Disruption and Competition in the Financial Advisory Market

Antje Berndt (ANU) and Şevin Yeltekin (CMU)

SED 2019

Financial Advisory Services

- Over the last 10 years, emergence and proliferation of digital advisors (Robo Advisors)
- Focus in both literature and practice have been on
  - Price: Digital advisors have lower price of access, deliver investment services at lower cost.
    Over 40% of global adult population without access to financial services.
  - Regulation: How should robo advisors be regulated?
  - Performance on both results and algorithm
- IO lens: Economic and social impact of robo advisors will depend on market competition and concentration.

This paper

- Document data on recent and current state of the Robo Advisory and investment services market
- Provide a tractable model of competition suitable for the advisory market
- Identify the main trade-offs and possible strategic outcomes in the Robo Advisory market
- Re-evaluate current market state through lens of IO model. Shed light on source and form of disruption

Our data

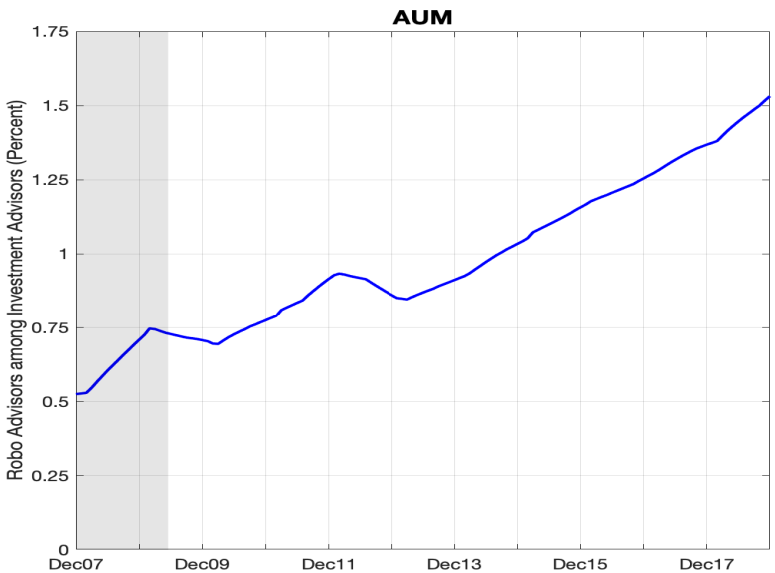
- We obtain data on assets under management (AUM) and number of client accounts for all registered investment advisors
  - Source: SEC Form ADV Part 1 Item 5
  - Number of advisors with ADF filings: 28,101 (as of June 2019)
- We identify Robo Advisors as investment advisors with digital platforms
  - Source: roboadvisorspro.com, Investopia, Business Insider, supermoney.com, backendbenchmarking.com
  - Number of advisors: 39 (as of June 2019)
- We identify Innovators as investment advisors with digital platforms **by 2010**
  - Source: manual Google search
  - Number of advisors: 8

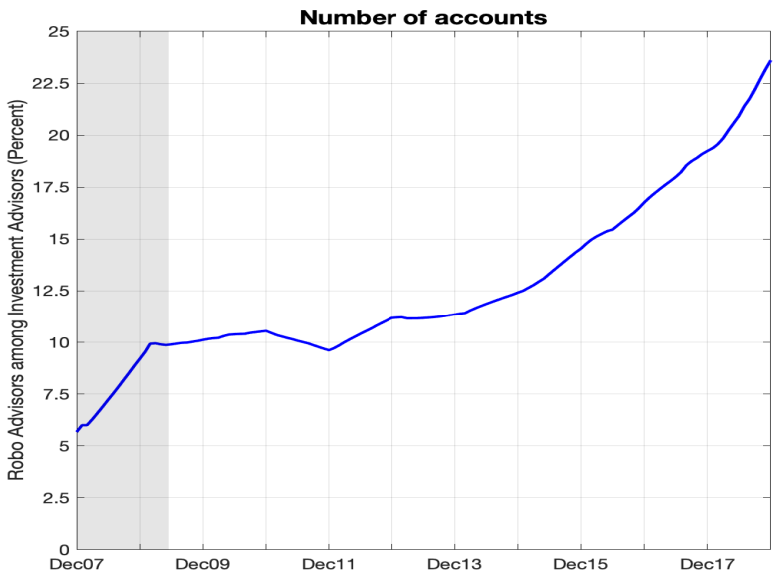
Robo advisors and innovators

	2010			2018		
	Firms	AUM (b)	Accts (m)	Firms	AUM (b)	Accts (m)
Investment Advs	11,208	3,812	1,662	12,869	8,426	4,047
Robo Advisors	15	31	179	34	133	1,038
Innovators	6	3	43	5	23	216

