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## **Private Capital Markets and Inequality**

**Ararat Gocmen (UCL)**

with Clara Martínez-Toledano (Imperial) and Vrinda Mittal (UNC-Chapel Hill)

EEA Annual Congress

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# 1. Motivation

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Graph

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- Focus on the U.S., since U.S. companies account for half of all private financing raised globally (Lerner & Nanda 2020)
  - 2004-2022: in 2009, the federal government introduced **tax incentives for HNWIs to invest in startups** (Polsky & Yale 2023)

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Preview of findings

# 1. Contributions

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- **Dynamics of income and wealth inequality:** differences across individuals in their access to private capital markets
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- **Heterogeneity in investment returns:** early-stage companies' outperformance relative to public stock markets
  - Moskowitz & Vissing-Jørgensen (2002); Calvet & Fisher (2007); Kartashova (2014); Brown and Kaplan (2019); Campbell, Ramadorai & Ranish (2019); Brown, Harris, Hu, Jenkinson, Kaplan & Robinson (2021); Balloch & Richers (2023); Canipek (2024)

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- **Investors in private capital markets:** HNWIs' increasing importance as sources of financing for early-stage companies
  - Lerner and Schoar (2004); Sorensen (2007); Robinson & Sensoy (2013); Edwards & Todtenhaupt (2020); Lindsey and Stein (2020); Maurin, Robinson, & Strömberg (2022); Chen & Farre-Mensa (2024); Karlsen, Kisseleva, Mjøs & Robinson (2024); Mittal (2024)

1. Introduction
2. Data
3. Descriptive evidence
4. Effects of QSBS reforms
5. Excess returns and inequality
6. Conclusion

## 2. Data on private capital market activity

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- Use data on the legal structure, industry, and financing history of each company to **identify QSBS-eligible companies**

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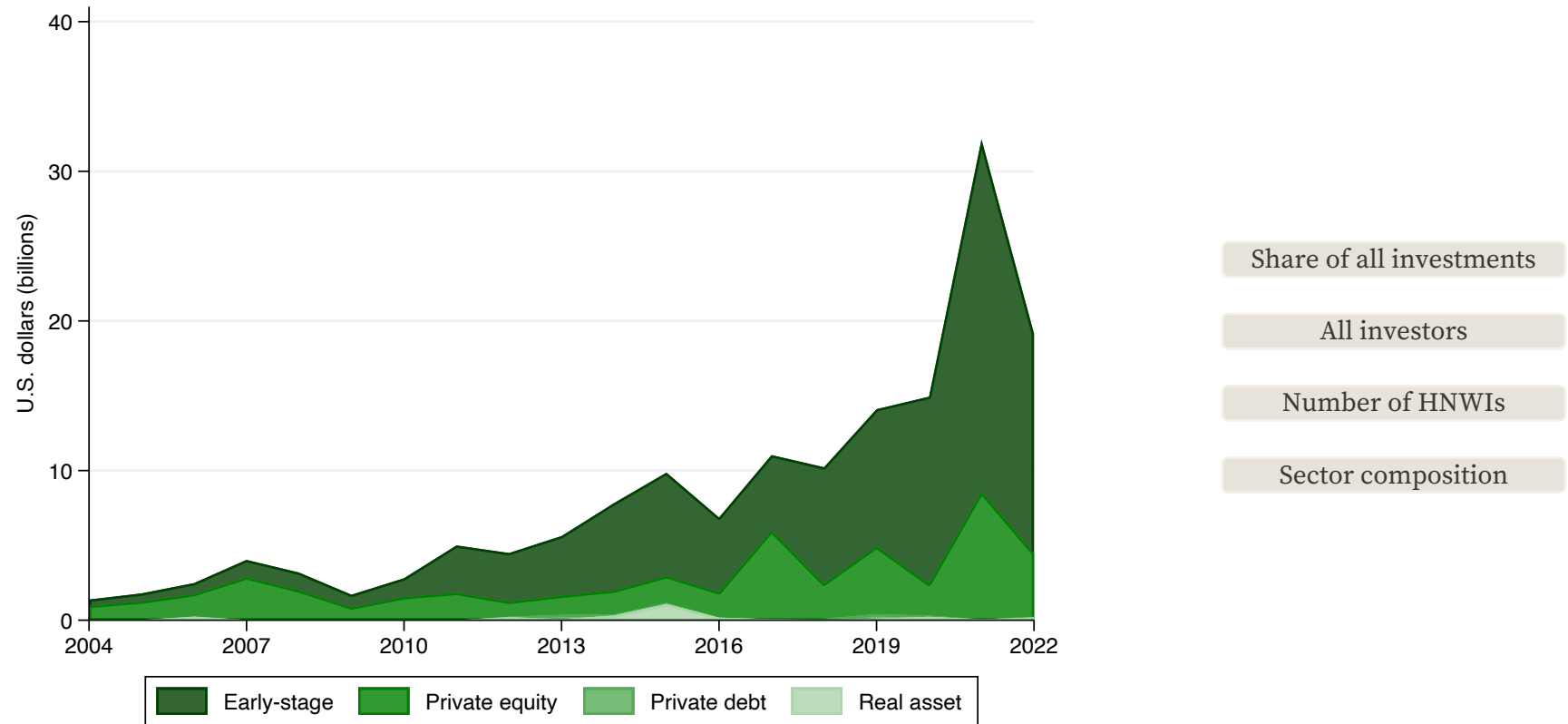
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- **Forbes 400 rich lists**: annual list of 400 wealthiest Americans from 2004 to 2022

### 3. HNWI's increasing participation in private capital markets

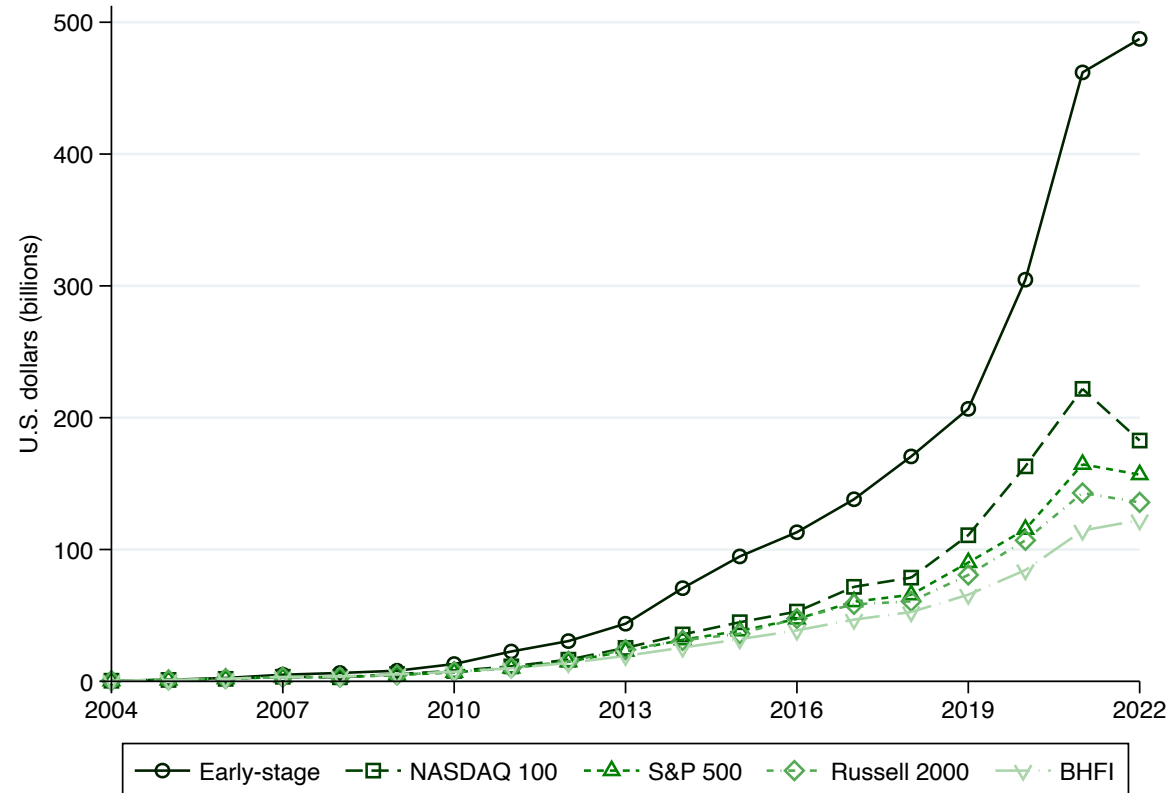
Figure 1, Panel A: U.S. HNWI's private investments in U.S. companies



Source: Pitchbook.

### 3. HNWI's excess returns on their early-stage investments

**Figure 1, Panel B:** Accumulated value of U.S. HNWI's early-stage investments in U.S. companies since 2004

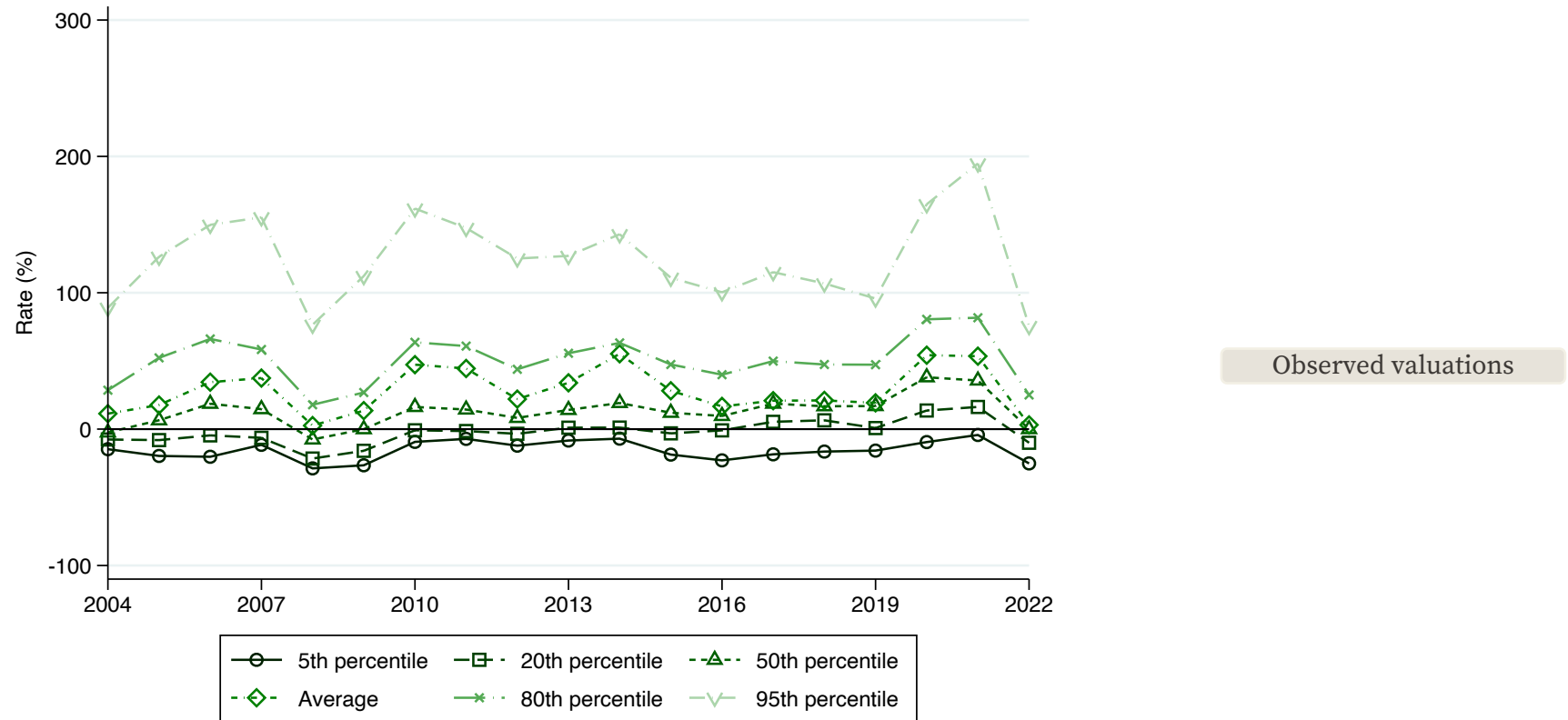


Average rate of return

Source: Pitchbook, S&P Capital IQ.

### 3. Heterogeneity in returns across HNWIs

Figure 1, Panel C: Distribution of returns on U.S. HNWIs' early-stage investments in U.S. companies since 2004



Source: Pitchbook.

## 4. QSBS capital gains tax exclusion

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  - Further **increased to 100%** in 2010
  - Renewed multiple times (sometimes retroactively) until **made permanent in 2015**

Expected tax wedge

## 4. Evaluating the effects of the reforms

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- As shocks to HNWI's participation in early-stage markets, the QSBS reforms treated **QSBS-eligible companies** (relative to QSBS-ineligible companies) and **HNWIs** (relative to non-accredited investors)

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- Exploit **state-level variation** in the initial settlement patterns of HNWIs to estimate the reforms' effect on early-stage investments by resident HNWIs
- After establishing the reforms' effects on HNWI's early-stage investments, evaluate their **effects on income inequality**

## 4. Company-level design

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- Regress  $Y_{i,t}$  (e.g., a dummy equal to 1 if company  $i$  raised financing in year  $t$  from at least one U.S.-based HNWI and 0 otherwise) on  $QSBS_i$  (i.e., a dummy equal to 1 for QSBS-eligible companies and 0 otherwise):

$$Y_{i,t} = \beta_t QSBS_i + \alpha_i + \gamma_{corp(i),t} + \delta_{ind(i),t} + \zeta_{size(i),t} + \epsilon_{i,t} \quad (1)$$

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## 4. Company-level design



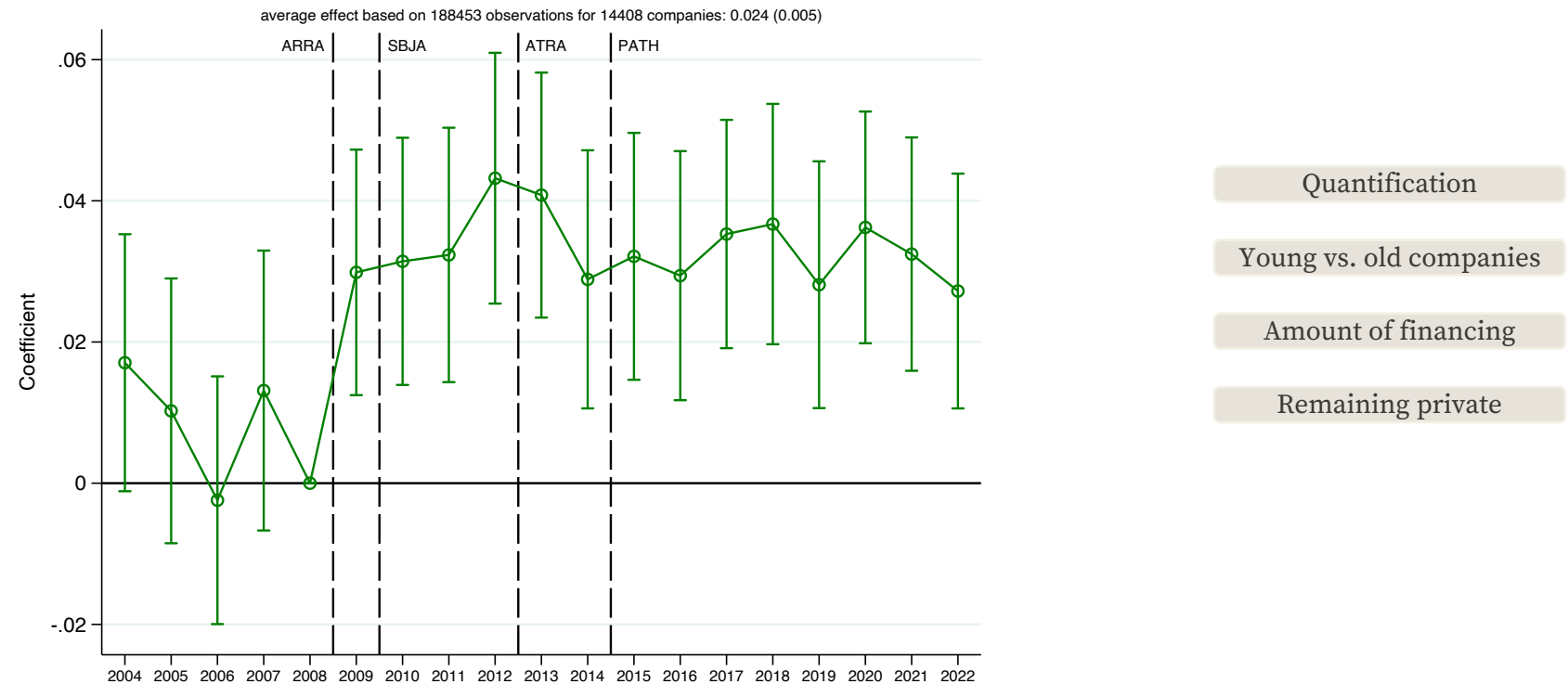
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## 4. Effects on QSBS-eligible companies

**Figure 2:** Estimates of equation (1): probability of raising financing from U.S.-based HNWI



Source: Pitchbook.

