

# The Dynamics of Seller Reputation Theory and Evidence from eBay

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# Outline

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- Introduction
- Empirical evidence from eBay
- Can theory explain the data?
- Conclusion

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# Economics, reputation and eBay

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- The economics of reputation: theory and empirics
  - Bootstrap and bayesian models
  - Some evidence that buyers care about seller reputation
  - Little empirical evidence on seller behavior
- eBay as a research lab →
- Studying eBay's reputation mechanism
- Evidence from eBay

# Economics, reputation and eBay

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- The economics of reputation: theory and empirics
- eBay as a research lab →
  - Quasi-anonymous trading. User's record of  $P$ s and  $N$ s.
  - Fairly controlled environment for testing theory.
  - Tons of data easy to access (or create).
- Studying eBay's reputation mechanism
- Evidence from eBay

# Economics, reputation and eBay

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- The economics of reputation: theory and empirics
- eBay as a research lab →
- Studying eBay's reputation mechanism

Approach	Advantages	Disadvantages
Field experiments	easy to control	high cost per observation
Cross section	easy to get data	unobserved heterogeneity
Panel data	seller fixed effects	difficulty to find data

- Evidence from eBay

# Economics, reputation and eBay

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- The economics of reputation: theory and empirics
- eBay as a research lab →
- Studying eBay's reputation mechanism
- Evidence from eBay
  - Mostly cross section
  - Reputations measures influence willingness to pay
  - Little evidence on seller behavior

# Summary of this paper

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- Panel data set of eBay sellers (feedback histories)
  - Use feedback sign as proxy of buyer satisfactions.
  - Use feedback rate as proxy of sales rate.
  - Use absence of feedback as proxy for exit.
- Stylized facts
- From facts to theory

# Summary of this paper

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- Panel data set of eBay sellers (feedback histories)
- Stylized facts
  - Upon first negative, sales growth drops; subsequent negatives arrive faster (not due to buyer behavior).
  - Exit rate declining with age; exit preceded by series of negatives.
  - Most sellers start off as buyers; especially those with better record.
- From facts to theory

# Summary of this paper

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- Panel data set of eBay sellers (feedback histories)
- Stylized facts
- From facts to theory
  - Bootstrap, pure adverse selection, pooling, other theories: all consistent with facts to some extent.
  - Our take: bootstrap hard to believe; some evidence that moral hazard plays a role.

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# Data

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- Downloaded with Perl-based “spidering” program; from October 2002 to March 2003.
- Homogeneous goods with varying sale values: collectible coins, IBM notebook, beanie baby. →
- Summary statistics:
  - $\approx$  130 unique sellers per market.
  - Number of feedbacks  $\approx$  lognormal, av. 1632.
  - Average percentage of Negatives: 0.9%
  - Average sale price from \$11 (BB) to \$579 (Thinkpad).

# Summary statistics

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	Golden Eagle	Mint Set	Think-pad	Beanie Baby
Sale Price	50.8 (10.7)	77.8 (21.6)	578.6 (413.6)	11.1 (4.3)
Percent. items sold	.90 (.30)	.84 (.37)	.85 (.35)	.52 (.49)
Minimum bid set by seller	20.0 (23.1)	38.3 (38.2)	104.7 (260.7)	9.8 (5.0)
Number of Bidders	6.8 (4.6)	7.5 (6.9)	21.5 (16.5)	1.7 (2.9)
Seller's eBay Rating	1596 (1639)	1475 (2250)	12442 (11628)	2634 (4371)
Auction Length (days)	5.9 (2.2)	5.5 (2.7)	4.6 (1.8)	5.3 (2.3)
Number observations	216	298	264	555
Number unique sellers	72	157	62	238
Market HHI	342	112	2756	195

# Distribution feedback aggregates

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	Number of Positives	Number of Negatives	Number of Neutrals	$N/(N + P)$ (entire history)
Mean	1,625	4.9	7.2	0.009
Std. Dev.	3,840	25.1	33.5	0.038
Min.	0	0	0	0
Max.	52,298	651	654	1
1%	0	0	0	0
5%	5	0	0	0
10%	18	0	0	0
25%	99	0	0	0
50%	397	1	1	0.0028
75%	1,458	3	4	0.0092
90%	4,361	9	13	0.021
95%	7,134	19	29	0.034
99%	15,005	52	86	0.068
N	819	819	819	795

