Certification, Reputation and Entry: An Empirical Analysis

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Asymmetric Information in Markets

- Sellers often have better info about product quality than buyers.
  - eBay sellers: product condition
  - Airbnb hosts: noise level of the neighborhood
  - Upwork freelancers: knowledge and experience
  - procurement contractors: quality of their work
- This may result in inefficiently low-quality sellers in markets (Akerlof, 1970).

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- This may result in inefficiently low-quality sellers in markets (Akerlof, 1970).
- A common solution in markets: Reputation Mechanisms
  - e.g., eBay's Feedback System, followed by most marketplaces
  - Better Business Bureau records
  - Yelp reviews
- How else can asymmetric information be mitigated?

Badges and Certification

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  - e.g., licensing for service providers (also barrier...)
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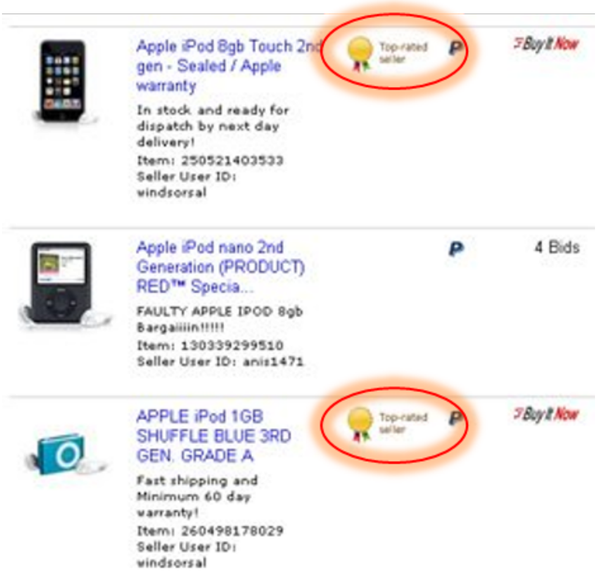
  - Marketplace can use data/process to certify quality
- Badges identify sellers who meet minimum quality thresholds

eTRS   Airbnb Superhost   Upwork Top Rated

- Buyers can identify who “passes the bar”

Badges in Search Results: eBay



This Paper

- Badges pro: mitigates asymmetric information
- Badges con: can be a barrier for entry
- **What will be the effects of a higher certification Bar?**
  - **Incentives of new sellers to enter the market?**
  - **Quality distribution of sellers in the market?**
- We study a policy change on eBay to answer these questions

Related Literature

- Elfenbein, Fisman and McManus (2015)
  - Study value of a certification badge across different markets among different types of sellers
  - Certification provides more value when the number of certified sellers is low and when markets are more competitive
  - We focus on change in standard and market outcomes
- Klein, Lambert & Stahl (2016); Hui, Saeedi & Sundaresan (2017)
  - Exploited a different policy change on eBay: One sided feedback
  - Klein et al.: clever DiD with scraped data - looks like moral hazard
  - Hui et al.: use internal data to show about 70% adverse selection
  - Our results more consistent with AS than MH

Guiding Framework

Stylized Model

- Competitive market for goods (eBay...)
- Firms differ in two dimensions
  - Quality $z \in \{z_1, z_2, z_3\}, z_1 < z_2 < z_3$, with mass m_1, m_2, m_3
  - Entry costs f, independently distributed $\sim G(f)$

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- Market has observable certification badge
  - Signals if the quality is weakly above a threshold z^*
- Baseline demand function (lowest quality): $P(Q)$.
- Demand for a good with expected quality $\bar{z}$: $P(Q) + \bar{z}$.

Stylized Model

- Policy Change: $z^* = z_2 \quad \Rightarrow \quad z^* = z_3$

$$z_1 \qquad \boxed{z_2 \qquad z_3} \qquad \Rightarrow \qquad z_1 \qquad z_2 \qquad \boxed{z_3}$$

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- Effect on entry depends on changes in prices
- For z_2 types:
  - Lower price
    - Unable to get badged any more
  - $\Rightarrow$ Less entry
- For z_3 and z_1 types:
  - Price for at least one of z_3 and z_1 increases, possibly both
    - z_3 type: Able to get more informative badge
    - z_1 type: Pooled with better sellers
  - $\Rightarrow$ More entry of z_3 (z_1) if the price for z_3 (z_1) increases