## 4. State-level design

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- Do **states with more resident HNWI**s in 2008 see more growth in their resident HNWI's early-stage investments?

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- Two threats to identification:
  - HNWI's may have chosen to settle in certain states to get access to exclusive local investment opportunities
  - If HNWI's **tend to invest in local startups**, and if startups in states with more resident HNWI's are exposed to different shocks than startups in states with fewer resident HNWI's, then these other shocks are potential confounders

Graph

## 4. State-level design



- Do **states with more resident HNWI**s in 2008 see more growth in their resident HNWI's early-stage investments?
- Two threats to identification:
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  - If HNWI's **tend to invest in local startups**, and if startups in states with more resident HNWI's are exposed to different shocks than startups in states with fewer resident HNWI's, then these other shocks are potential confounders
- Compare **growth** of resident HNWI's investments in startups **in their own state** to that of investments by other types of investors (e.g., resident institutions, non-resident institutions, and non-resident HNWI's) in those same startups

Graph

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- Compare **growth** of resident HNWI's investments in startups **in their own state** to that of investments by other types of investors (e.g., resident institutions, non-resident institutions, and non-resident HNWI's) in those same startups
- Regress  $\ln Y_{i,s,t}$  (e.g., log millions of dollars invested by investors of type  $i$  in startups headquartered in state  $s$  in year  $t$ ) on  $\ln X_{s,2008}$  (i.e., the log number of HNWI's residing in  $s$  in 2008):

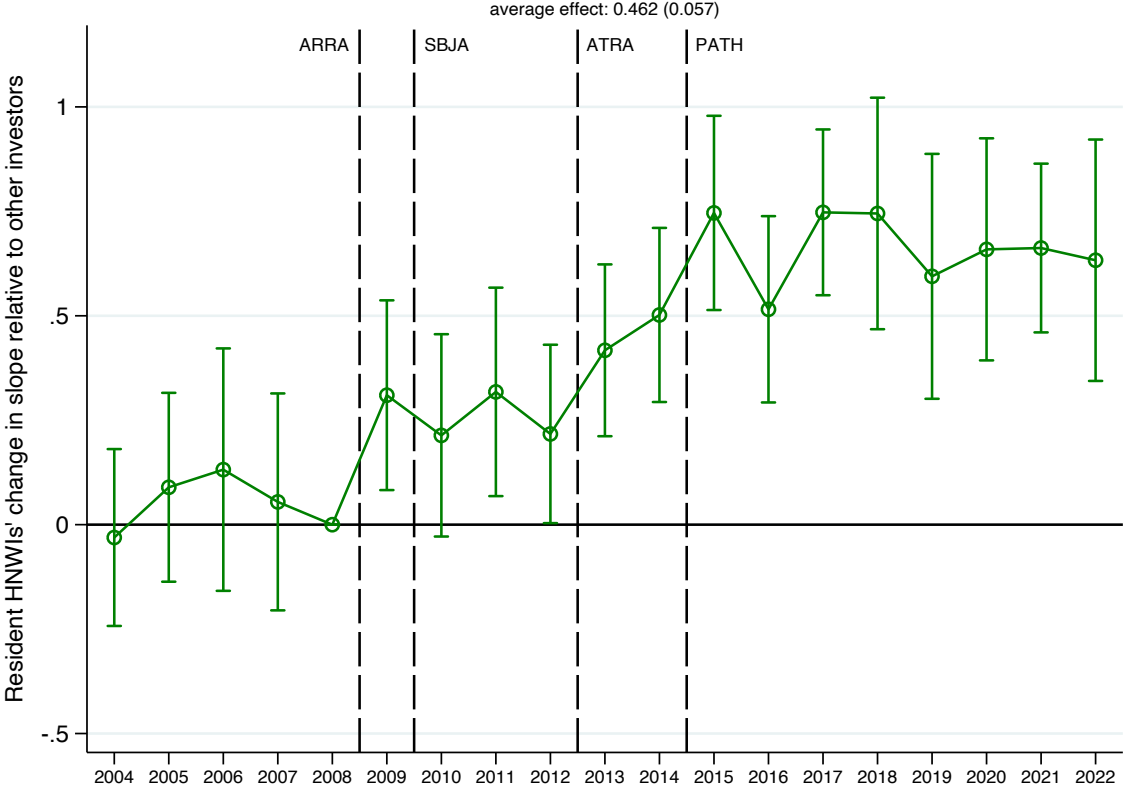
Graph

$$\ln Y_{i,s,t} = \beta_t (\ln X_{s,2008} \times 1_{i=\text{resident HNWI}}) + \alpha_{i,s} + \gamma_{i,t} + \delta_{s,t} + \epsilon_{i,s,t} \quad (2)$$

# 4. Effects on resident HNWIs' early-stage investments



Figure 3: Estimates of equation (2)



Source: Pitchbook, GEOWEATLH-US.

- Quantification
- Raw trends
- Difference-in-differences
- States without tech hubs

## 5. Effects of the QSBS reforms on state-level income inequality

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  - In every state in every year, **the top 0.5% of income earners** qualified as accredited investors in terms of their individual income

## 5. Effects of the QSBS reforms on state-level income inequality

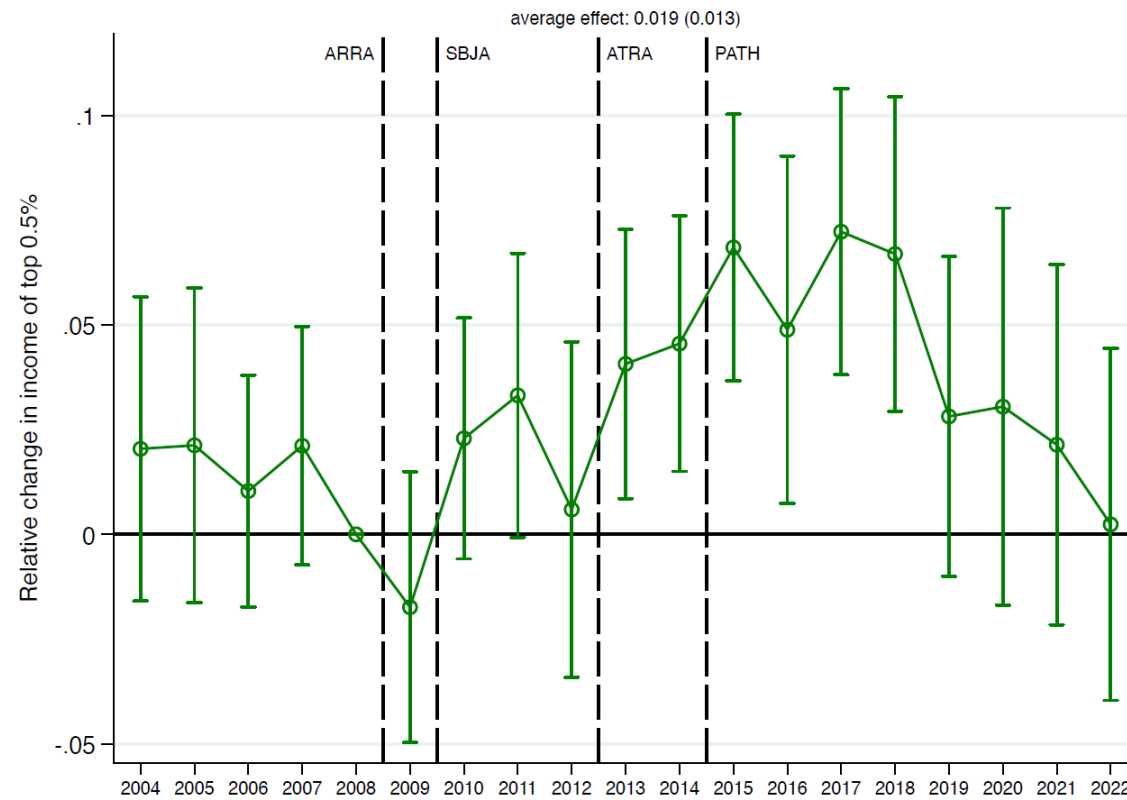


- Resident HNWIs' early-stage investments increased more in states with more resident HNWIs
  - If those investments yielded excess returns relative to public stock market returns, **income inequality** should have increased due to **increased capital gains for HNWIs** (with a 5-year delay)
  - In every state in every year, **the top 0.5% of income earners** qualified as accredited investors in terms of their individual income
- Regress  $\ln Y_{i,s,t}$  (e.g., log thousands of dollars of income per capita in group  $i \in \{1, \dots, 99, 99.5, 99.9, 99.99, 100\}$  of the income distribution in state  $s$  in year  $t$ ) on  $\ln X_{s,2008}$  (i.e., the log number of HNWIs residing in  $s$  in 2008):

$$\ln Y_{i,s,t} = \beta_t (\ln X_{s,2008} \times 1_{i>99.5}) + \alpha_{i,s} + \gamma_{i,t} + \delta_{s,t} + \epsilon_{i,s,t} \quad (3)$$

# 5. Effects on state-level income inequality

Figure 4, Panel A: Estimates of equation (3): total income

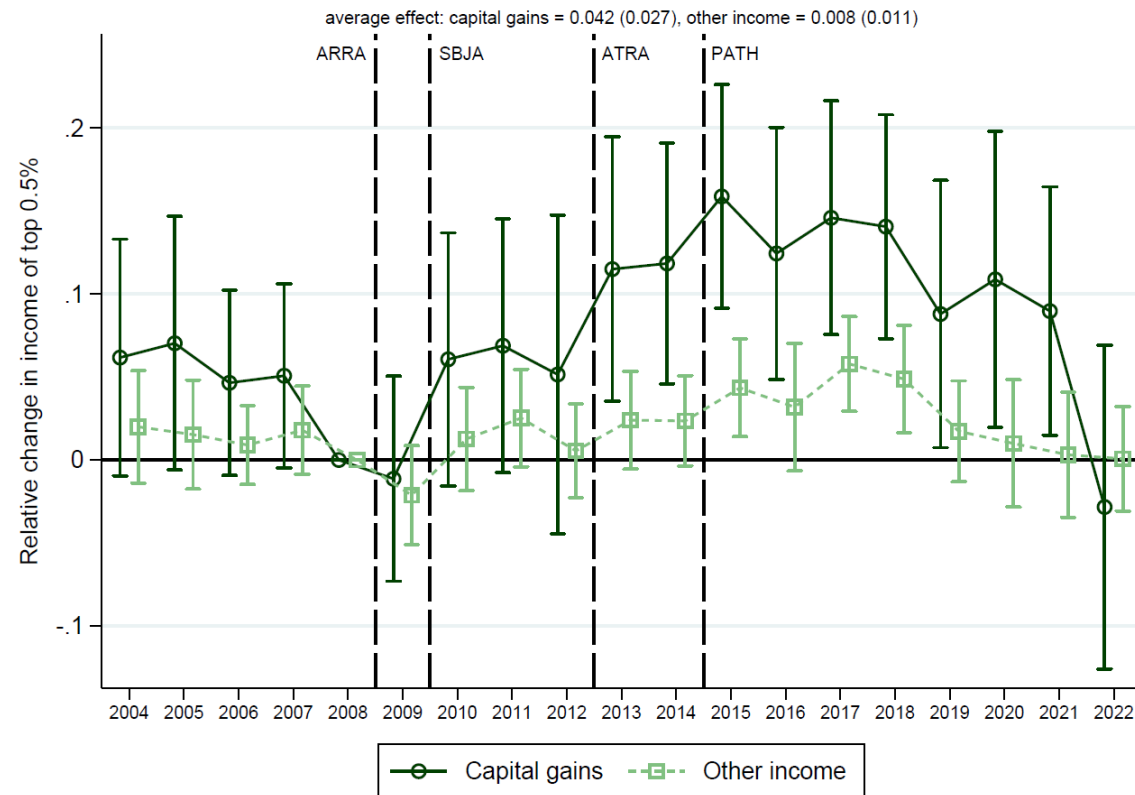


Quantification  
Difference-in-differences

Source: SOI, GEOWEATLH-US.

## 5. Increase in inequality driven by realized capital gains

**Figure 4, Panel B:** Estimates of equation (3): decomposition of total income into realized capital gains and other income



Source: SOI, GEOWEALTH-US.

## 5. Counterfactual simulations of income and wealth inequality

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## 5. Counterfactual simulations of income and wealth inequality

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- Allocate HNWI's **post-tax income/wealth** from their early-stage investments since 2004 to the accredited investors in the SOI/SCF—after augmenting both by the Forbes 400 rich lists—in a way that allows for heterogenous rates of return

## 5. Counterfactual simulations of income and wealth inequality

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- **Subtract the actual gains** that HNWI's earned from their early-stage investments, and **add the capital gains** that they would have earned from counterfactual investments in the NASDAQ 100

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- **Subtract the actual gains** that HNWI's earned from their early-stage investments, and **add the capital gains** that they would have earned from counterfactual investments in the NASDAQ 100
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- **Subtract the actual gains** that HNWIs earned from their early-stage investments, and **add the capital gains** that they would have earned from counterfactual investments in the NASDAQ 100
- **19%** of the growth in the **top 0.5% income share** from 2010 to 2019 is explained by U.S. HNWI's increased participation in U.S. early-stage capital markets
- **9%** of the growth in the **top 0.5% wealth share** from 2010 to 2022 is explained by U.S. HNWI's increased participation in U.S. early-stage capital markets

## 6. Conclusion

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## 6. Conclusion

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- In this paper, we use empirical evidence to argue that the increasing participation of HNWIs in early-stage markets has contributed to rising income and wealth inequality in the U.S.

## 6. Conclusion

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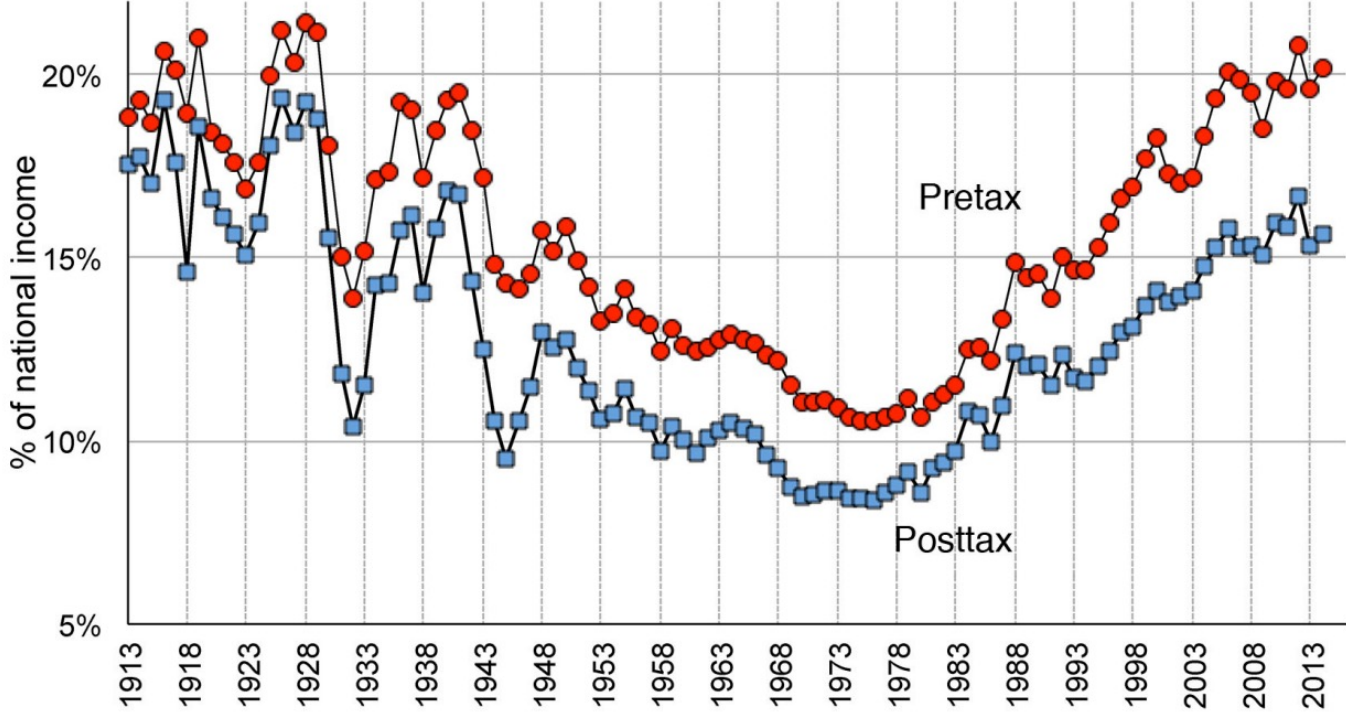
- In this paper, we use empirical evidence to argue that the increasing participation of HNWI's in early-stage markets has contributed to rising income and wealth inequality in the U.S.
- Policy implications: **what is the tradeoff between more startup activity and greater economic inequality?**

# Appendix

# Rising concentration of income



Figure A1: Top 1% of income



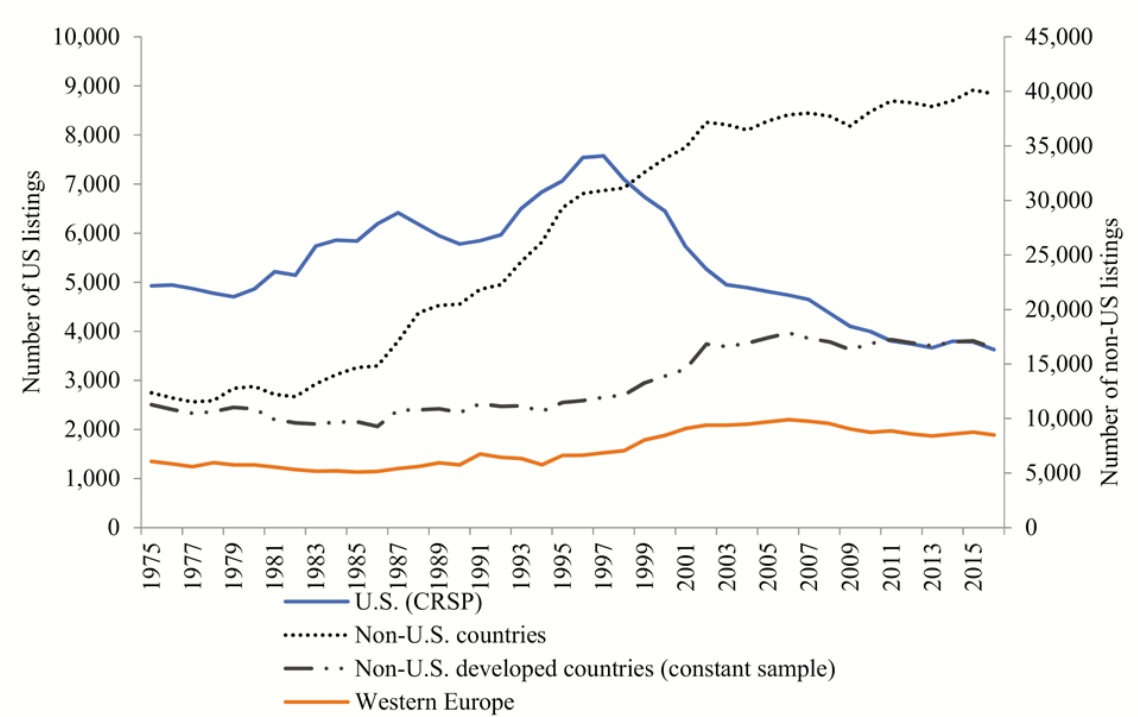
Motivation

Source: Piketty, Saez & Zucman (2018).

