Competition in the Financial Advisory Market: Robo versus Traditional Advisors

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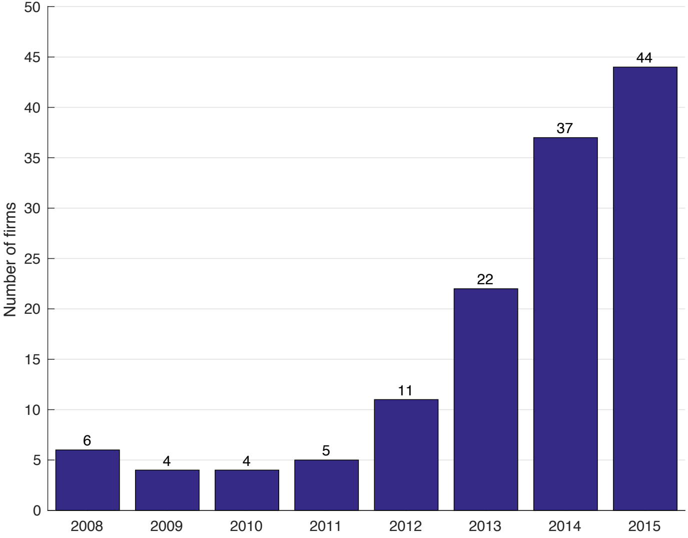
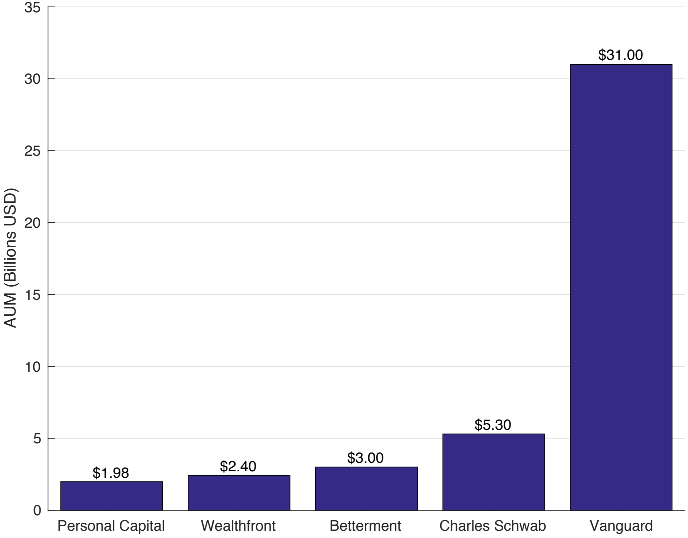
Robo Advisor Launches in the U.S.



Assets Under Management of Top U.S. Robo Advisors



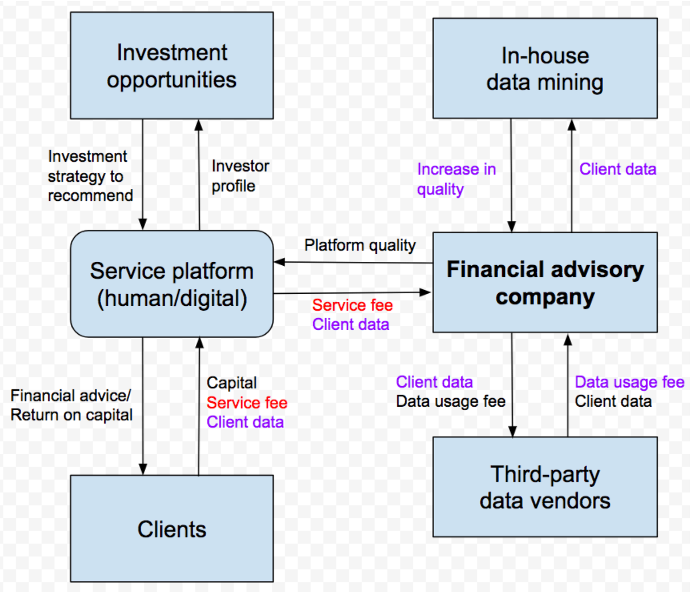
Point of Departure

- Unregulated, market features are likely to result in high levels of concentration and a small number of dominant firms
- The speed of convergence towards dominance is increased by the reinforcing interactions between firm size and profitability

