]
Non-Investor	-0.057	-0.193*	-0.316**	-	-	-
	[1.11]	[1.96]	[2.07]			
Log(# of Trades)	0.109***	0.143**	0.189***	0.093*	0.131**	0.210***
	[2.59]	[2.55]	[3.11]	[1.87]	[2.07]	[3.20]
Log(# of Stocks)	-	-0.169	-0.152	-	-0.233*	-0.202*
		[1.59]	[1.43]		[1.90]	[1.68]
Ratio: Portfolio Value/Gross Wealth	-	0.093	-	-	0.207	-
		[0.27]			[0.50]	
Log(Portfolio Value)	-	-	-0.020	-	-	-0.038*
			[1.06]			[1.71]
Region Controls (7)	+	+	+	+	+	+
No. of Observations	126,551	126,544	126,551	13,917	13,915	13,917
No. of Groups	6,062	6,062	6,062	695	695	695
Log-Likelihood	-18,223.5	-18,221.6	-18,221.5	-2,055.9	-2,053.7	-2,052.3

Table 8
Portfolio Value and the Transition to Self-Employment
Matched Case-Control Sample: 1-to-20 Matching; Robust Standard Errors

Dep. Var.: New Entry 2003-2005	***(1)***	***(2)***
Age in year 2000	-0.067	-0.065
	[1.43]	[1.39]
Age Squared in year 2000/1,000	0.592	0.567
	[1.16]	[1.12]
Married in year 2002	-0.033	-0.029
	[0.28]	[0.24]
Widowed/Separated in year 2002	-0.033	-0.029
	[0.18]	[0.16]
Years of Education in year 2002	-0.032**	-0.032**
	[2.06]	[2.09]
Log(Wage 1994-1998)	0.228***	0.226***
	[2.79]	[2.80]
Log(Wealth 1994-1998)	0.102*	0.093*
	[1.80]	[1.65]
Log(Portfolio Value)	-0.224***	-
	[2.58]	
Log(Portfolio Value) Squared	0.014***	-
	[2.60]	
Portfolio Value: NOK 0 - 2,000	-	-0.242*
		[1.76]
Portfolio Value: nok 2,000 - 10,000	-	-0.294**
		[2.02]
Portfolio Value: 10,000 - 50,000	-	-0.334**
		[2.46]
Portfolio Value: 50,000 - 100,000	-	-0.294*
		[1.67]
Portfolio Value: >100,000	-	*[Ref.]*
Region Controls (7)	+	+
No. of Observations	15,351	15,351
No. of Groups	731	731
Log-Likelihood	-2,194.9	-2,194.7
LR χ^2	55.7***	55.8***

Notes:
* p<0.10, ** p<0.05, *** p<0.01

Figure 2:
Portfolio Value and the Probability of Entry



Notes:
The predicted probabilities are from specifications similar to Column (2) of Table 8.

Discussion

- We approximate the unobservable aspects of entrepreneurial activity, via stock market participation and activity/performance
  - In a careful ***matched case-control design*** that isolates the confounding effects of age, education, marital status, wealth and earnings
  - Examining stock market activity in the ***past*** to avoid endogeneity
  - Controlling for opportunities by comparing the likelihood of entry of otherwise "***similar***" individuals

- We find that future entrepreneurs are considerably more willing to expose their wealth to stock market participation than non-entrepreneurs.
  - This result is robust to differences in the environment and opportunities

- The association of the volume of trading in the stock market and later entry into self-employment becomes much stronger for very active traders
- Overall, our results provide strong evidence that entrepreneurs are different when faced with the same investment menu as non-entrepreneurs.

Appendix Table A
Pairwise Correlation Matrix

Panel A: Individual Data (One observation per individual, 1994-1998)

	New Entrant	Investor	Married	Single	Separated	Years of Education	Age	Wealth (1994-1998)	Earnings (1994-1998)	Wealth 2002	Earnings 2002
New Entrant	1.000										
Investor	0.012***	1.000									
Married	0.006***	0.091***	1.000								
Single	-0.006***	-0.096***	-0.816***	1.000							
Separated	0.0002	0.006***	-0.329***	-0.277***	1.000						
Years of Education	0.008***	0.103***	0.041***	0.011***	-0.085***	1.000					
Age	-0.024***	0.145***	0.436***	-0.570***	0.206***	-0.126***	1.000				
Wealth (1994-1998)	0.010***	0.085***	0.073***	-0.071***	-0.005***	0.028***	0.094***	1.000			
Earnings (1994-1998)	0.050***	0.201***	0.343***	-0.361***	0.021***	0.206***	0.339***	0.127***	1.000		
Wealth 2002	0.016***	0.073***	0.046***	-0.042***	-0.007***	0.031***	0.055***	0.939***	0.111***	1.000	
Earnings 2002	0.035***	0.154***	0.183***	-0.156***	-0.050***	0.340***	0.018***	0.068***	0.687***	0.077***	1.000

Panel B: Stock Market Data (Longitudinal, 1994-1998)

	New Entrant	Wealth	Earnings	Portfolio Value	Portfolio/ Wealth	Market Cap.	#Stocks	#Trades	Monthly Returns	S.D. of M. Returns	Market Beta
New Entrant	1.000										
Wealth	0.041***	1.000									
Earnings	0.049***	0.384***	1.000								
Portfolio Value	0.012***	0.430***	0.116***	1.000							
Portfolio/Wealth	-0.001	0.006**	-0.107***	0.626***	1.000						
Market Capitalization	0.001	0.011***	0.030***	-0.002	0.018***	1.000					
#Stocks	0.008***	0.258***	0.073***	0.477***	0.321***	-0.046***	1.000				
#Trades	0.015***	0.180***	0.030***	0.450***	0.333***	-0.048***	0.335***	1.000			
Monthly Returns	-0.001	-0.018***	0.000	-0.071***	-0.081***	0.076***	-0.068***	-0.093***	1.000		
S.D. of M. Returns	0.004	-0.078***	-0.046***	-0.050***	-0.044***	-0.186***	-0.072***	0.027***	0.112***	1.000	
Market Beta	-0.002	-0.062***	-0.082***	-0.036***	-0.031***	-0.179***	0.044***	-0.001	0.183***	0.426***	1.000

Notes:
* p<0.10, ** p<0.05, *** p<0.01