# Declining public stock market listings



**Figure A2: Number of Listed Companies**



Motivation

Source: Stulz (2020).

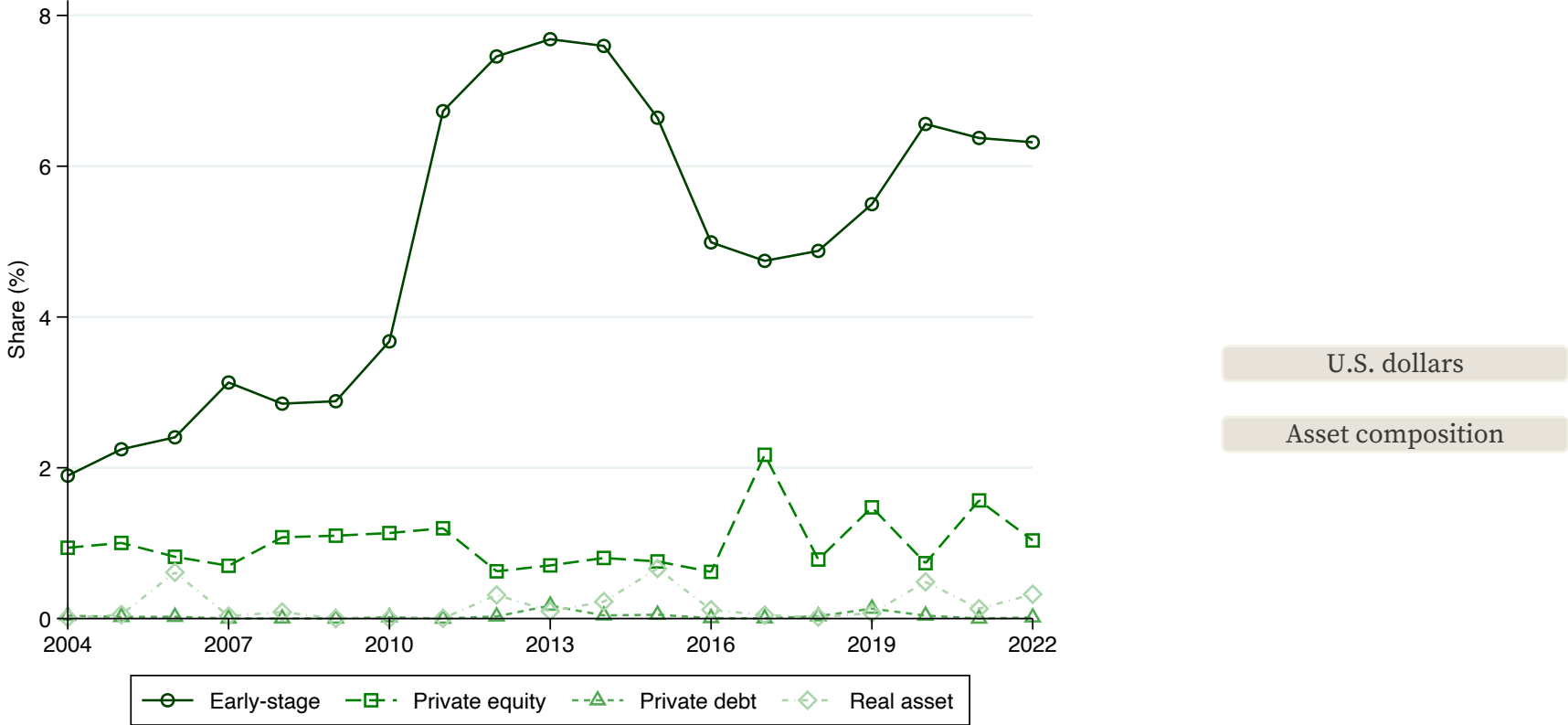
- QSBS-eligible startups' probability of raising financing from HNWIIs **increased by 60%** relative to 2004-2008
- QSBS reforms **explain 21.4%** of the overall growth in HNWIIs' early-stage investments between 2004-2008 and 2009-2022
- The average state-level income gap between HNWIIs and other income earners increased by 7.2%, driven mostly by an increase in HNWIIs' **realized capital gains**
- HNWIIs' excess returns on their early-stage investments (relative to the NASDAQ 100) explain **9%** of the overall growth in the **top 0.5% share of post-tax income** between 2010 and 2019
- HNWIIs' excess returns explain **9%** of the overall growth in the **top 0.5% share of wealth** between 2010 and 2022

Summary

# HNWIs' increasing importance in private capital markets



Figure A3, Panel A: U.S. HNWI's share of private investments in U.S. companies

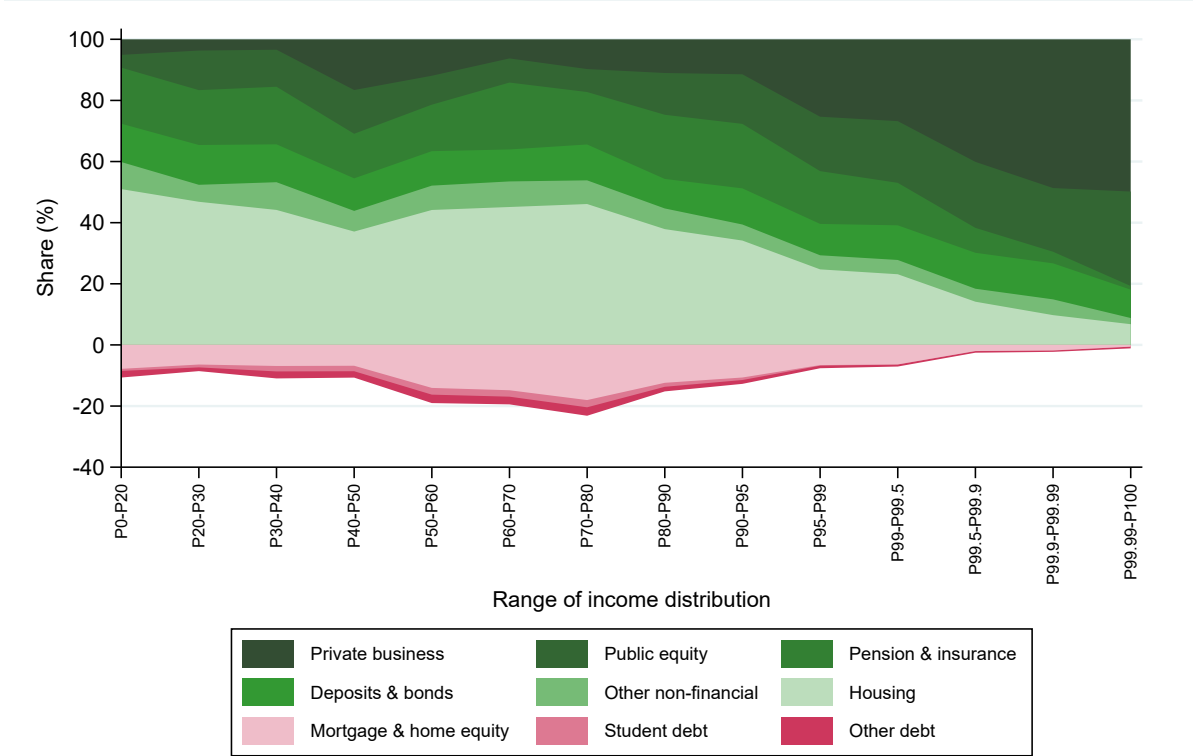


Source: Pitchbook.

# HNWIs' increasing importance in private capital markets

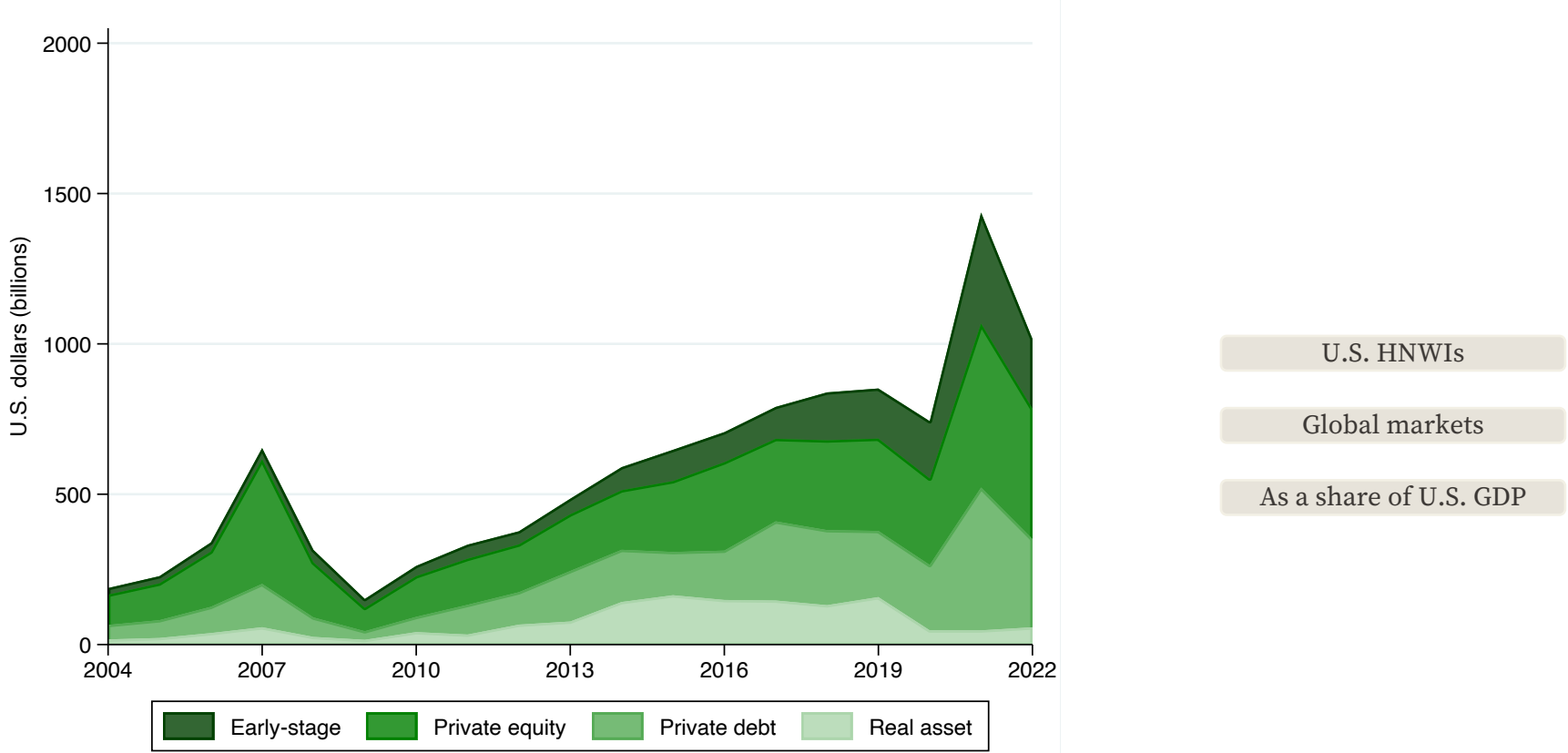


Figure A3, Panel B: Asset composition of U.S. households by income level



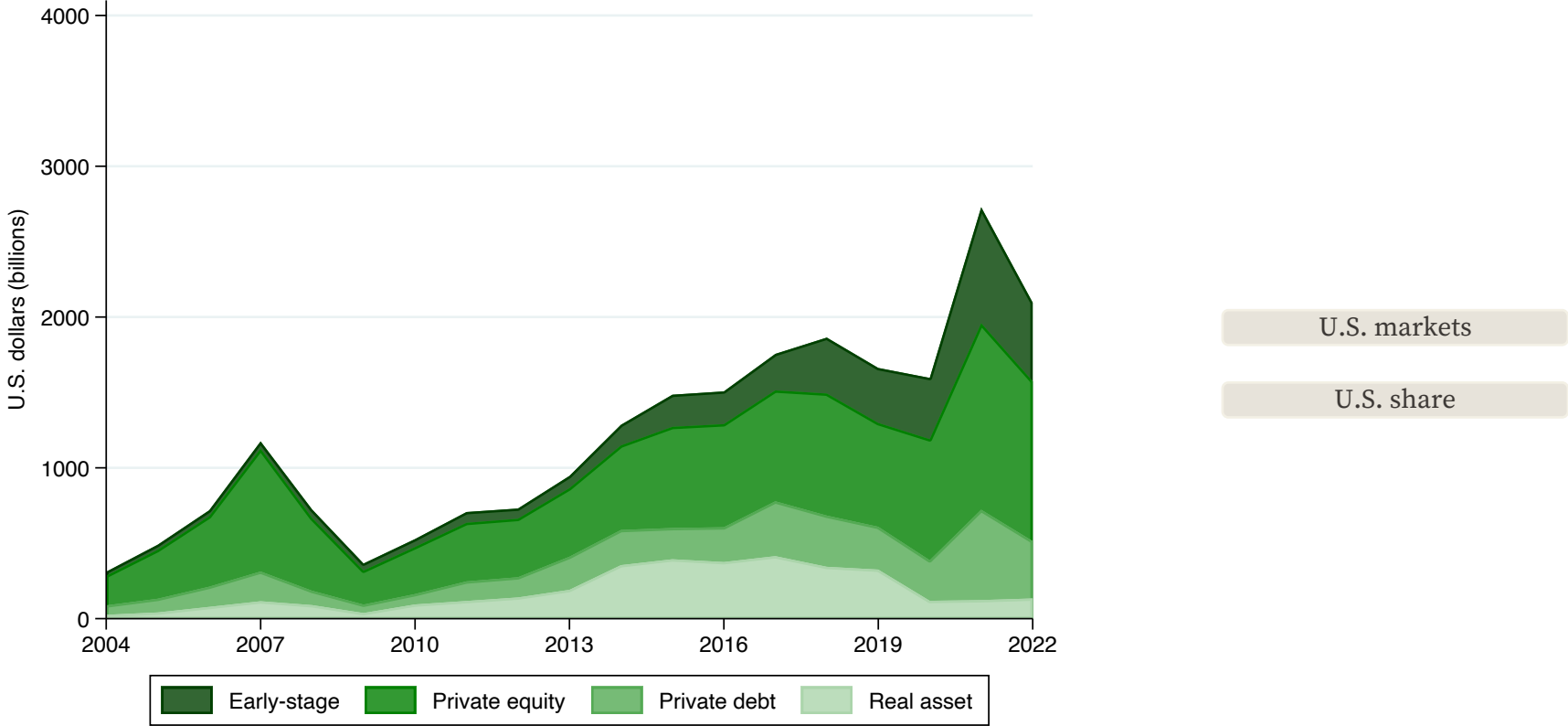
Source: Survey of Consumer Finances.