Data

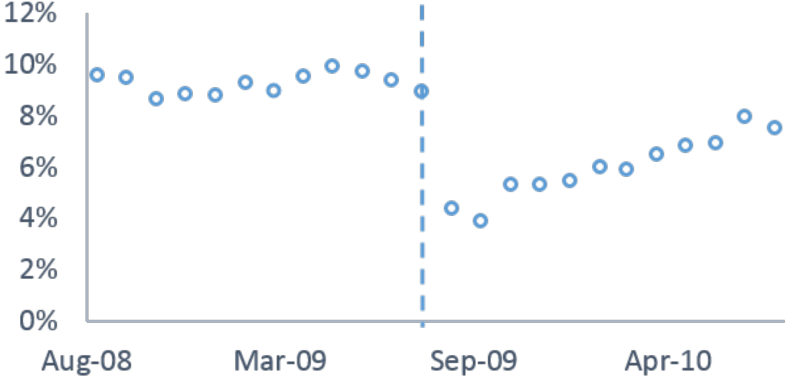
Data

- Proprietary data from eBay
- Information on product attributes, listing features, buyer history, and seller feedback and reputation.
- eBay product catalog:
  - 400+ sub-categories that are exhaustive, e.g., Fiction & Literature, and Fresh Cut Flowers.
  - Product IDs for homogeneous goods, e.g., iPhone 6, Black, 32GB, Unlocked.
- Data on sellers' first listing date

Policy Change

- eBay switched from Powerseller to the eTRS badge in Sept 2009
- Certification requirements more stringent
  - eTRS = Powerseller + other more stringent requirements
  - Powerseller badge became obsolete

Change in Share of Badged Sellers



Empirical Strategy

Empirical Strategy

- We use a two-stage approach
- First stage:

  Estimate impact on share of badged sellers in each category c:

$$Share\_Badged_{ct} = \beta_c Policy + \eta_c + \alpha_c t + \epsilon_{ct},$$

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- Identification:
  - Policy change was "one size fits all"
  - Different markets will be affected differentially
  - Assume differential impact is exogenous (Run placebo test)

Empirical Strategy

- Second stage:

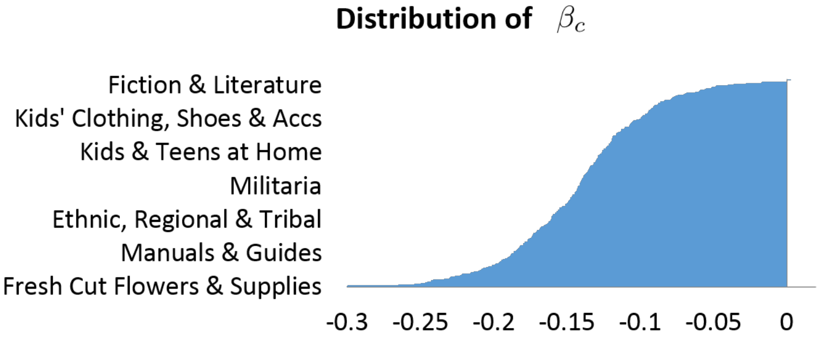
  Difference-in-difference approach (%-interaction for treatment)

  Robustness

$$Y_{ct} = \gamma \widehat{\beta_c} Policy + \mu_c + \xi_t + \epsilon_{ct},$$

- Y_{ct}: Various variables of interest:
  - Number of entrants
  - Quality and performance of entrants
  - Quality of incumbents

First Stage Estimates



- Lots of variation across markets (subcategories)
- Second stage uses this variation to identify differential impact

Results: Entrants

Effect on Number of Entrants

$$Y_{ct} = \gamma \widehat{\beta_c} Policy + \mu_c + \xi_t + \epsilon_{ct},$$

- Entrant ratio = # entrants at t / # sellers at $t-1$
- $\gamma < 0$: more entrants in more affected categories. ($\widehat{\beta_c} < 0$)
- Over time entry seems to converge to new equilibrium

Dependent Variable: Entrant Ratio			
	(1)	(2)	(3)
	+/- 3 Months	+/- 6 Months	Month 7 to 12
γ	-0.299***	-0.204***	-0.047
	(0.041)	(0.027)	(0.051)
R^2	0.913	0.889	0.691

Effect on Quality of Entrants

- EPP = No. of positive feedback / No. of transactions
  - Effective Positive Percentage
  - Nosko, Tadels (2015)

Dependent Variable: EPP Conditional on Survival in the Second Year			
	6-Month Window	12-Month Window	Month 7 to 12
γ	-0.102***	-0.066***	-0.062**
	(0.034)	(0.023)	(0.026)
R^2	0.758	0.717	0.690

