Does Retirement Increase Stock Market Participation? Evidence from a Fuzzy Regression Discontinuity Design

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Motivation and Research Question

- **Limited Stock Market Participation Has been a Puzzle Since 1960s (Mankiw and Zeldes, 1991; Haliassos and Bertaut, 1995)**
  - Over half of U.S. households do not hold stocks
  - Even among wealthy households with large liquid financial wealth (over $10,000), fewer than half hold stocks
- **A Vast and Rapidly Growing Literature on Important Determinants of Stock Market Participation**
  - e.g., risk aversion, awareness of financial assets, trust, political preferences and activisms, financial literacy, health insurance, wealth, sociality, corporate scandals, etc.
- **However, the High Levels of Non-Participation, even among the Wealthy, is still Unexplained**
- **This Paper**
  - Proposes retirement as an alternative important determinant
    - As an important life-cycle event, does retirement cause a greater tendency to stock market participation?
      - Key insight: Retirement relaxes the time constraint and provides more time flexibility
    - Empirical challenge: joint decision of retirement and stock market participation
      - Identification: Fuzzy RDD at 62, early eligibility age (EEA) to claim social security benefits

Findings and Literature

- What We Find
  - Estimated (early) retirement effect on stock market participation is around 61 percentage points (locally)
  - The result is mainly driven by households with medium wealth
  - The underlying mechanism is the relaxation of time constraint on tracking the market
  - In addition, (early) retirement increases the share of risky assets approximately 37 percentage points (locally)

- Literature
  - Determinants of stock market participation
    - Financial literacy (Van Rooij et al., 2011);
    - IQ (Grinblatt et al., 2011);
    - Trust (Guiso et al., 2008; Georgarakos and Pasini, 2011);
    - Sociability (Georgarakos and Pasini, 2011);
    - Political factors (Kaustia and Torstilla, 2011; Bonaparte and Kumar, 2013);
    - Homeownership (Vestman, 2019)

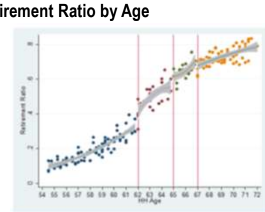
  - Portfolio rebalance around retirement
    - Farhi and Panageas (2007); Yogo (2016); Addoum (2017); Fagereng et al., (2017)

Institutional Background and Basic Pattern of Retirement

- **Age Requirement for Retirement Benefits**

Year of Birth	Full (normal) Retirement Age	At Age 62: Months between age 62 and the FRA	A $1000 retirement benefit would be reduced to	The retirement benefit is reduced by	A $500 spouse's benefit would be reduced to	The spouse's benefit is reduced by
1937 or earlier	65	36	$800	20%	$375	25%
1938	65 and 2 months	38	$791	20.83%	$370	25.83%
1939	65 and 4 months	40	$783	21.67%	$366	26.67%
1940	65 and 6 months	42	$775	22.5%	$362	27.5%
1941	65 and 8 months	44	$766	23.33%	$358	28.33%
1942	65 and 10 months	46	$758	24.17%	$354	29.17%
1943-1954	66	48	$750	0.25	$350	0.3
1955	66 and 2 months	50	$741	25.83%	$345	30.83%
1956	66 and 4 months	52	$733	26.67%	$341	31.67%
1957	66 and 6 months	54	$725	27.5%	$337	32.5%
1958	66 and 8 months	56	$716	28.33%	$333	33.33%
1959	66 and 10 months	58	$708	29.17%	$329	34.17%
1960 and later	67	60	$700	30%	$325	35%