Figure A4, Panel A: Private investments in U.S. companies by all investors



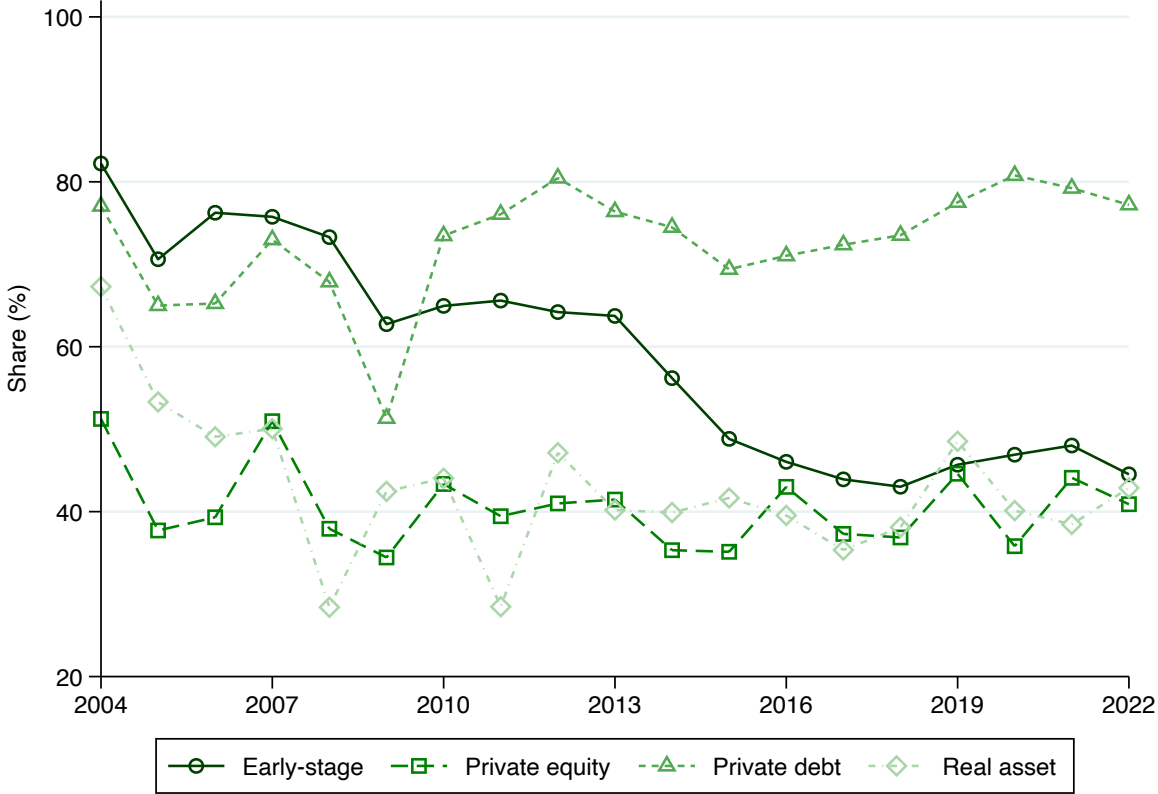
Source: Pitchbook.

Figure A4, Panel B: Private investments in all companies by all investors



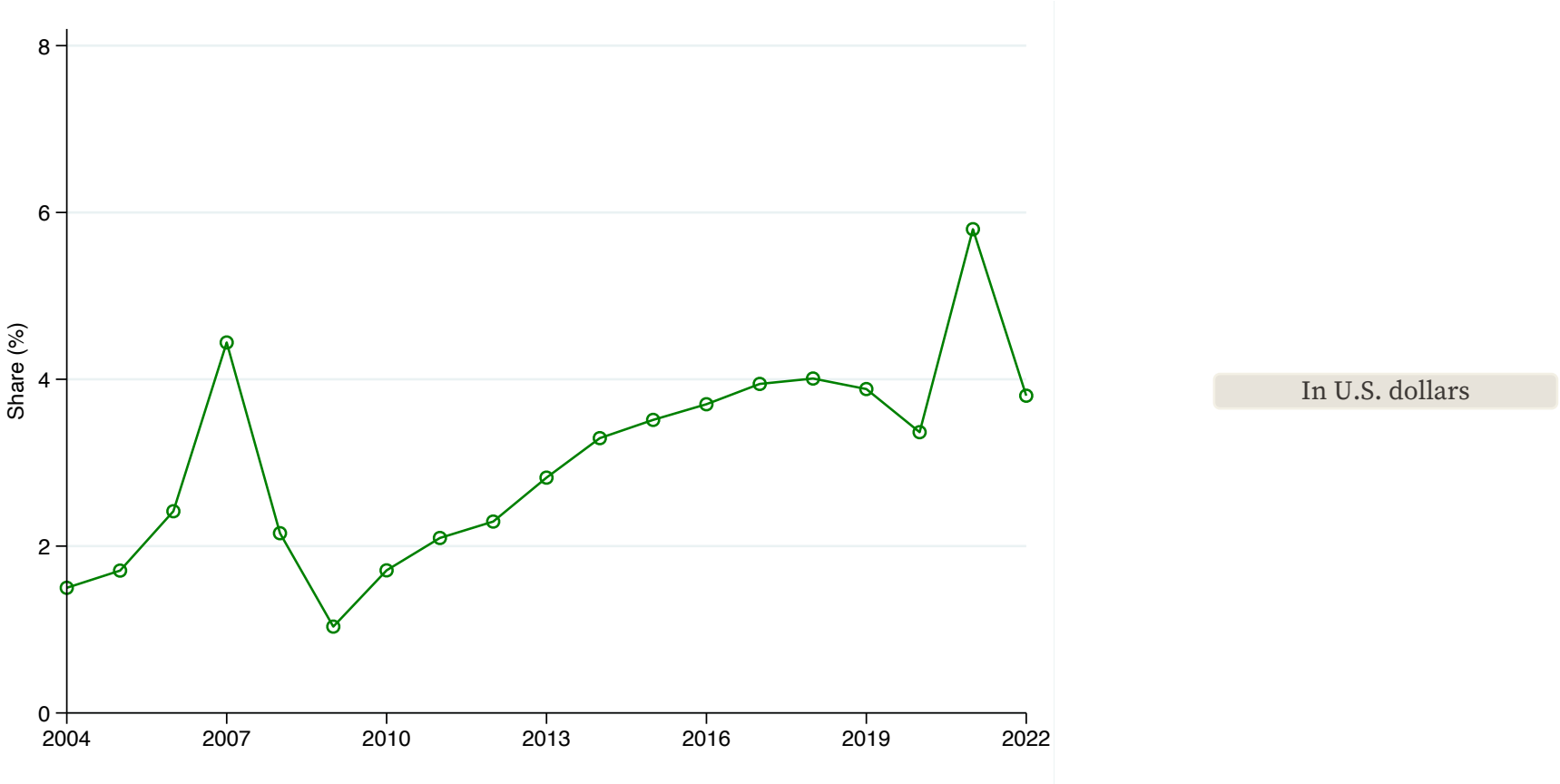
Source: Pitchbook.

Figure A4, Panel C: U.S. companies' shares of private investments in all companies by all investors



Source: Pitchbook.

**Figure A4, Panel D:** Private capital market investments in U.S. companies as a share of U.S. GDP

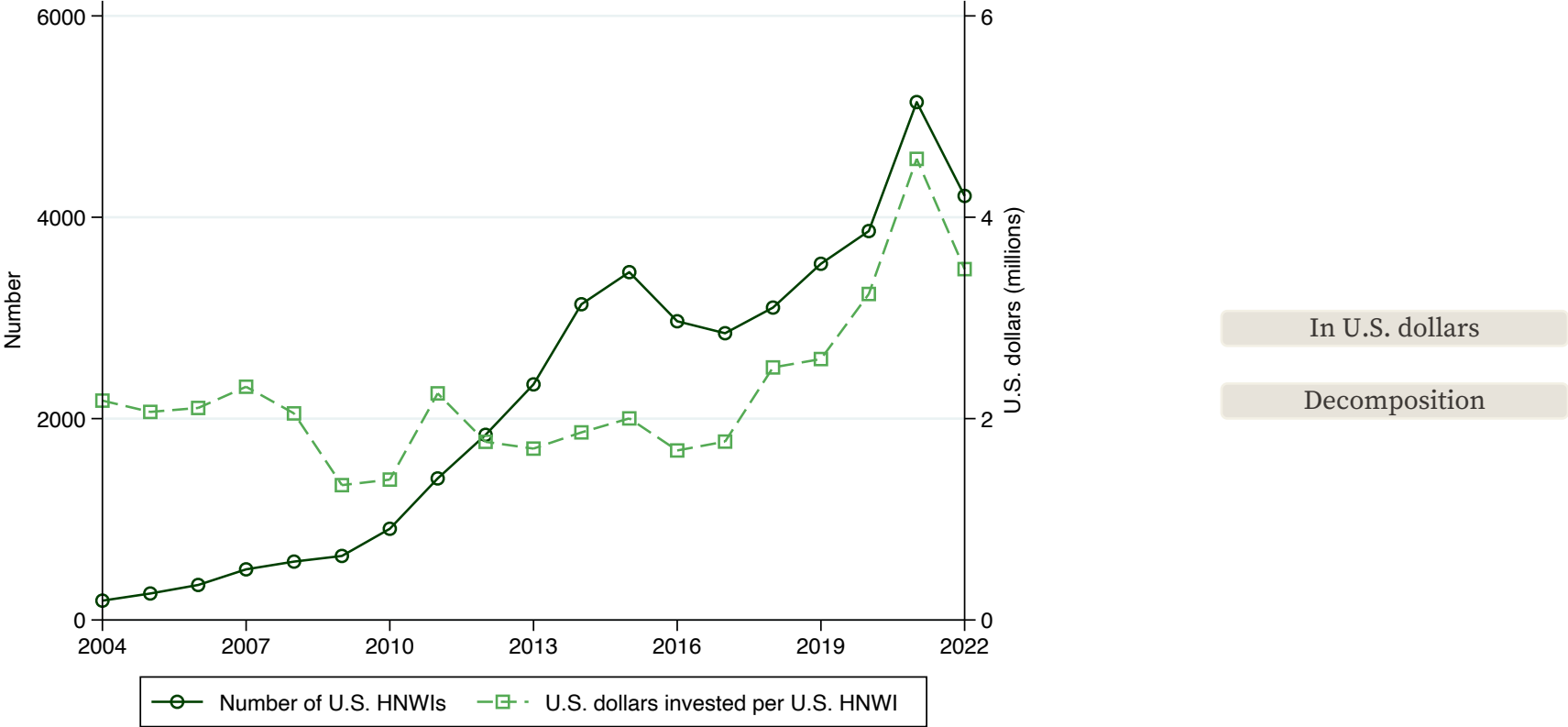


Source: Pitchbook, Bureau of Economic Analysis.

# HNWIs' increasing participation in private capital markets



Figure A5, Panel A: Number of U.S. HNWIs with early-stage investments in U.S. companies

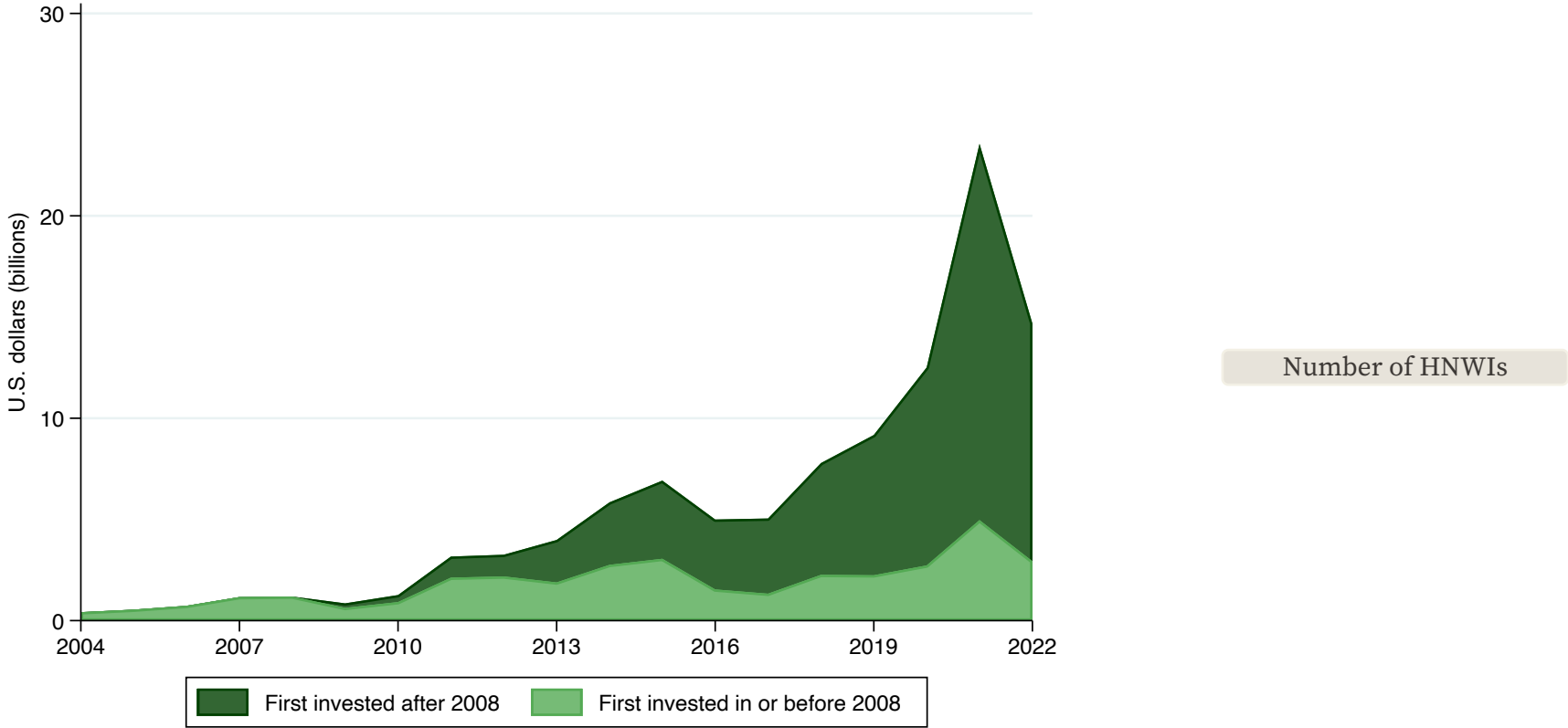


Source: Pitchbook.

# HNWIs' increasing participation in private capital markets



Figure A5, Panel B: Decomposition of U.S. HNWI's early-stage investments in U.S. companies

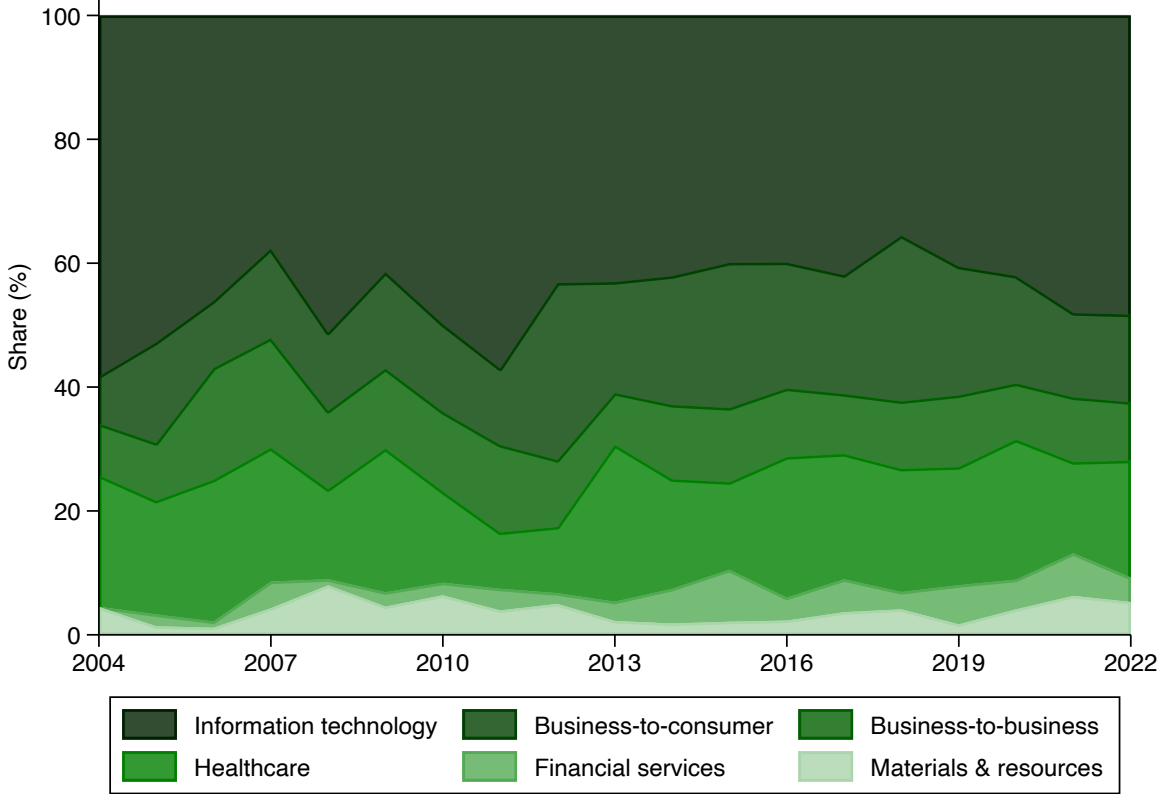


Source: Pitchbook.