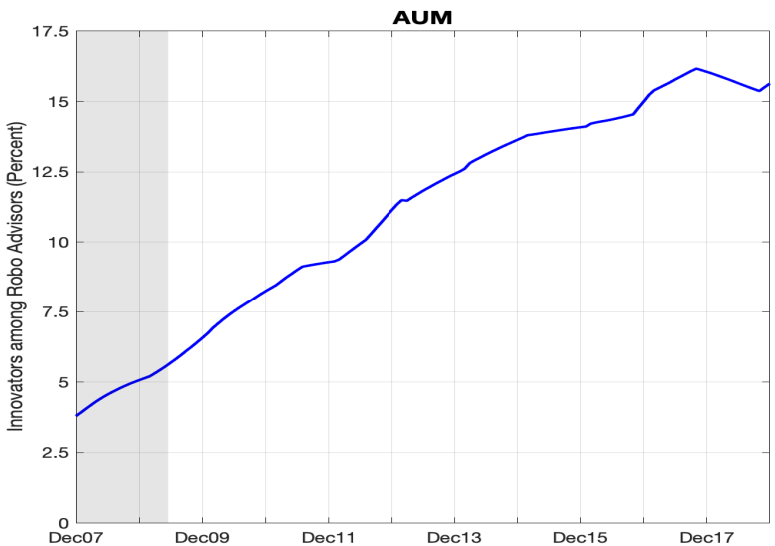
- Innovators include Asset Builder, Betterment, FinancialEngines, Financial Guard (no data), Hedgable (faulted in 2018), LearnVest (no data, faulted in 2018), MarketRiders and Wealthfront

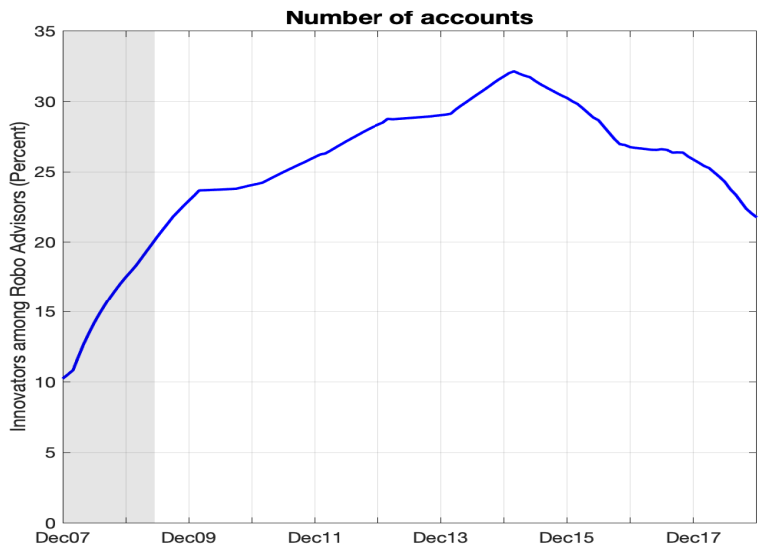
Robo advisors' share of investment advisor market





Innovators' share of robo advisor market





Model ingredients

- Model of vertical product differentiation and entry.
- 3-stage game
  - Sequential entry and quality choice in Stages 1 and 2
  - Price competition in Stage 3
- Differentiation in "quality" : amount of human touch involved
- Disruption: Cost of quality profile of innovators vs. incumbents.
- Framework extension of Lutz (1997), Stoneman et al (2018) and Boccard and Wauthy (2009)

Competition model

- **Firms (financial advisors)** compete for clients in a differentiated product market
- **Clients** choose products based on their quality (w) and price (p):

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

- Clients differ in their **taste**, $\theta \in [0, \overline{\theta}]$, which can be thought of as marginal rate of substitution between income and quality
- Client distribution is uniform on the interval $[0, \overline{\theta}]$

Two firms play a three-stage game

- 1 incumbent (Firm 1), 1 entrant (Firm 2)

Stage 1

  - Firm 1 decides on quality w_1 and incurs quality cost: $c_1^s(w_1) = \alpha_1 w^{\beta_1}$

Stage 2

  - Firm 2 decides to enter or not, and if enter, pays entry cost c^e
  - Firm 2 chooses w_2 with quality cost $c_2^s(w_2) = \alpha_2 w^{\beta_2}$