- **Retirement Ratio by Age**



Methodology and Data

- **Methodology: Fuzzy Regression Discontinuity Design**
  - Discontinuity to be used: age 62, the early eligibility for claiming retirement benefits

$$\beta^{U}_{1st} = \lim_{\varepsilon\downarrow 0}\mathbb{E}[R_{it}|X_{it} = c+\varepsilon] - \lim_{\varepsilon\uparrow 0}\mathbb{E}[R_{it}|X_{it} = c-\varepsilon]$$

$$\tau^{U}_{FRD} = \frac{\lim_{\varepsilon\downarrow 0}\mathbb{E}[SMP_{it}|X_{it} = c+\varepsilon] - \lim_{\varepsilon\uparrow 0}\mathbb{E}[SMP_{it}|X_{it} = c-\varepsilon]}{\lim_{\varepsilon\downarrow 0}\mathbb{E}[R_{it}|X_{it} = c+\varepsilon] - \lim_{\varepsilon\uparrow 0}\mathbb{E}[R_{it}|X_{it} = c-\varepsilon]}.$$

  - Estimation : A nonparametric method developed by Calonico, Cattaneo and Titiunik (2014a,b)

- **Data**
  - Health and Retirement Study (HRS) 1992-2014
    - A national biannual survey since 1992
    - Detailed demographic information like age, education, family size, employment and retirement status
    - Financial information includes assets and debts from different classes

Graphical Evidence

- **Discontinuity on Retirement**

- **Discontinuity on Stock Market Participation**

Main Results and Mechanisms

- **The FRD of Retirement on the SMP**

	HD Retirement (1)	(2)	(3)	(4)	(5)	Stock Market Participation (6)	(7)	(8)	(9)	(10)
Above EEA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
HD Retirement						0.610**	0.559**	0.600***	0.658***	0.662***
						[0.286]	[0.254]	[0.260]	[0.246]	[0.243]
Respondent Characteristics	N	Y	Y	Y	Y	N	Y	Y	Y	Y
Household Characteristics	N	N	Y	Y	Y	N	N	Y	Y	Y
Wave Dummies	N	N	N	Y	Y	N	N	N	Y	Y
Spouse Characteristics	N	N	N	N	Y	N	N	N	N	Y
Observations	59,718	59,718	59,737	59,737	58,540	59,718	59,718	59,737	59,737	58,540
Effective left	6478	6478	6478	6478	6346	6478	6478	6478	6478	6346
Effective right	6702	6702	6702	6702	6571	6702	6702	6702	6702	6571

- **A Proposed Mechanism in HRS: Time Spending**

	(1)	(2)	(3)	(4)	(5)
HD Retirement	20.99**	12.56**	6.108***	5.163***	3.643***
	[8.974]	[4.981]	[2.211]	[1.836]	[1.176]
Respondent Characteristics	N	Y	Y	Y	Y
Household Characteristics	N	N	Y	Y	Y
Wave Dummies	N	N	N	Y	Y
Spouse Characteristics	N	N	N	N	Y
Observations	20,876	20,876	20,876	20,876	20,412
Effective left	2021	2021	2021	2021	1962
Effective right	2321	2321	2321	2321	2269

- **American Time Usage Survey (ATUS) Data**

	(1) Retirement	(2) Financial	(3) Media	(4) Reading	(5) Copmuter	(6) Political
Above EEA	0.115***					
	[0.0106]					
HD Retirement		1.315**	4.722***	16.93***	5.132***	-11.30***
		[0.580]	[0.0379]	[1.724]	[1.084]	[0.0189]
Respondent Characteristics	Y	Y	Y	Y	Y	Y
Household Characteristics	Y	Y	Y	Y	Y	Y
Wave Dummies	Y	Y	Y	Y	Y	Y
Observations	37,946	37,946	37,946	37,946	37,946	37,946
Effective left	5855	5855	5855	5855	5855	5855
Effective right	6990	6990	6990	6990	6990	6990

- **The FRD of Retirement on Risky Share**

	(1)	(2)	(3)	(4)	(5)
HD Retirement	0.370**	0.344**	0.415**	0.404**	0.416***
	[0.184]	[0.166]	[0.169]	[0.161]	[0.158]
Respondent Characteristics	N	Y	Y	Y	Y
Household Characteristics	N	N	Y	Y	Y
Wave Dummies	N	N	N	Y	Y
Spouse Characteristics	N	N	N	N	Y
Observations	59,718	59,718	59,737	59,737	58,540
Effective left	6478	6478	6478	6478	6346
Effective right	6702	6702	6702	6702	6571