# HNWIs' increasing participation in private capital markets



Figure A6: Sector composition of U.S. HNWIs' early-stage investments in U.S. companies



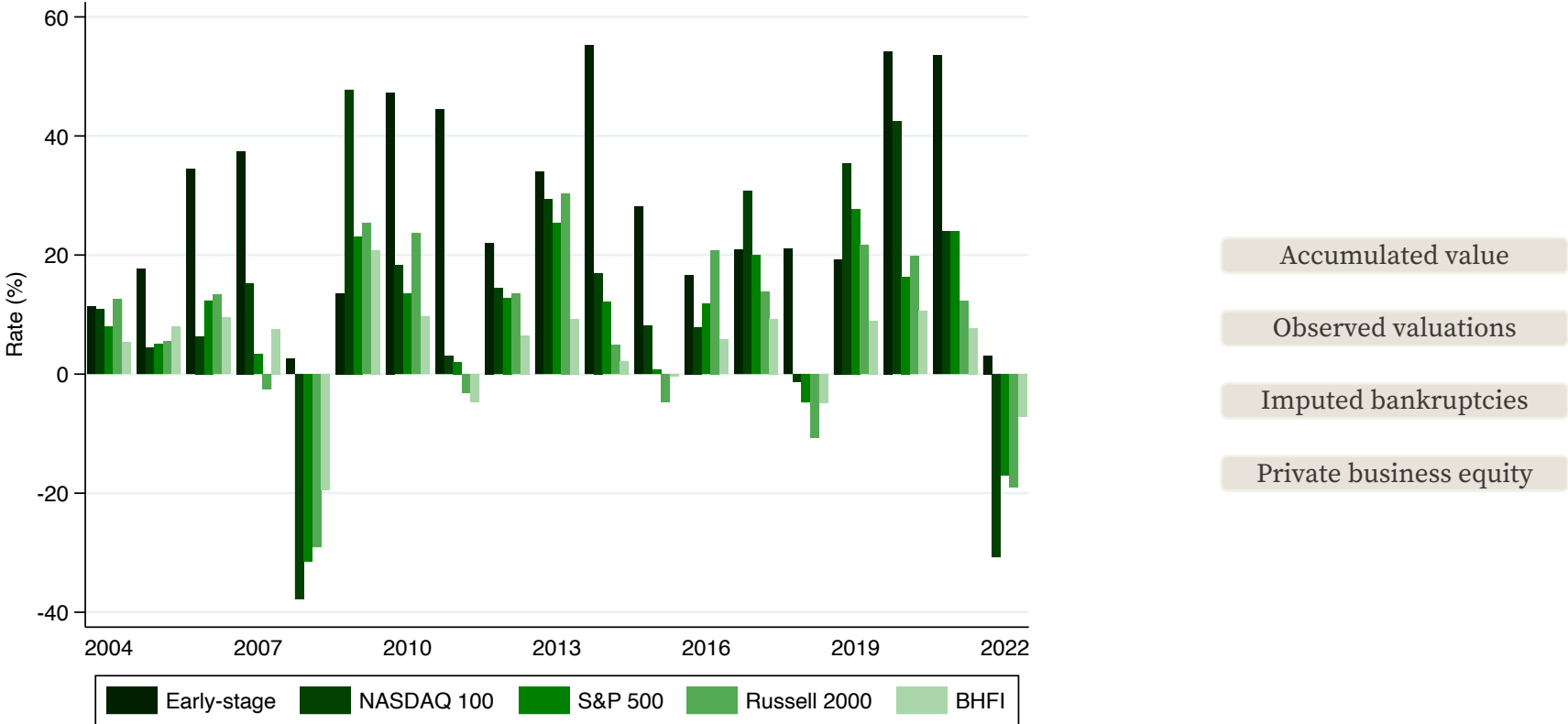
In U.S. dollars

Source: Pitchbook.

# HNWIs' excess average rate of return



Figure A7, Panel A: Average rate of return on U.S. HNWI's early-stage investments in U.S. companies since 2004

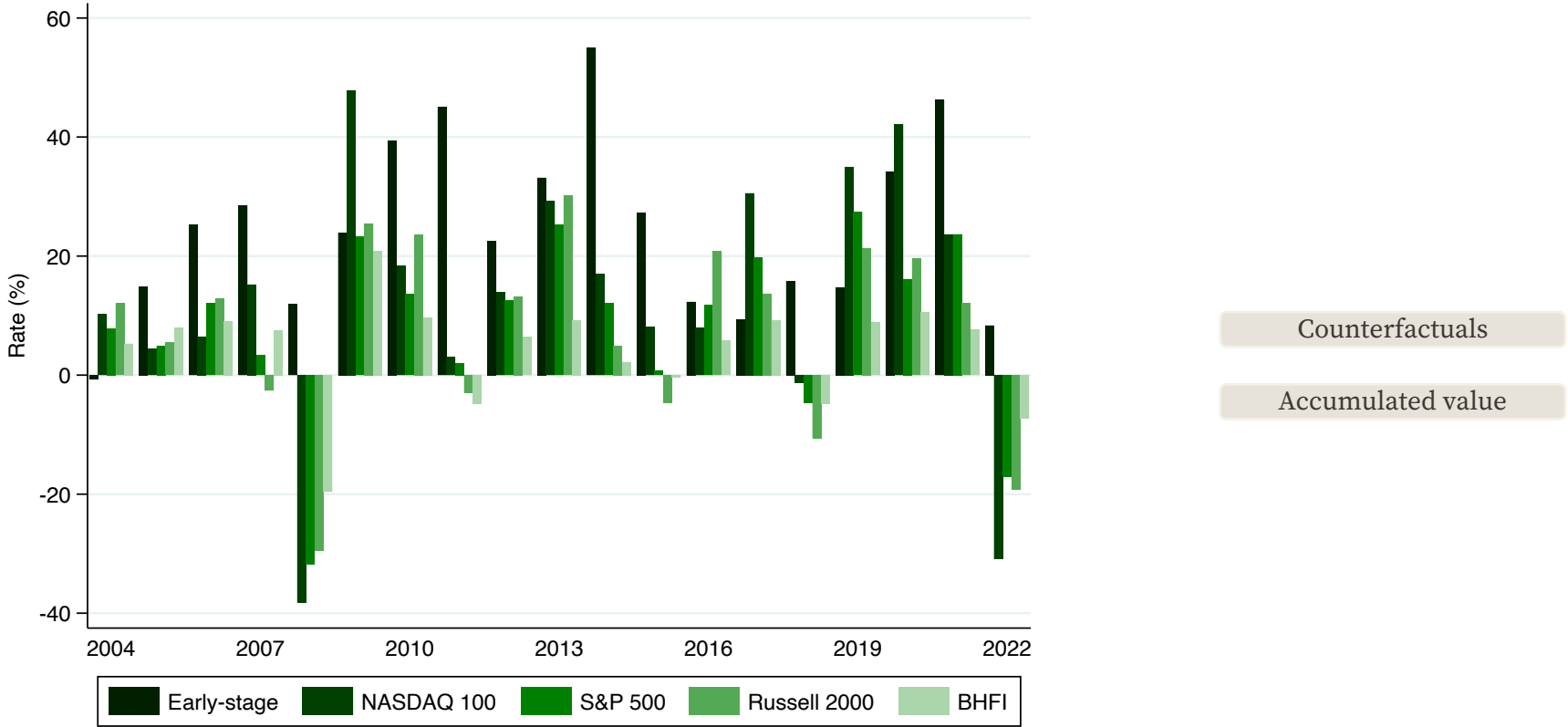


Source: Pitchbook, S&P Capital IQ.

# HNWIs' excess average rate of return



Figure A7, Panel B: Average rate of return on U.S. HNWIs' early-stage investments in U.S. companies: obs. valuations

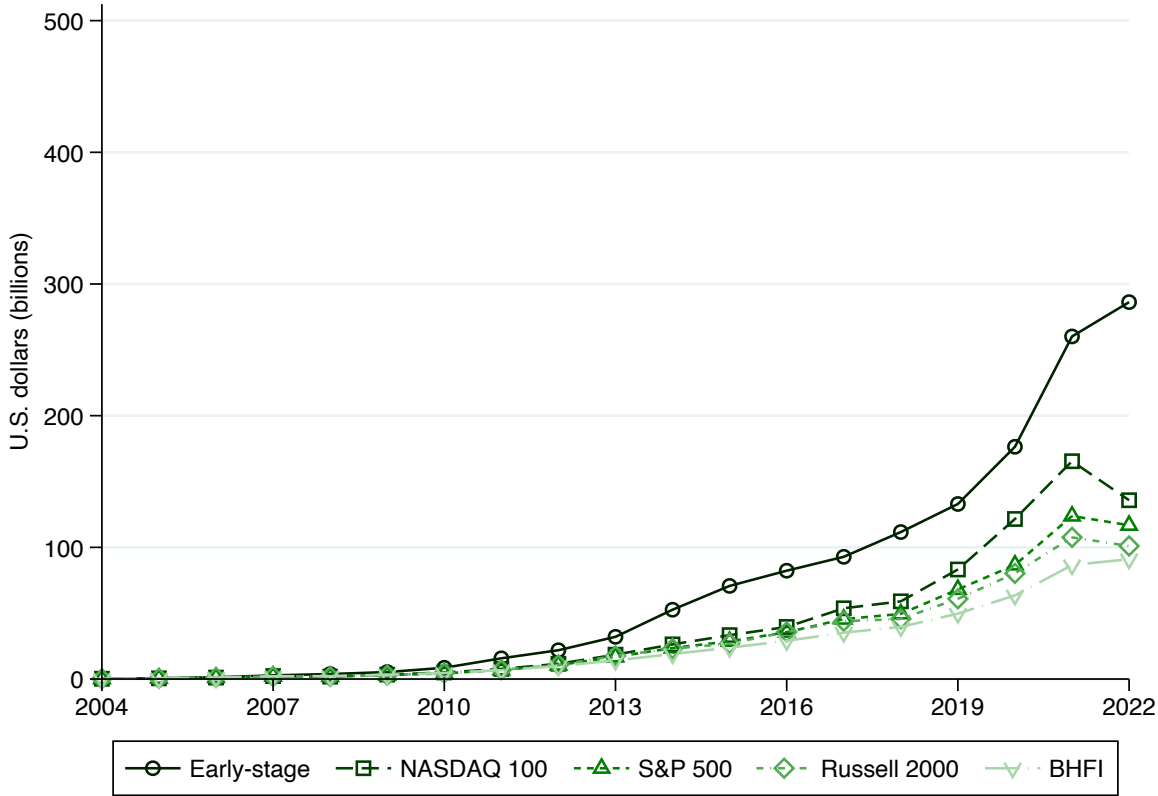


Source: Pitchbook.

# HNWIs' excess average rate of return



Figure A7, Panel C: Accumulated value of U.S. HNWIs' early-stage investments in U.S. companies: observed valuations



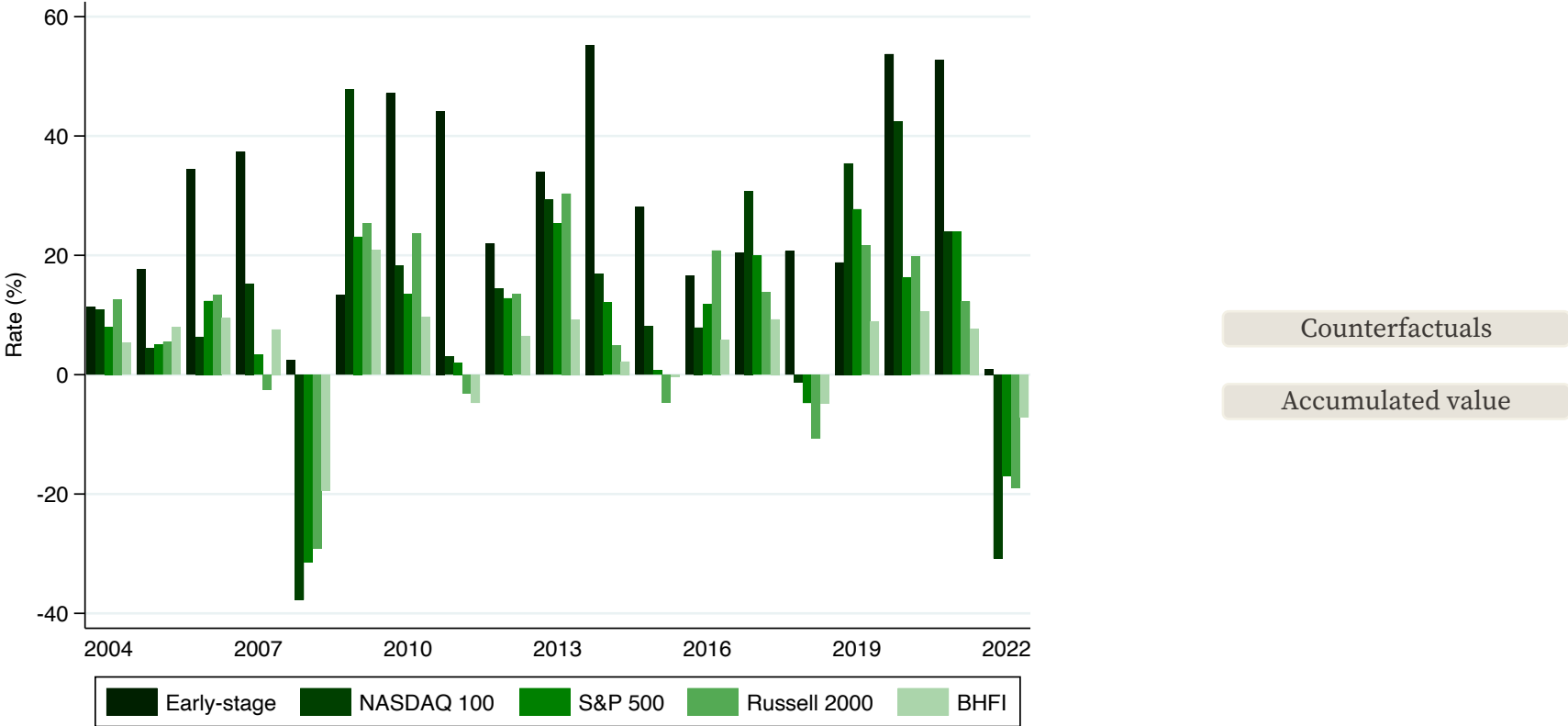
Average rate of return

Source: Pitchbook.

# HNWIs' excess average rate of return



Figure A7, Panel D: Average rate of return on U.S. HNWI's early-stage investments in U.S. comp.: imp. bankruptcies

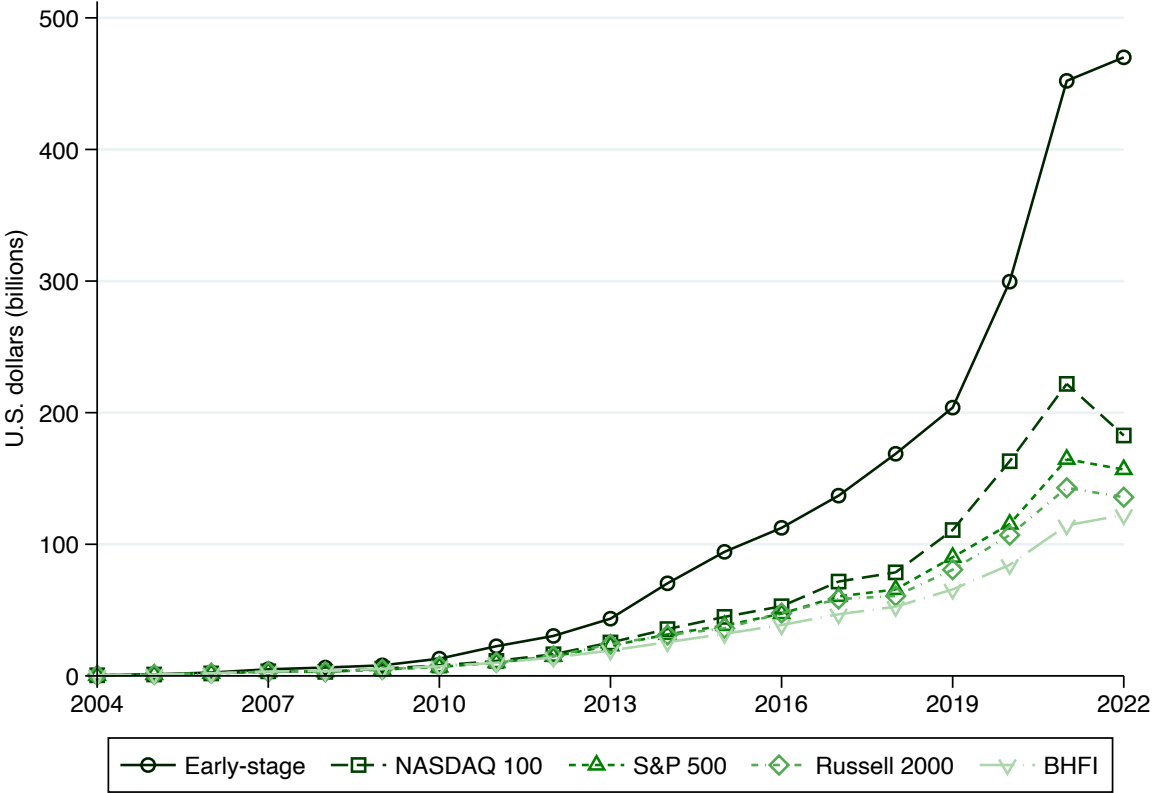


Source: Pitchbook.