Stage 3

  - Firms set prices $\{p_i\}$
  - Firms incur product-dependent unit production costs $\delta_i + \kappa_i w$
    Total production cost is:

$$c_i^p(i; \mathbf{w}, \mathbf{p}) \quad = \quad (\delta_i + \kappa_i w_i)\, q_i(\mathbf{w}, \mathbf{p})$$

Equilibrium

- Equilibrium Concept: Subgame Perfect Equilibrium
- Solve problem backwards starting from Stage 3
  - **Stage 3**: Bertrand competition in prices with qualities, market participants determined
  - **Stage 2**: Entrant's decision conditional on Stage 3 price competition
  - **Stage 1**: Incumbent's decision conditional on Entrant's quality best response and price competition

Stage 3: Client demand and utility

- Client demand for firm i's product, q_i, is a function of the offered quality-price pairs $(\mathbf{w}, \mathbf{p})$
- Demand function $\mathbf{q} = (q_1(\mathbf{w}, \mathbf{p}), q_2(\mathbf{w}, \mathbf{p}))$ is built using

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

▸ Demand Details

Profit maximization

- **Stage 3**: Firms simultaneously choose p_i to maximize their stage-three profits given **w**

$$\begin{aligned} \pi_i &= p_i\, q_i - c_i^p \\ &= (p_i - \delta_i - \kappa_i\, w_i) q_i \end{aligned}$$

- **Stage 2**: Entrant makes entry & quality choice w_2 to maximize

$$\Pi_2 = \begin{cases} \pi_2 - c_2^s - c^e = (p_2 - \delta_2 - \kappa_2\, w_2) q_2 - \alpha_2\, w_2^{\beta_2} - c^e & \text{entry} \\ 0 & \text{no entry} \end{cases}$$

given quality choice by incumbent w_1 and takes into account price competition in Stage 3

- **Stage 1**: Incumbent makes quality choice w_1 taking into account best response by entrant and price competition.

Benchmark results I

Vertically differentiated products with price competition and entry

- No quality dependent cost with simultaneous entry [Shaked-Sutton (1982, 1983)]

  $\rightarrow$ Product differentiation relaxes price competition

  $\rightarrow$ Polarization in quality: one firm at max, the other at min quality

- No quality dependent cost and sequential entry with entry cost [Hung-Schmitt (1988), (1992)]

  $\rightarrow$ Incumbent deters entry when possible

  $\rightarrow$ In entry is not deterred, incumbent always produces high quality

Benchmark results II

Vertically differentiated products with price competition and entry

- Quality-dependent cost as one major determinant of market behavior [Lutz (1997)]

  $\rightarrow$ Identical costs, entry is deterred by incumbent moving to lower quality equal or than monopoly.

  $\rightarrow$ Entrant has higher costs, incumbent can allow entry and choose high quality.

  $\rightarrow$ Entrant has lower costs, incumbent can allow entry and choose low quality.

Robo advisory market $\rightarrow$ Entry AND Incumbent moves to lower quality.