Tests on Heterogeneity

- **Heterogeneity by Wealth**

	(1)	(2)	(3)	(4)	(5)
Panel A. Low Wealth					
HD Retirement (First Stage)	0.041	0.047	0.049*	0.052*	0.053*
	[0.030]	[0.029]	[0.029]	[0.029]	[0.028]
Stock Market Participation (Second Stage)	0.008	0.016	-0.003	0.056	0.140
	[0.455]	[0.365]	[0.362]	[0.343]	[0.341]
Panel B. Medium Wealth					
HD Retirement (First Stage)	0.150***	0.160***	0.158***	0.157***	0.155***
	[0.031]	[0.030]	[0.030]	[0.029]	[0.029]
Stock Market Participation (Second Stage)	0.629***	0.720***	0.677***	0.647***	0.689***
	[0.266]	[0.232]	[0.224]	[0.222]	[0.211]
Panel C. High Wealth					
HD Retirement (First Stage)	0.031	0.028	0.005	0.006	0.007
	[0.032]	[0.031]	[0.030]	[0.030]	[0.030]
Stock Market Participation (Second Stage)	1.386	1.41	8.319	7.615	8.732
	[1.779]	[1.674]	[48.96]	[34.95]	[39.24]

- **Taking Financial Advice When Making Decisions: Evidence from Survey of Consumer Finance (SCF)**

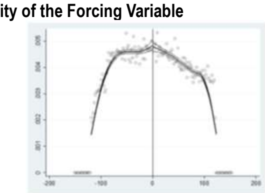
	Before Retirement: Broad Adv	Before Retirement: Narrow Adv	After Retirement: Broad Adv	After Retirement: Narrow Adv
High Wealth	0.235***	0.266***	0.193***	0.214***
	[0.004]	[0.004]	[0.009]	[0.007]
Medium Wealth	0.129***	0.172***	0.090***	0.120***
	[0.004]	[0.004]	[0.008]	[0.007]
Age	0.002***	0	-0.001*	-0.004***
	[0.000]	[0.000]	[0.001]	[0.000]
Married	0.064***	0.043***	0.121***	0.131***
	[0.006]	[0.006]	[0.011]	[0.012]
HH Size	-0.006***	-0.011***	-0.022***	-0.036***
	[0.001]	[0.001]	[0.004]	[0.004]
Male	-0.040***	-0.068***	-0.071***	-0.113***
	[0.006]	[0.006]	[0.011]	[0.012]
Wave Dummies	Y	Y	Y	Y
Observations	75,007	75,007	19,768	19,768

Robustness

- **With Different Orders and Bandwidths**
- **Alternative Retirement Definitions**
- **Excluding Crisis Samples for Potential Passive Holdings**
- **Local Polynomial Regression (Parametric Estimation)**
- **Different Measures of Shares of Risky Assets**

Validity Tests

- **Density of the Forcing Variable**



- **Distribution of characteristics around the cutoff: all smooth except for income**
- **Placebo test: passed**
- **Tests for the instrument strength**
  - Passed the first-stage F-test (F-Stat>10)
  - Passed the Anderson-Rubin test
- **Tests on external validity**
  - Passed Angrist (2004) test
  - Failed Bertanha-Imbens (2019) test

Conclusion

- Using the HRS, we identify and estimate the causal effect of retirement on stock market participation
  - (Early) retirement increases the stock market participation by about 61 percentage points
  - The retirement effect is particularly strong for households with medium wealth
  - (Early) retirement increases the share of risky assets approximately 37 percentage points
- The relaxed time constraints can be a possible mechanism
  - Reduced cost of information acquisition
  - Increased day-to-day trading

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