# HNWIs' excess average rate of return



**Figure A7, Panel E:** Accumulated value of U.S. HNWIs' early-stage investments in U.S. companies: imp. bankruptcies



Average rate of return

Source: Pitchbook.

Figure A7, Panel F: Average rate of return on private business equity and public equity



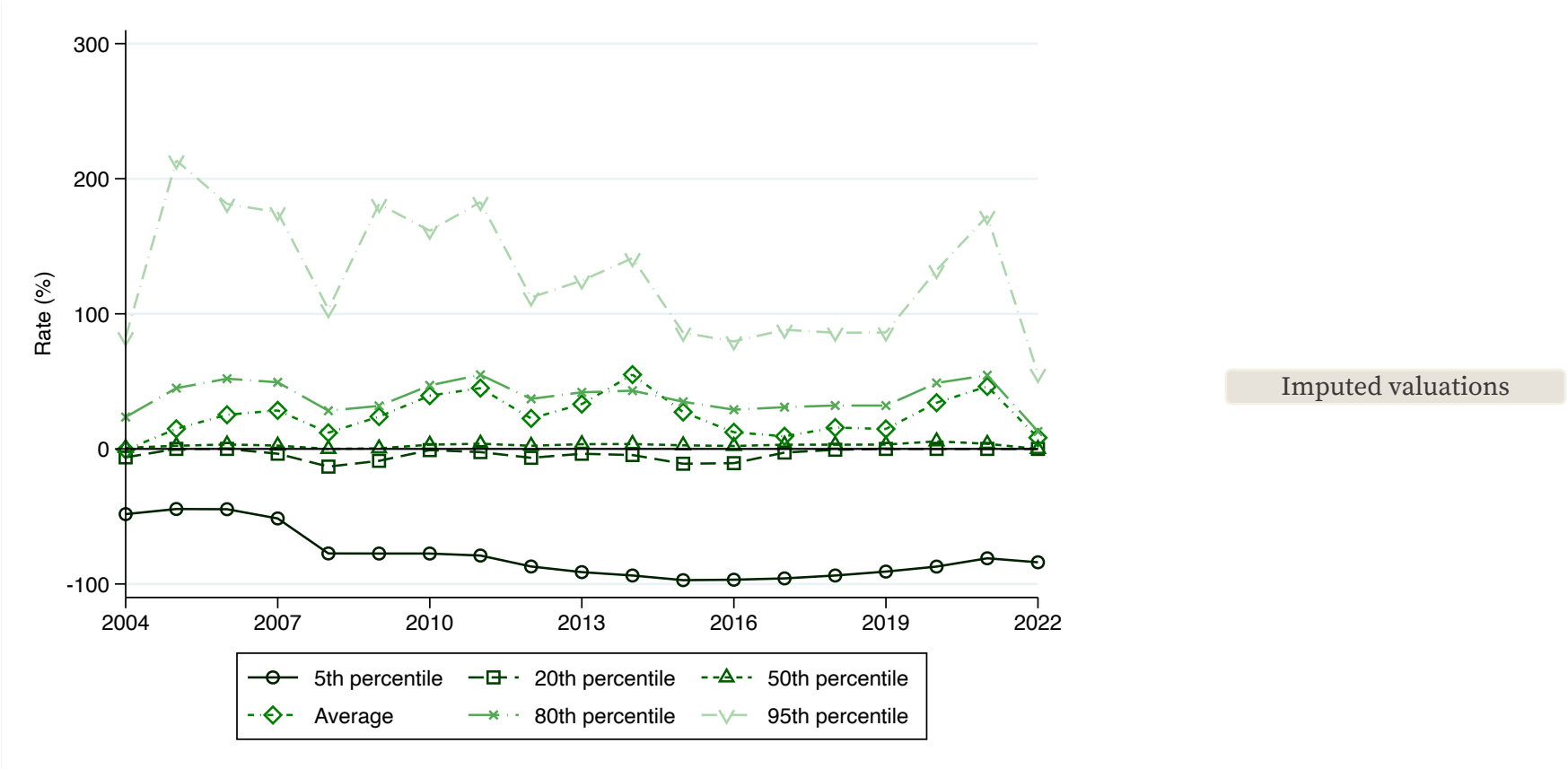
Early-stage companies

Source: Survey of Consumer Finances.

# Heterogeneity in returns across HNWI

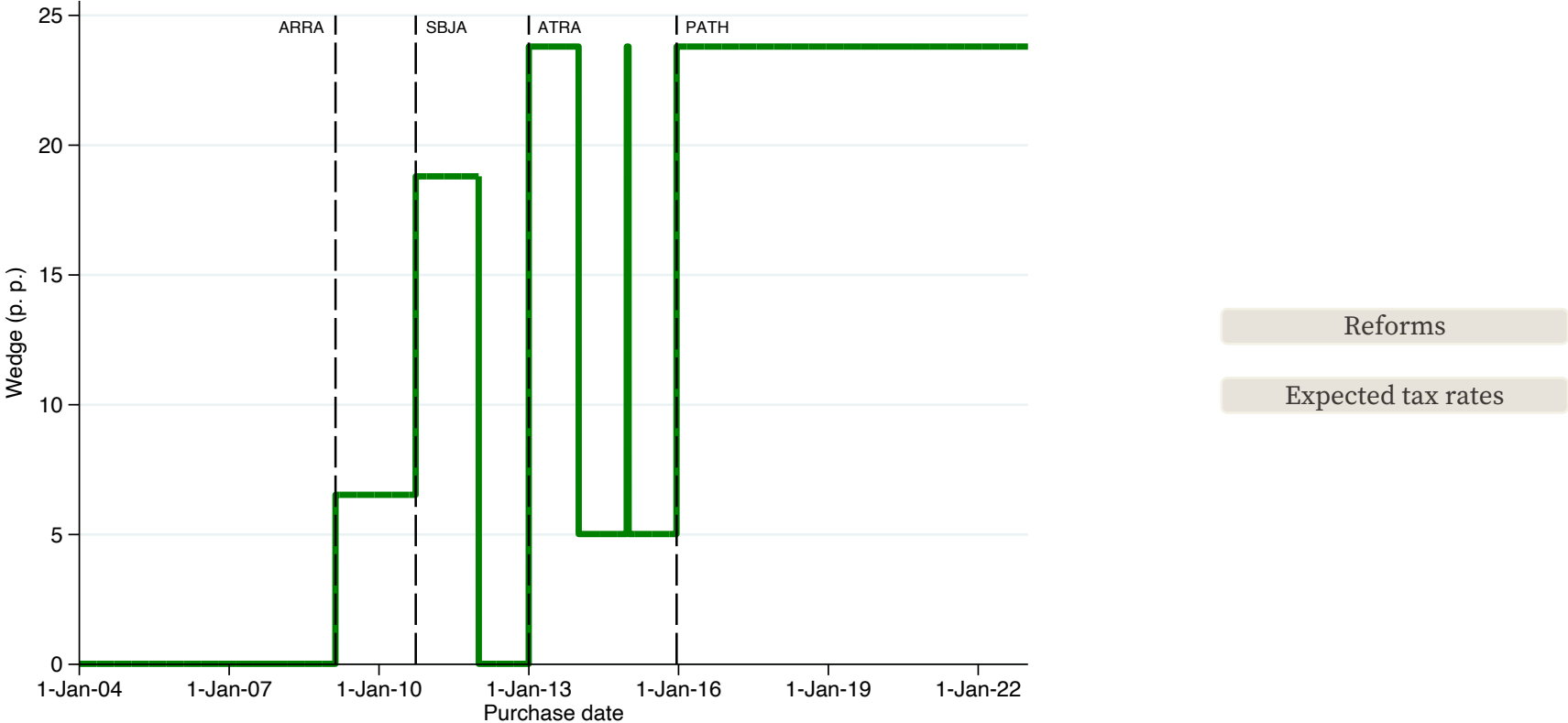


Figure A8: Distribution of returns on U.S. HNWI's early-stage investments in U.S. companies: observed valuations



Source: Pitchbook.

Figure A9, Panel A: Expected federal long-term capital gains tax wedge on QSBS relative to other investments

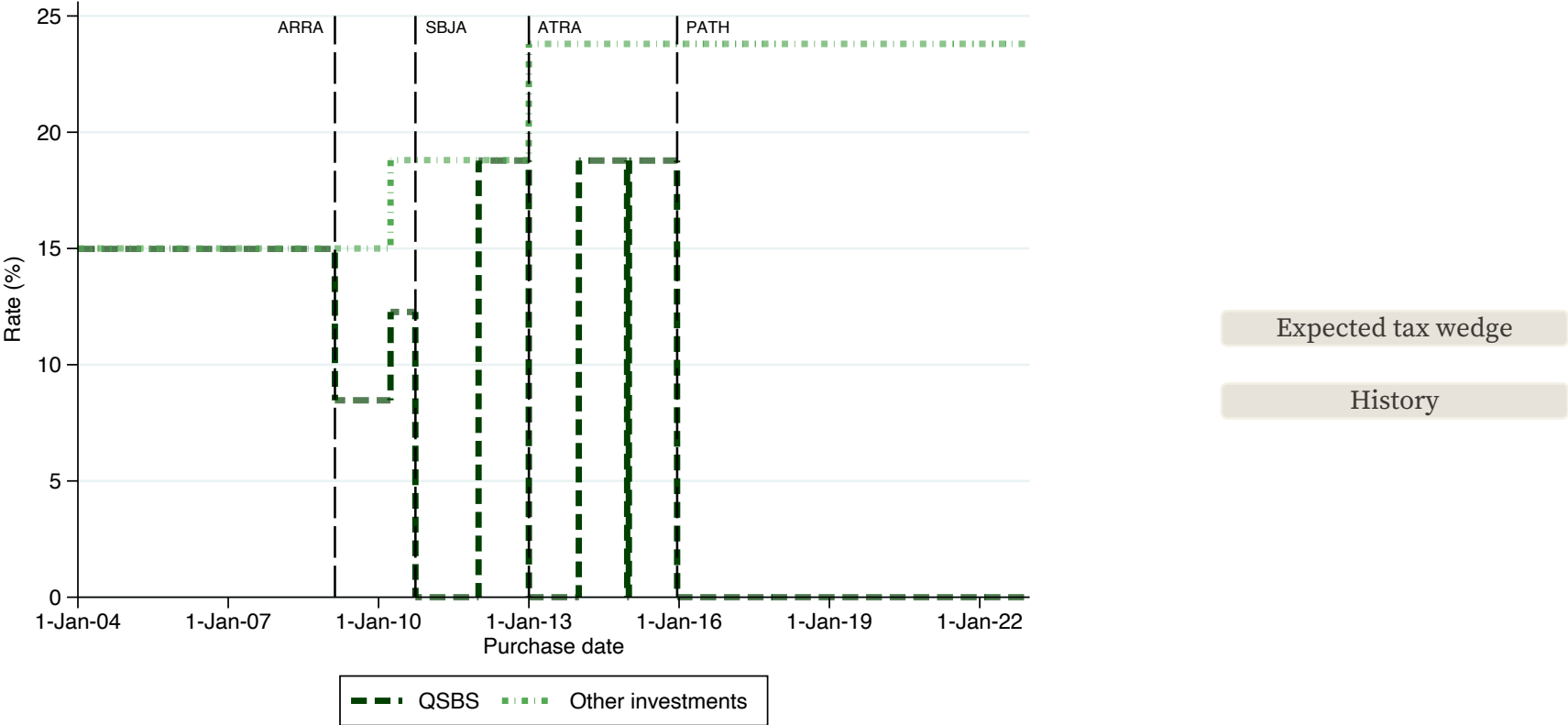


Source: Polsky & Yale (2023).

# QSBS capital gains tax exclusion

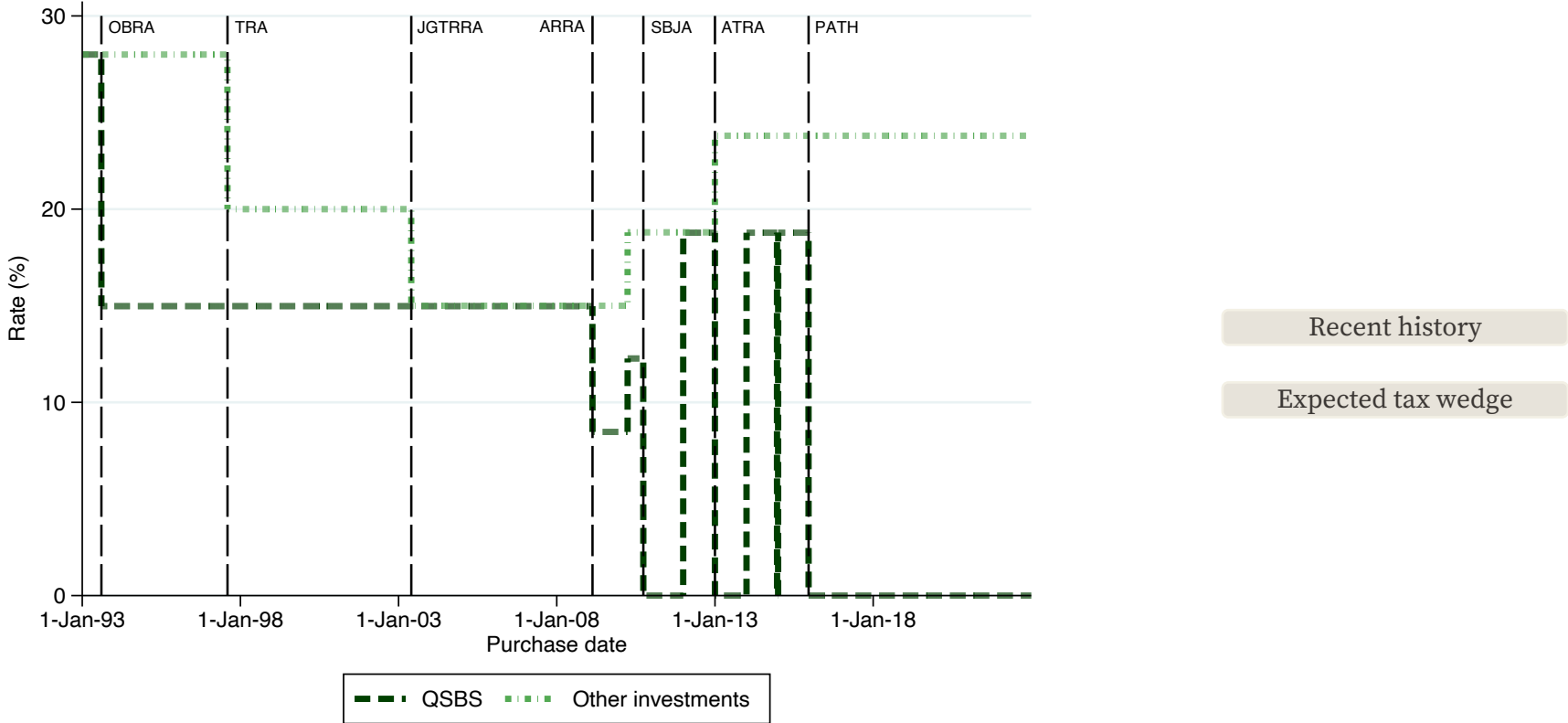


Figure A9, Panel B: Expected federal long-term capital gains tax rates on QSBS and other investments



Source: Polsky & Yale (2023).

Figure A9, Panel C: History of expected federal long-term capital gains tax rates on QSBS and other investments

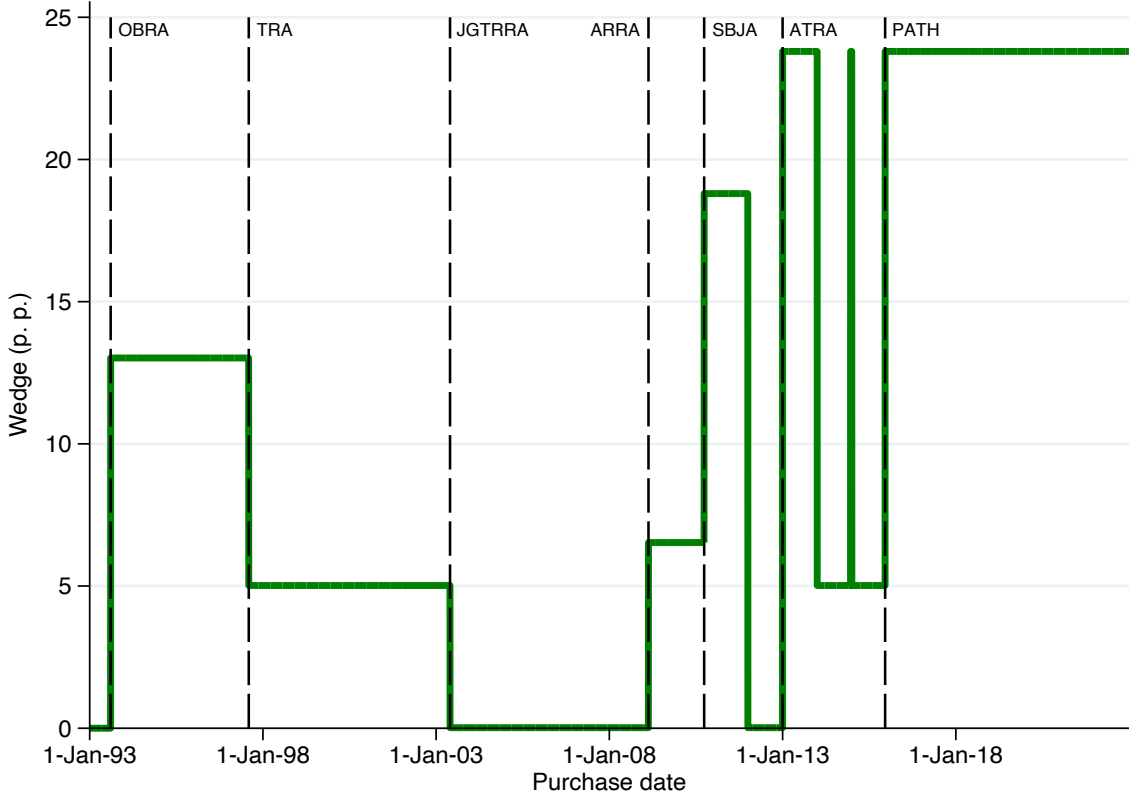


Source: Polsky & Yale (2023).