Our paper

- Models entry, competition and exit in the financial advisory (FA) market in a dynamic games setting
- Provides framework for firm behavior in FA market suitable for evaluating regulatory policy

Structure of Financial Advisory Market



Static Game

- **Firms (financial advisors)** compete for clients in a differentiated product market

- **Clients** choose products based on their quality (ω) and price (p):

$$u(\omega, p, \theta) \quad = \quad \theta \cdot \omega - p$$

- Clients differ in their **taste**, $\theta \in [0, \Theta]$, which can be thought of as marginal rate of substitution between income and quality

- Client distribution is modeled as F_θ

Illustrative Example: Two Firms Play a Two-Stage Game

Stage 1

- Firms decide on quality ω to be produced ($\omega_2 > \omega_1 \geq \underline{\omega}$)
- Use $j(i)$ to denote product choice by firm i
- Firms incur fixed set-up cost $c_i = c_i(\omega_{j(i)})$

Stage 2

- Firms set prices $p_{j(i)}$
- Firms incur product-dependent production costs $c^p_{j(i)}$

- We look for the subgame perfect Nash equilibrium of the game

Demand Function and Profit Maximization

- Demands for different product types:

$$q_j(\mathbf{p},\omega) = \begin{cases} 1 - F_\theta\left(\dfrac{p_2 - p_1}{\omega_2 - \omega_1}\right), & j = 2, \\ F_\theta\left(\dfrac{p_2 - p_1}{\omega_2 - \omega_1}\right) - F_\theta\left(\dfrac{p_1}{\omega_1}\right), & j = 1 \end{cases}$$

- Firms choose prices to maximize their stage-two profits

$$\pi_i \quad = \quad p_{j(i)}\, q_{j(i)} - c^p_{j(i)}$$

- Firms choose quality to maximize their overall profits

$$\Pi_i \quad = \quad \pi_i - c_i$$

Solutions for Heterogeneous Fixed Costs

- Suppose $\theta \sim U([0, 10])$, $c_j^p = \omega_j \, q_j$, and firm-specific set-up costs

$$c_i \quad = \quad \alpha_i \, \omega_{j(i)}^2 / 2$$

- For $\alpha_1 > \alpha_2 = 1$, firm 1 will produce the low-quality good
- As α_1 increases, product quality ω decreases and a somewhat smaller fraction of clients $(1 - q_0)$ are being covered

α_1	ω_1	ω_2	p_1	p_2	q_0	q_1	q_2	Π_1	Π_2
1	0.39	2.05	1.14	9.90	0.29	0.24	0.47	0.10	1.60
5	0.10	2.03	0.30	10.81	0.32	0.23	0.46	0.02	1.95
10	0.05	2.03	0.16	10.98	0.32	0.23	0.45	0.01	2.00

Solutions for Heterogeneous Fixed Costs

- As α_1 increases, quality decreases and price increases for higher-quality product

α_1	ω_1	ω_2	p_1	p_2	q_0	q_1	q_2	Π_1	Π_2
1	0.39	2.05	1.14	9.90	0.29	0.24	0.47	0.10	1.60
5	0.10	2.03	0.30	10.81	0.32	0.23	0.46	0.02	1.95
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Duopolistic versus Monopolistic Outcome

α_1	ω_1	ω_2	p_1	p_2	q_0	q_1	q_2	Π_1	Π_2
				Duopolistic outcome					
1	0.39	2.05	1.14	9.90	0.29	0.24	0.47	0.10	1.60
5	0.10	2.03	0.30	10.81	0.32	0.23	0.46	0.02	1.95
10	0.05	2.03	0.16	10.98	0.32	0.23	0.45	0.01	2.00
				Monopolistic outcome					
–	–	2.03	–	11.14	0.55	–	0.45	–	2.05