- On average higher quality entrants enter in more affected categories

Distribution of Entrants' Quality

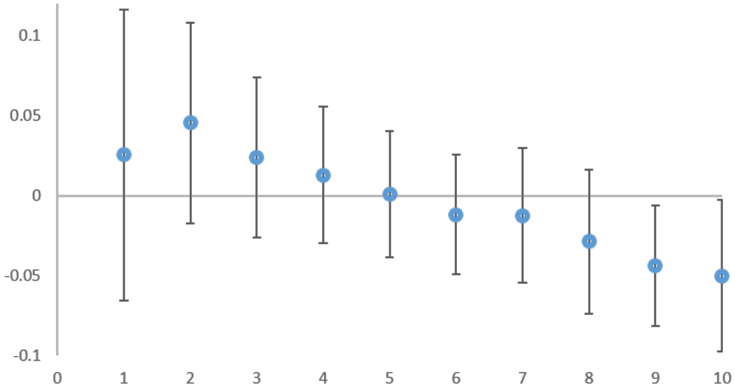
- Last exercise shows
  - More affected categories: higher average quality of entrants

Distribution of Entrants' Quality

- Last exercise shows
  - More affected categories: higher average quality of entrants
- What is the effect on the distribution of entrants?
- Divide entrants in each subcategory into deciles based on EPP in the first year after entry
- For each decile, perform the DiD.

$$Y_{ct}^{decile} = \gamma \widehat{\beta_c} Policy + \mu_c + \xi_t + \epsilon_{ct},$$

Distribution of Entrants' Quality, Fatter Tails



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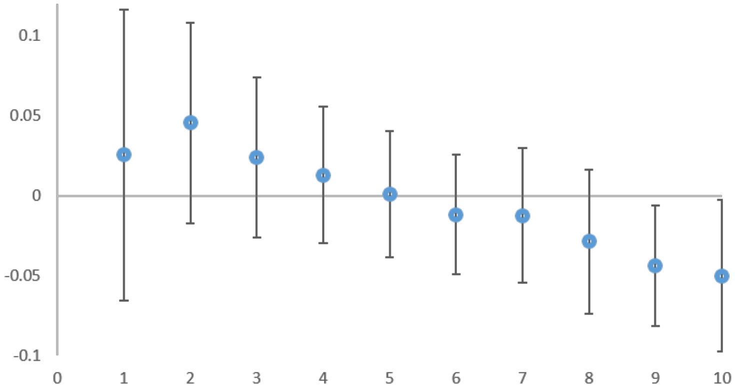

- Decile 10: highest quality entrants
  - Negative coefficient: Higher EPP in more affected markets

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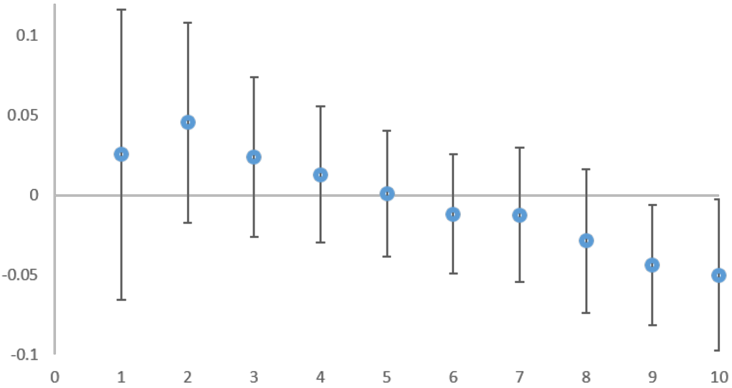
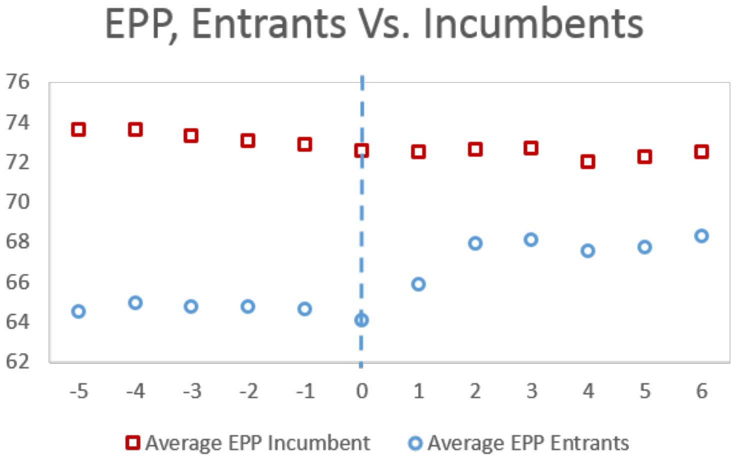