# QSBS capital gains tax exclusion



Figure A9, Panel D: History of expected federal long-term capital gains wedge on QSBS relative to other investments



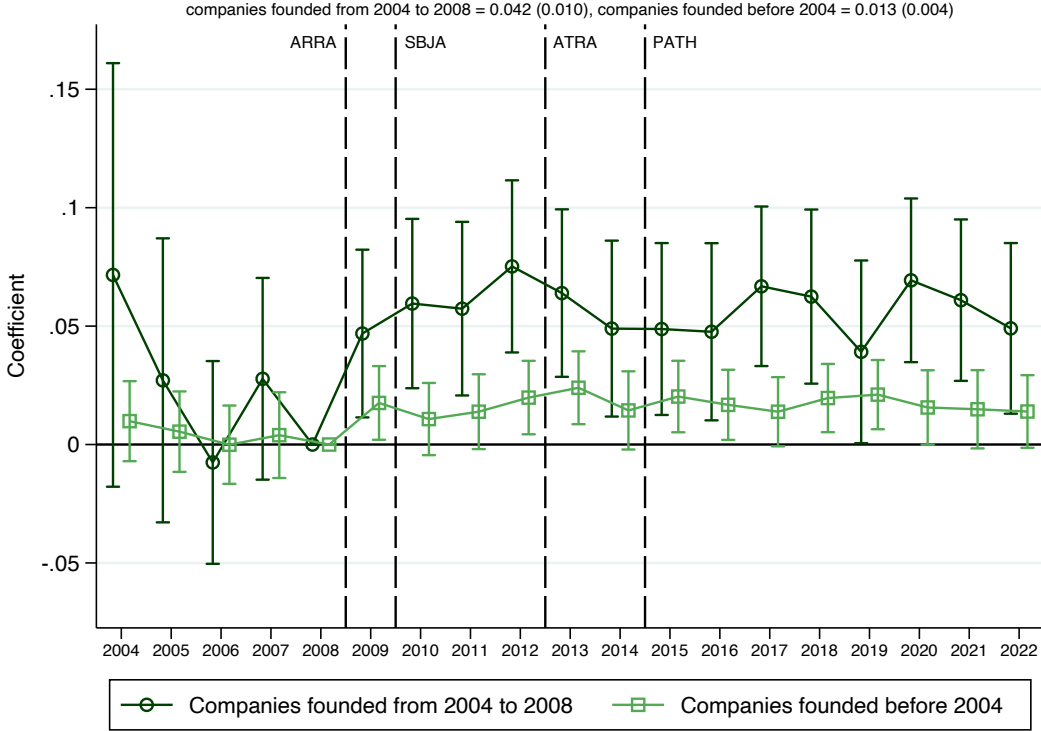
Expected tax rates

Source: Polsky & Yale (2023).

- Average effect is **2.4 percentage points**
- For treated and control companies in 2004-2008, **the probability of raising financing from at least one HNWI was 4.0%**
- The QSBS reforms account for  $2.4/4.0 \approx 60\%$  **of the increase** in the probability that QSBS-eligible U.S. companies raise financing from at least one U.S. HNWI

Estimates

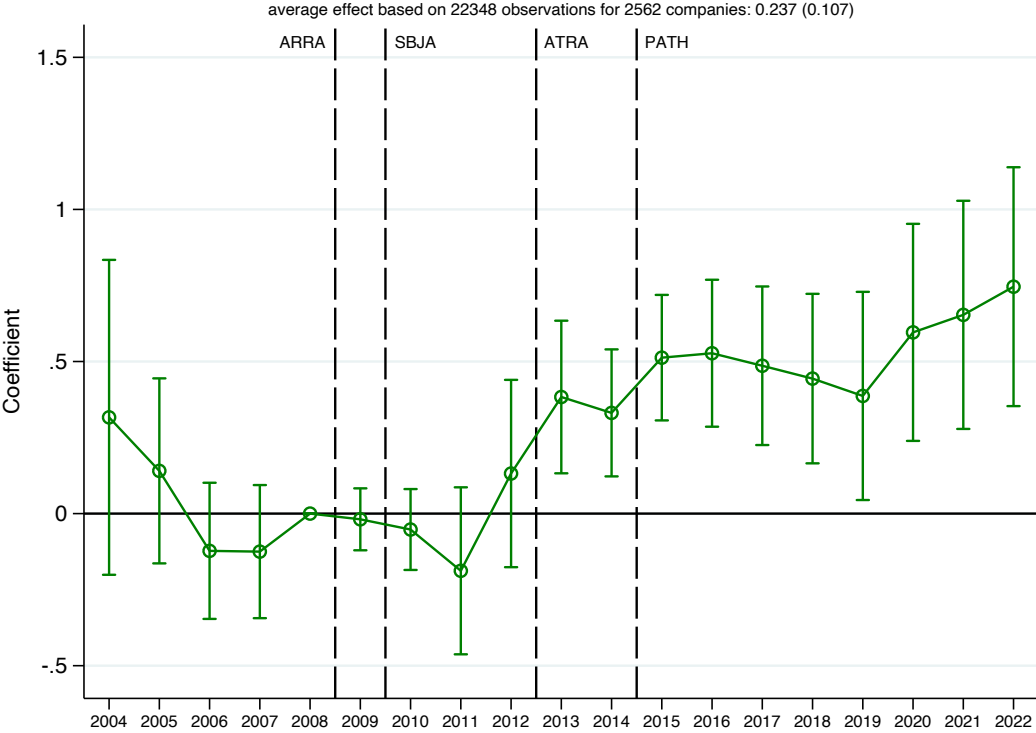
**Figure A10, Panel A:** Estimates of equation (1): companies founded in 2004-2008 or before



All companies

Source: Pitchbook.

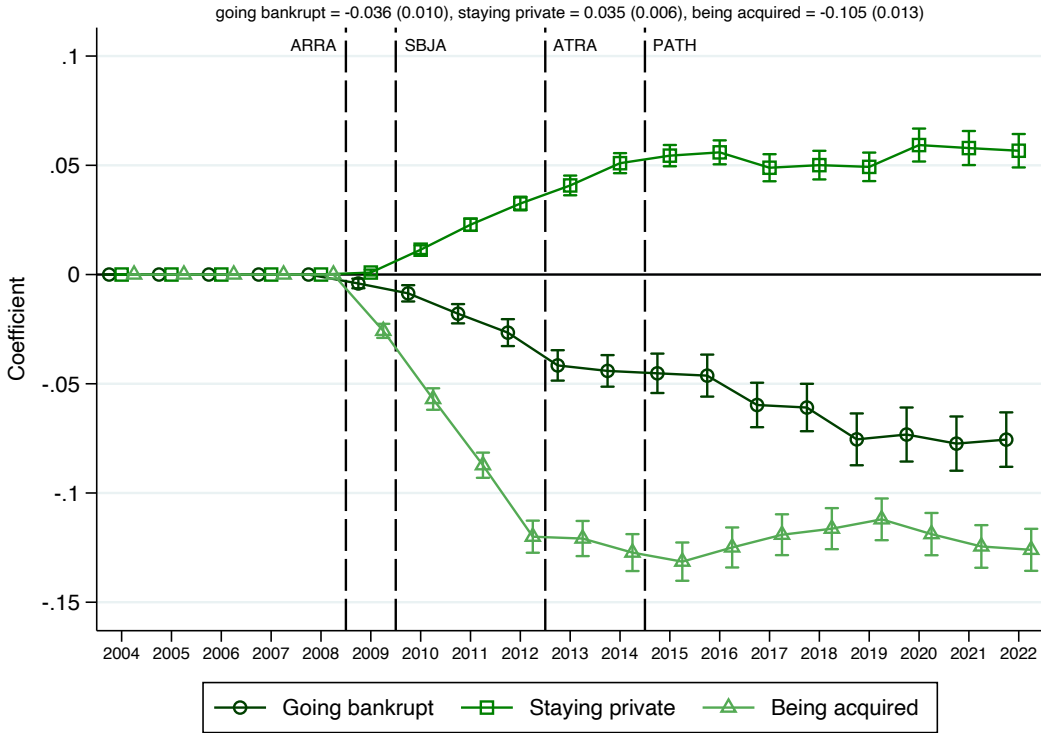
Figure A10, Panel B: Estimates of equation (1): log accumulated amount of financing raised from U.S. HNWI



Raising HNWI financing

Source: Pitchbook.

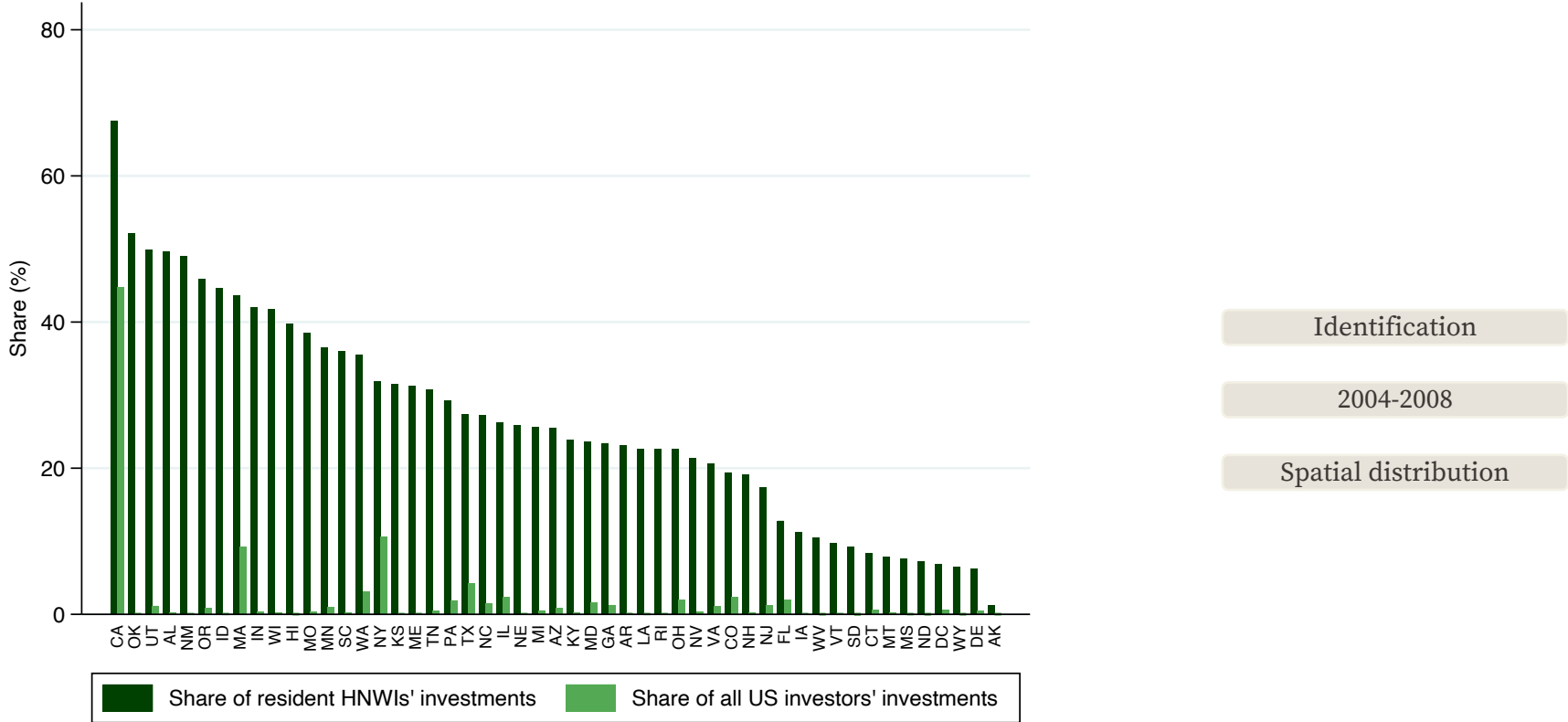
**Figure A10, Panel C:** Estimates of equation (1): probability of going bankrupt, staying private, and being acquired



Raising HNWI financing

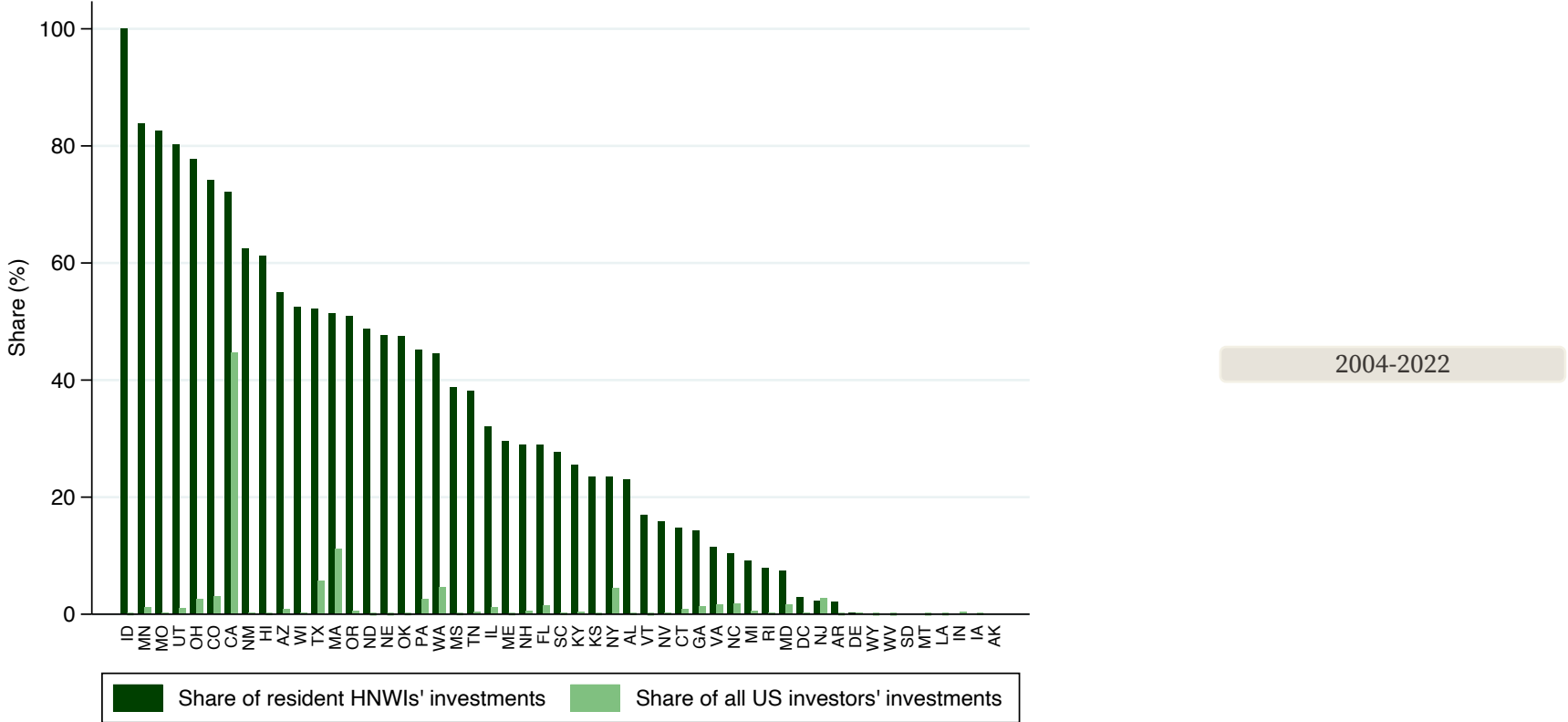
Source: Pitchbook.

**Figure A11, Panel A:** In-state bias of early-stage investments by resident HNWI's from 2004 to 2022



Source: Pitchbook.