- Clients with $\theta < p_1/\omega_1$ are not covered by the FA market
- Low-θ individuals tend to be low-income individuals
- If a social welfare function puts positive weight on these individuals, then lowering barriers to entry would be welfare-improving

Modeling Entry, Competition and Exit in the FA Market

- N firms enter at different times and have evolving market power
- Each firm supplies one good $j = j(i)$ with quality $\omega_{j(i)}$, price $p_{j(i)}$
- Each period has two sub-periods

  First sub-period:
  - Firms choose their quality $\omega_{j(i)}$
  - Firms pay set-up costs $c_i = c_i(\omega_{j(i)}, k_i)$ that are functions of product quality and client capital

  Second sub-period:
  - Firms compete on prices
  - Firms decide how much client capital to invest in
  - Firms incur production cost
- Clients choose product that maximizes their utility

Financial Advisors' Client Capital

- Client capital: Stock of information about potential clients
- Client data include hard and soft information about potential investors' financial circumstances, risk tolerance and utility
- FAs can either collect data from existing clients or purchase them from third-party vendors
- Firms can mine client data to produce a higher-quality product at the same cost, or the same quality product at a lower cost
- Evolution of client capital k_i over time:

$$k_{t+1,i} = \left(1 + \delta_1 \left(\omega_{t,j(i)}\right)\right) \left(1 - \delta_2\right) k_{t,i} + a_{t,i},$$

  where $a_{t,i}$ is the period-t investment in client capital
- High quality (through $\delta_1 \, \omega_{t,j(i)}$) offsets depreciation (through $-\delta_2$)

Equilibrium and Its Characterization

- The equilibrium concept we employ is **subgame-perfect equilibrium**, or SPE
- At any history, the "remaining game" is called a subgame and can be regarded as a game of its own
- Subgame-perfection strengthens Nash equilibrium
- It imposes the sequential rationality requirement that behavior be optimal in all circumstances (i.e., subgames), both those that arise in equilibrium (as required by Nash equilibrium) and those that arise out of equilibrium

Solving the Dynamic Game

- There are multiple equilibria. We will compute all equilibrium values
- The equilibrium value correspondence of the dynamic game does not admit a closed-form solution
- We will use the numerical procedures of Sleet and Yeltekin (2016) and Yelteking, Cai and Judd (2017) to compute equilibria

Why a Dynamic Model?

- Allows us to look at firm entry and exit
- Client capital is a strategic variable
  $\Longrightarrow$ Implications for regulation of information
- Supports cooperative outcomes that are not possible in static setting
  $\Longrightarrow$ Allows regulation to take a long-term view
- **Central idea**: Provide framework to identify policies that can rule out BAD equilibria (such as extreme preemptive behavior that forces competitors out of the market, price wars, tacit collusion) without ruling out good equilibria

Historical Time-Series Data on Firm Size

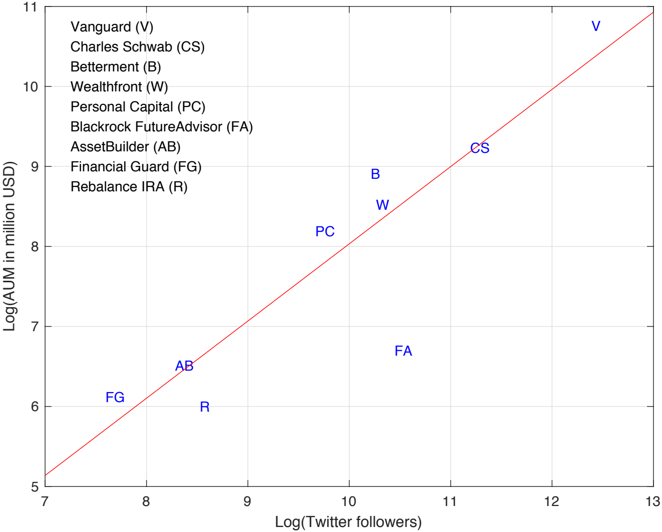

Figure: **AUM versus Twitter followers of top US Robo Advisors**