# Negatives and sales growth (%)

Avg. Week. Growth R.		Object			
		Thinkpad	Proof set	G. Eagle	B. Baby
First Negat.	Before	7.12	6.85	9.04	14.19
	After	-6.76	-7.51	-3.89	-4.28
	Difference	-13.88 ***	-14.36 ***	-12.92 ***	-18.47 ***
	Std. Error	4.88	3.45	3.58	3.69
	N	66	130	95	136
Second Negat.	Before	3.96	4.50	-0.22	7.68
	After	9.93	8.00	9.47	8.03
	Difference	+5.97	+3.50	+9.69 **	+0.36
	Std. Error	5.00	5.96	4.82	6.12
	N	37	78	70	83
Third Negat.	Before	9.19	3.80	3.58	2.00
	After	5.28	2.48	-2.09	10.25
	Difference	-3.90	-1.32	-5.68	+8.24
	Std. Error	6.14	3.22	7.44	6.23
	N	28	57	52	64

# Frequency of negative feedback

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T1: Sale-related feedbacks to first negative.

T2: Sale-related feedbacks between 1st and 2nd negative.

ET: Average number of sale-related feedbacks between negatives.

	All Cat.	Thinkpad	Eagle	Mint	Teddy
T1	240.88	93.24	339.66	267.71	226.99
T2	188.76	58.59	199.24	261.26	199.86
ET	162.39	50.8	216.1	189.61	163.5
T1 – T2	52.12	34.66	140.41	6.45	27.13
T1 > T2 : p-val	0.021	0.036	0.017	0.452	0.27
T1 – ET	78.48	42.44	123.56	78.09	63.49
T1 > ET: p-val	0.0002	0.0083	0.02	0.025	0.044
T2 – ET	26.36	7.79	-16.86	71.64	36.36
T2 > ET: p-val	0.032	0.176	0.73	0.027	0.089
N	311	58	79	78	96

# Correcting for selection bias

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	All Cat.	Thinkpad	Eagle	Mint	Teddy
Sample: sellers with 2+ negatives born after Oct 24, 2002					
	All sellers	Thinkpad	Eagle	Mint	Teddy
T1	196	26.5	175	238	174
T2	80	23.2	37	501	64
T1>T2: p-val	0.03	0.36	0.03	0.22	0.03
N	20	6	5	4	5
Sample: sellers with 1+ negatives born after Oct 24, 2002					
	All sellers	Thinkpad	Eagle	Mint	Teddy
T1	257	26.5	206	403	346
T2*	174	23.2	107	253	277
T1>T2: p-val	0.035	0.36	0.03	0.2	0.04
N	28	6	7	7	8

\* T2=T1 for sellers with only 1 negative.

# Does buyer behavior explain it?

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- Fear of seller feedback retaliation.  
*Seller equally likely to retaliate.*
- Nasty buyers throw the first stone.  
*Comment giver profile similar.*
- Dissatisfaction threshold higher for first negative.  
*Textual comments similar.*
- Conformism, herding.  
*Reasons for negative similar.*

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# Reasons negative feedback (%)

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	1st N	2nd N
Misrepresented item	22	16
Bad communication	19	20
Item damaged	15	17
Item not received	10	13
Other	34	31
Total	100	100

# Exit by January 4, 2004

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	Subsample			
	All exit events	Still-sellers excluded	Invalid ID excluded	Both excluded
Log. number negat. May 03	0.066 (0.049)	0.085 (0.046) *	0.071 (0.045)	0.090 (0.039) **
Log. number posit. May 03	-0.170 (0.024) ***	-0.136 (0.022) ***	-0.181 (0.021) ***	-0.143 (0.018) ***
Observations	818	818	818	818
	Subsample			
	Laptop sellers	Golden sellers	Silver sellers	Beanie sellers
Log. number negat. May 03	0.026 (0.105)	0.131 (0.092)	0.037 (0.150)	0.157 (0.095) *
Log. number posit. May 03	-0.164 (0.049) ***	-0.151 (0.044) ***	-0.304 (0.093) ***	-0.200 (0.045) ***
Observations	199	255	115	249