**Figure A11, Panel B:** In-state bias of early-stage investments by resident HNWI's from 2004 to 2008

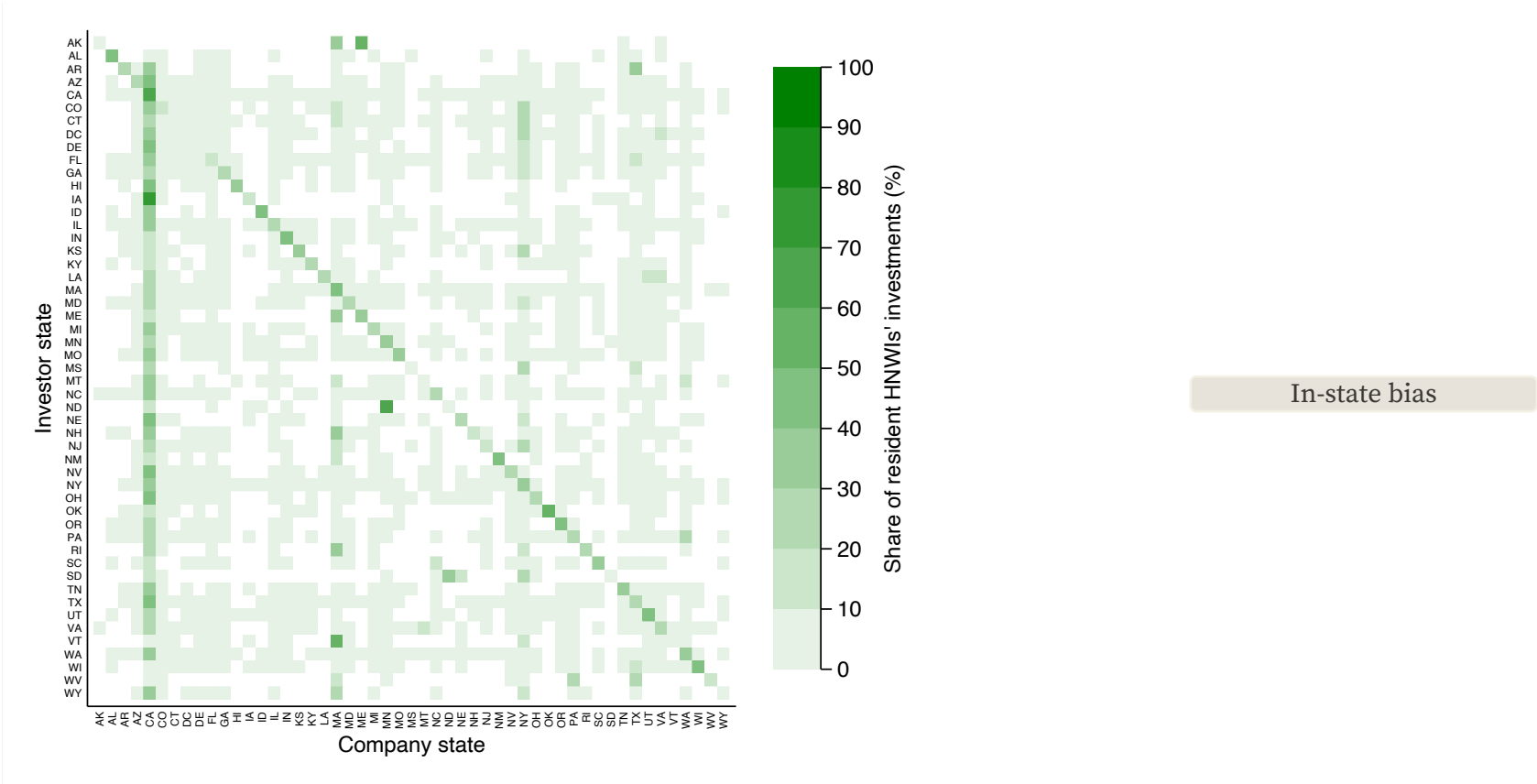


Source: Pitchbook.

# Overcoming threats to identification



Figure A11, Panel C: Spatial distribution of HNWI's early-stage investments from 2004 to 2022

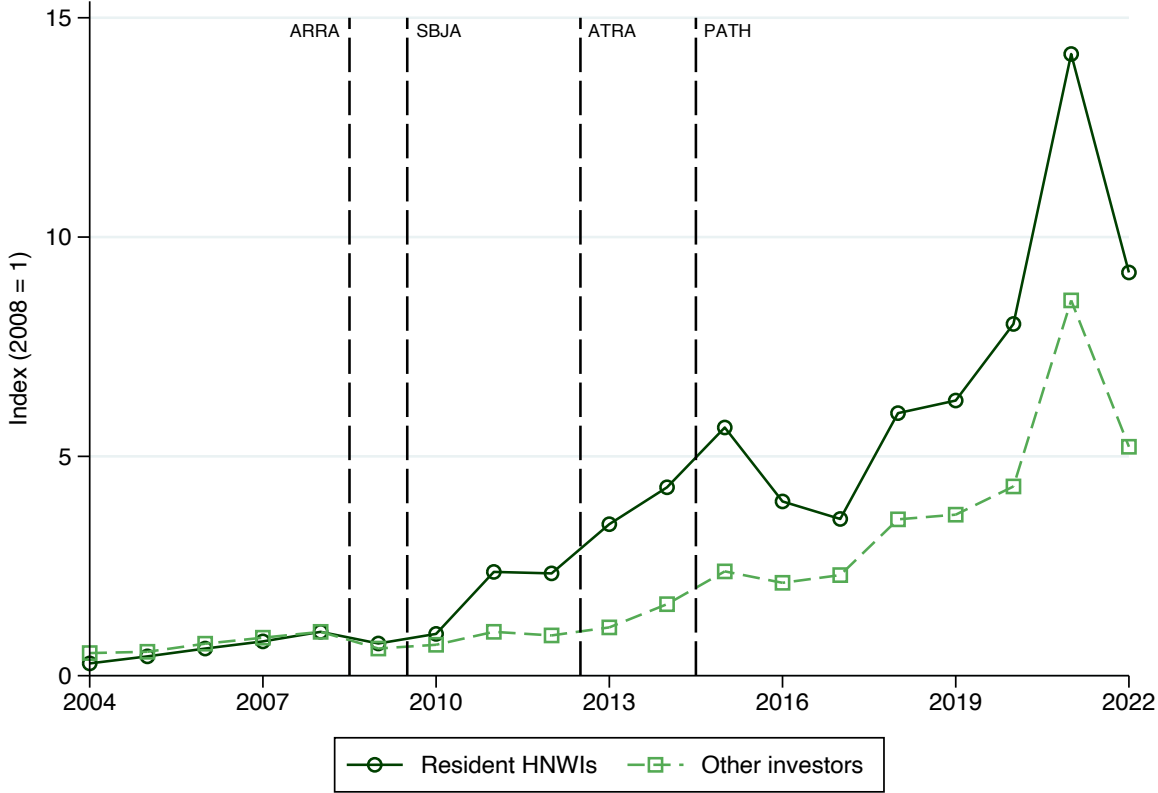


Source: Pitchbook.

# Effects on resident HNWIs' early-stage investments



**Figure A12:** In-state investments by resident HNWIs and other types of investors



Estimates of equation (2)

Source: Pitchbook.

# Effects on resident HNWIs' early-stage investments



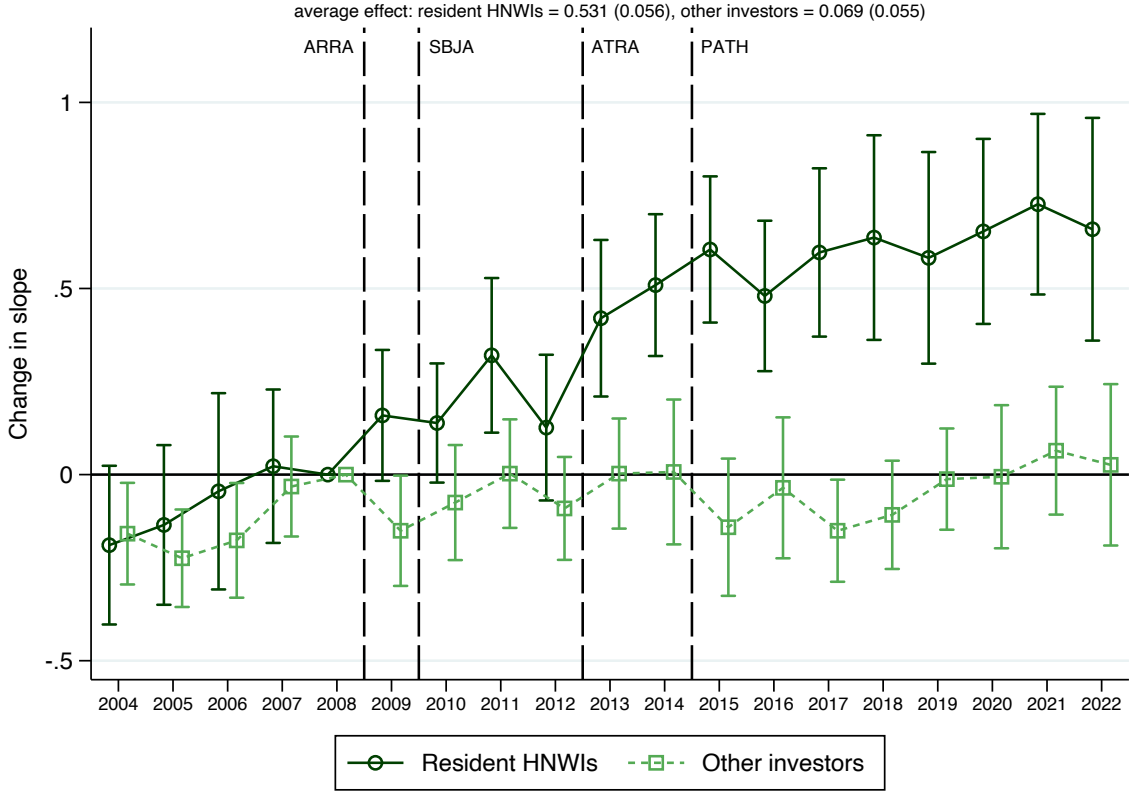
- Average effect is **0.462**
- With approximately **6.4 million HNWIs** residing in the U.S. in 2008, this average effect implies that the QSBS reforms explain  $(6.4 \times 10^6)^{0.462} = \$1,400$  million = \$1.4 billion of the increase in early-stage investments by HNWIs
- Overall increase between the average pre-reform year and the average post-reform year was **\$6.5 billion** (from \$0.8 billion per year for 2004-2008 to \$7.3 billion per year for 2009-2022)
- The QSBS reforms account for  $1.4/6.5 \approx$  **21.4% of the increase** in HNWIs' participation in early-stage markets

Estimates

# Effects on resident HNWIs' early-stage investments



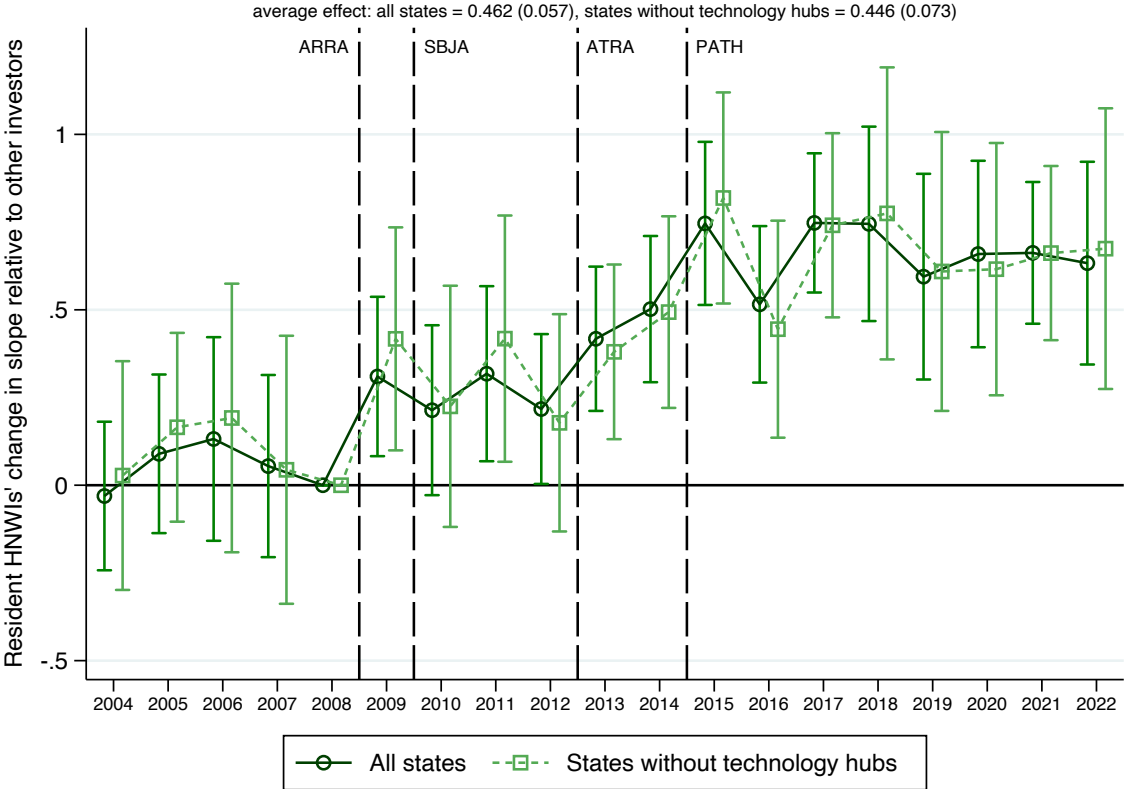
**Figure A13:** Difference-in-difference estimates for resident HNWIs and other types of investors



Estimates of equation (2)

Source: Pitchbook, GEOWEALTH-US.

**Figure A14:** Estimates of equation (1): sensitivity to excluding states without technology hubs



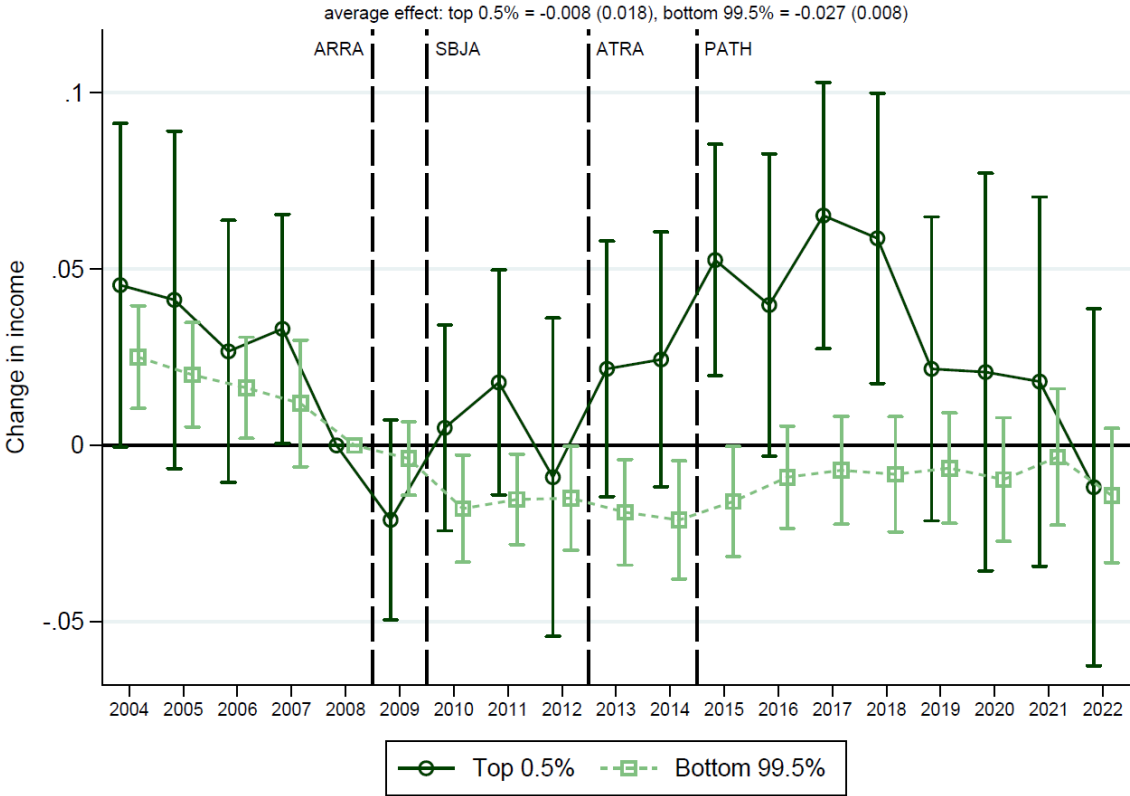
Baseline estimates

Source: Pitchbook, GEOWEALTH-US.

- Average effect is **0.019**
- Average income gap between the top 0.5% and bottom 99.5% increased by  $0.019/0.462 \approx 4.1\%$  for every 100% increase in resident HNWI's early-stage investments
- Since the QSBS reforms increased HNWI's early-stage investments by \$1.4 billion per year relative to the pre-reform average of \$0.8 billion for 2004-2008, they also **increased the average income gap** by  $1.4/0.8 \times 4.1\% \approx 7.2\%$

Estimates

**Figure A15:** Difference-in-difference estimates for top 0.5% and bottom 99.5%



Estimates of equation (3)

Source: SOI, GEOWEALTH-US.