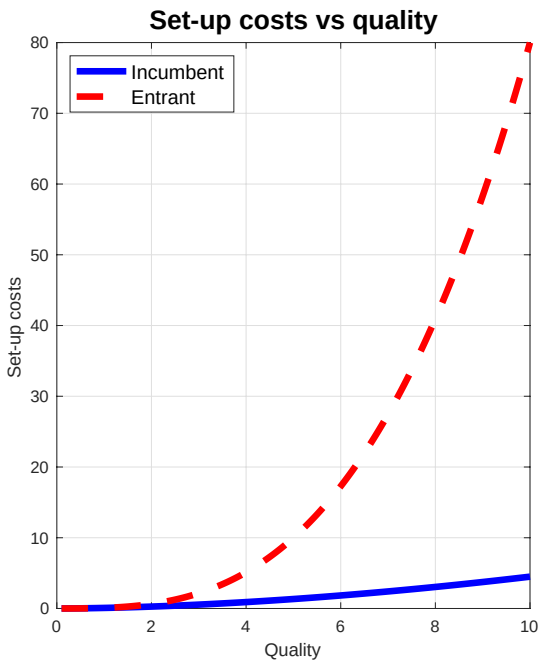
Quality costs

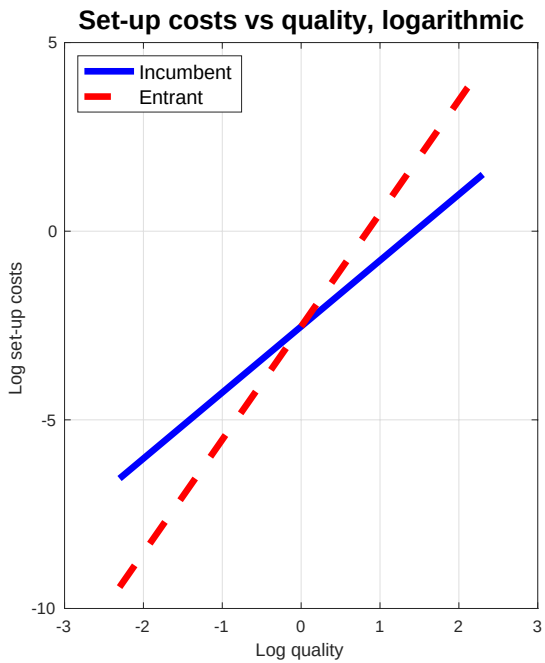
- Log-linear firm-specific setup costs $c^s = c^s(w)$ to produce quality w:

$$c_i^s(w) \quad = \quad \alpha_i \, w^{\beta_i}$$

- Consider incumbent investment advisor (I) and new entrant (E) with $\alpha_I \geq \alpha_E > 0$ and $1 \leq \beta_I < \beta_E$

- Cost specification captures the notion that it is much more costly for entrant to offer human touch, but less costly to offer digital platform





	Entry	Qlty	Profit	Qnty	Price	Mkt share	Unsrvd
Lutz			$(\alpha_I, \beta_I) = (\alpha_E, \beta_E) = (0.08, 1.75)$				
Incumbent	1	2.17	0.23	0.50	1.09	0.50	
Entrant	0	0	0	0	0	0	0.50
		$(\alpha_I, \beta_I) = (0.08, 1.75)$ and $(\alpha_E, \beta_E) = (0.04, 1.75)$					
Incumbent	1	3.21	0.09	0.52	1.36	0.52	
Entrant	1	0.61	0.01	0.26	0.13	0.05	0.43
		$(\alpha_I, \beta_I) = (0.08, 1.75)$, $(\alpha_E, \beta_E) = (0.03, 1.75)$					
Incumbent	1	0.31	0.00	0.25	0.07	0.49	
Entrant	1	7.07	0.71	0.51	3.42	0.24	0.27
BY		$(\alpha_I, \beta_I) = (0.08, 1.75)$ and $(\alpha_E, \beta_E) = (0.08, 3)$					
Incumbent	1	2.09	0.16	0.53	0.88	0.53	
Entrant	1	0.43	0.01	0.26	0.09	0.05	0.42

Conclusion

- Robo advisors emerged about a decade ago
- Early entrants have been able to attract clients, but their progress towards gathering a sizable share of the advisory market has stalled
- This is largely due to legacy advisors starting to offer their own digital platforms given that the disruption is easily replicable
- We propose a 3-stage static model where the incumbent can move into the lower quality area and arrest the advance of innovators
- Presence of innovators does discipline the incumbent and hence serves the consumer better
- In future work, we will calibrate the cost parameters β_I and β_E to market data
- Dynamic model of investment in quality production, to reduce costs and change competition

Demand functions

- Set $\rho_i = p_i/w_i$ and $\rho = (p_2 - p_1)/(w_2 - w_1)$. Then

$$q_2 = \begin{cases} 0, & \text{if } w_2 = 0 \\ & \text{or } 0 < w_1 = w_2 \ \& \ p_1 < p_2 \\ \min\left\{\max\left(1 - \frac{\rho_2}{\overline{\theta}}, 0\right), 1\right\}, & \text{if } \ w_1 = 0 \ \& \ w_2 > 0 \\ & \text{or } 0 < w_1 = w_2 \ \& \ p_1 > p_2 \\ \min\left\{\max\left[1 - \max\left(\frac{\rho}{\overline{\theta}}, \frac{\rho_2}{\overline{\theta}}\right), 0\right], 1\right\}, & \text{if } \ 0 < w_1 < w_2 \\ q_1 = \frac{1}{2}\min\left\{\max\left(1 - \frac{\rho_1}{\overline{\theta}}, 0\right), 1\right\} & \text{if } \ 0 < w_1 = w_2 \ \& \ p_1 = p_2. \end{cases}$$

- Symmetric case of $w_1 \geq w_2$ yields similar formulas.