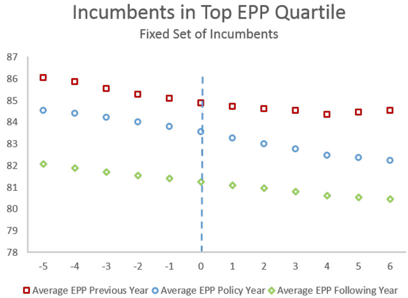
- Decile 10: highest quality entrants
  - Negative coefficient: Higher EPP in more affected markets
- Decile 1: lowest quality entrants
  - Positive coefficient: Lower EPP in more affected markets

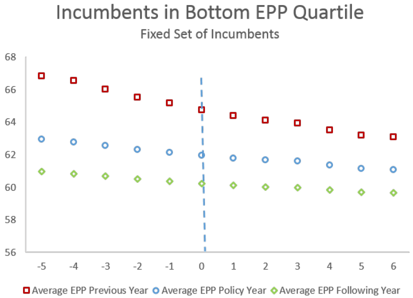
Results: Incumbents

Response of Incumbents?



Incumbents by Quality Quartile





Effect on Price and Market Share by Group

- For each group BB, BN, NB, and NN
  - Relative Price:= listing price/product value
    - Product value = average price of the product in posted price format
  - Sales probability
  - Sales quantity
  - Market Share
- Changes in magnitude: NB(+) > BB(+) > NN(+) > BN(-)

Effect on Price and Market Share by Group

Table 3: Change in Badge Premium

	(1) Relative Price	(2) Sales Probability	(3) Sales Quantity	(4) Market Share
Policy	-0.003	0.015***	0.009	-1.5E-07(-2%)
	(0.003)	(0.001)	(0.006)	(1.4E-06)
BB*Policy	-0.003	0.024***	0.032***	6.2E-06***(15%)
	(0.003)	(0.001)	(0.005)	(2.2E-06)
BN*Policy	-0.007***	-0.001***	-0.010***	-3.3E-06*(-6%)
	(0.002)	(4.E-04)	(0.004)	(1.8E-06)
NB*Policy	0.001	0.097***	0.221***	1.8E-06(13%)
	(0.012)	(0.003)	(0.026)	(4.1E-06)
Seller FE	✓	✓	✓	✓
Week FE	✓	✓	✓	✓
R^2	0.288	0.808	0.862	0.813

Robustness Analyses

Subcategory Heterogeneity

- Concern: Results driven by serially-correlated subcategory heterogeneity that simultaneously correlates with $\widehat{\beta_c}$ and Y_{ct}.
- Assuming this confounding correlation persists over time, we should see that $\widehat{\beta_c}$ can explain variations in entry in the past.
- Placebo test:
  - Use $\widehat{\beta_c}$ estimated from the policy year
  - DiD re-estimated using data around September in the previous year.
  - No statistically significant coefficient for entrant ratio, quality, or their size.
  - Not a proof but reassuring Go back

Two Types of Market Entrants

- New sellers Vs. existing sellers entering new subcategories
- Consistent with differential entry costs

Table 5: Two Types of Entry

	New Sellers		Existing Sellers	
Panel A. Entrant Ratio				
	(1)	(2)	(3)	(4)
	+/- 3 Months	+/- 6 Months	+/- 3 Months	+/- 6 Months
Estimate	-0.057***	-0.041***	-0.295***	-0.215***
	(0.012)	(0.007)	(0.042)	(0.028)
R^2	0.887	0.898	0.890	0.912
Panel B. EPP				
	(1)	(2)	(3)	(4)
	+/- 3 Months	+/- 6 Months	+/- 3 Months	+/- 6 Months
Estimate	-0.559***	-0.123*	-0.144***	-0.093***
	(0.123)	(0.074)	(0.037)	(0.024)
R^2	0.309	0.418	0.706	0.733

Econometric Specification

- Check robustness of the first stage β_c
  - Use number of badged sellers instead of share
  - Use immediate drop in share of badged sellers in the week before and the week after the policy change
  - Use different time windows for estimation.
- Check robustness of the second stage β_c
  - Use number of entrants instead of entrant ratio
  - Use percentiles of $\widehat{\beta_c}$ across subcategories for DiD analyses
  - Different quality measures and time windows for defining EPP

Other Robustness Analyses

- Price and market share regressions with different types of listings
- Exit behavior of incumbents
  - The distribution of the quality of exits have thinner tails
  - Sellers in the BN group shrink in their market share

Conclusion

- How does more demanding certification affect entry?
- In more affected markets,
  - More entrants
  - Higher quality with fatter tails
  - Quality change from improved selection
- Managerial implications for digital platforms
  - Certification policies can affect rate and quality of entry
    - Innovation, e.g., Kickstarter Project We Love
  - Ceritification policies seem more effective in affecting selection.

Thank You!