# Opportunistic exit by Jan 4, 2004

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	All sellers	Laptop sellers	Golden sellers	Silver sellers	Beanie sellers
Log. number negat. May 03	0.050 (0.019) ***	0.048 (0.026) *	0.072 (0.025) ***	-0.076 (0.076)	-0.008 (0.045)
Log. number posit. May 03	-0.017 (0.010) *	-0.026 (0.013) **	-0.024 (0.011) **	0.030 (0.045)	0.018 (0.022)
Observations	818	199	255	115	250

# Seller switched from buy to sell

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	(1)	(2)	(3)
No. of comm./1000 (by May 2003)	-0.006 (0.034)	-0.008 (0.006)	-0.004 (0.005)
Percent. negatives (by May 2003)	-6.372 (3.068) **	-6.093 (2.967) **	-5.987 (2.138) ***
Gold coins	0.019 (0.099)	0.022 (0.106)	0.050 (0.073)
Silver proof sets	0.066 (0.098)	-0.011 (0.103)	0.047 (0.070)
Beanie Babies	0.088 (0.096)	0.105 (0.105)	0.127 (0.071) *
Observations	234	384	618

# Econ. signif. entry/exit coeff.

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Probability	Average	Dep. var (May 03)	Change in perc.	
			25 to 50	50 to 75
Exit	18.6	# positives	-10.3	-9.6
Opport. exit	5.0	# negatives	2.4	2.1
B to S switch	30.5	% negatives	-1.8	-4.1

Note: all values in percentage terms.

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# Bootstrap model

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- Klein and Leffler (1981), Shapiro (1983).
- Buyers and seller coordinate on high effort while record is perfect.
- Buyers punish seller if negative takes place; seller reverts to low effort.
- Consistent with change in sales rate and negative feedback frequency.
- Problem: what stops seller from changing name?  
There must be an endogenous cost:
  - advertising, low prices, growing effort, growing sales rate

# Bayesian pooling model

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- K-M-R-W (1982), Diamond (1989).
- $\theta \in \{\underline{\theta}, \bar{\theta}\}$ ,  $q_t \in \{1, 0\}$ ,  $e_t \in \{\underline{e}, \bar{e}\}$ ,  $T \leq \infty$ .
- $P(q_t = 1 | \bar{\theta}) \approx 1$   
 $P(q_t = 1 | \underline{\theta}, \underline{e}) < P(q_t = 1 | \underline{\theta}, \bar{e}) < 1$
- Theorem: If  $\underline{\delta} < \delta < \bar{\delta}$ , then  
 $e_t = \bar{e}$  until first negative,  $e_t = \underline{e}$  thereafter.
- No exit while record is perfect. Thereafter,  $\underline{\theta}$  indifferent between old name and new name.
- Consistent with sales rate before and after first negative, frequency of negative feedback.

# Pure adverse selection

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- Tadelis (1999), Cabral (2000), Mailath and Samuelson (2001, 2005).
- Type  $\theta$  evolves stochastically;  $q_t \in \{1, 0\}$ ,  $T \leq \infty$ .
- If type and reputation very low, change name.
- Consistent with sales rate before and after first negative; frequency of negative feedback; exit pattern; “buying” a reputation pattern.

# Other stories

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- Fishman-Rob (2005): word of mouth
- Tadelis (PC): limited span of attention.
- Phelan (2005): opportunistic use of reputation.
- (Your story here)

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# Concluding remarks

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- Is there hope for testing reputation theory with eBay data?
  - Can we distinguish between the bootstrap and bayesian mechanisms?
  - Can we distinguish between moral hazard and adverse selection?
  - What additional data would one need?
- Further topics

# Concluding remarks

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- Is there hope for testing reputation theory with eBay data?
- Further topics
  - What makes buyers (and sellers) give feedback? How informative is it?
  - What is an optimal strategy for a seller?
  - How can feedback mechanism be improved?





*"On the Internet, nobody knows you're a dog."*



Tim Robinson



item view

## 2001 US MINT SILVER PROOF SET

Item # 3021093159

[Coins:Coins: US:Proof Sets:1999-Now](#)



Current bid **US \$35.25**

Starting bid **US \$29.95**

Quantity **2**

# of bids **2** [Bid history](#)

Time left **3 days, 16 hours +**

Location **EVANS, GEORGIA**



Started Apr-26-03 11:16:46 PDT

Country/Region **United States /Atlanta**

Ends May-03-03 11:16:46 PDT

[Mail this auction to a friend](#)

[Watch this item](#)

Seller (rating)

[wsb5\(127\)](#) ★

**Feedback rating: 127** with 99.2% **positive** feedback reviews ([Read all reviews](#))

Member since: Jun-19-99. Registered in United States

[View seller's other items](#) | [Ask seller a question](#) | [Safe Trading Tips](#)

High bidder [See winning bidders list](#) (include e-mails)

## Feedback Summary

218 positives. 128 are from unique users.

0 neutrals.

1 negatives. 1 are from unique users.

[See all feedback reviews](#) for wsb5.

**ebay ID card**

[wsb5\(127\)](#) ★

Member since: Saturday, Jun 19, 1999 Location: United States

### Summary of Most Recent Reviews

	Past 7 days	Past month	Past 6 mo.
Positive	12	51	116
Neutral	0	0	0
Negative	0	0	0
<b>Total</b>	<b>12</b>	<b>51</b>	<b>116</b>
<a href="#">Bid Retractions</a>	0	0	0

View wsb5 's [Items for Sale](#) | [ID History](#) | [Feedback About Others](#)

## Feedback Reviews for wsb5

Feedback [Help](#) | [FAQ](#)

[leave feedback](#)  
for wsb5

If you are wsb5 :  
[Respond to comments](#)

wsb5 was the **Seller = S**  
wsb5 was the **Buyer = B**

Left by	Date	Item#	S/B
<a href="#">rattman50(11)</a> ★ <b>Praise</b> : Nice coin! Fast shipment!	Apr-29-03 14:05:51 PDT	<a href="#">3019804072</a>	S
<a href="#">silverpeacedollar(26)</a> ★ <b>Praise</b> : hi great job nice coin and good service thanks!!!!!!	Apr-29-03 09:09:31 PDT	<a href="#">3018674118</a>	S
<a href="#">z3forefun(351)</a> ★ <b>Praise</b> : very nice coin, accurately represented, fast shipping	Apr-29-03 06:39:59 PDT	<a href="#">3018676358</a>	S
<a href="#">patrag40(161)</a> ★ <b>Praise</b> : The coin has been cleaned but a great deal	Apr-28-03 17:41:37 PDT	<a href="#">3018673349</a>	S
<a href="#">bernardtreeman(62)</a> ★ <b>Praise</b> : thanks for a nice coin. ++++++AAAAAAA	Apr-25-03 18:11:09 PDT	<a href="#">3014810862</a>	S



[← Back to your last item](#)    [Home](#) > [Services](#) > [Feedback Forum](#) > [Member Profile](#)

## Member Profile: bc ds3962 (67 ★)

**Feedback Score:** 67  
**Positive Feedback:** 97.2%

Members who left a positive: 70  
Members who left a negative: 2

All positive feedback received: 154

[Learn about](#) what these numbers mean.

### Recent Ratings:

	Past Month	Past 6 Months	Past 12 Months
positive	59	94	96
neutral	0	0	0
negative	0	0	0

Bid Retractions (Past 6 months): 1

Member since: Aug-09-01  
Location: United States

- [ID History](#)
- [Items for Sale](#)
- [Add to Favorite Sellers](#)

Contact Member

### All Feedback Received    [From Buyers](#)    [From Sellers](#)    [Left for Others](#)

157 feedback received by bc ds3962 (0 mutually withdrawn)

Page 1

Comment	From	Date / Time	Item #
Terrific Multiple Purchase Buyer-Top Notch-Fast Payment-Recomend-A+A+A+	Seller <a href="#">dtervo</a> ( <a href="#">1623</a> ★ )	Oct-30-04 00:51	<a href="#">592908</a>
Pleasure To Deal With! Super Fast Payment!! AAA+++Recommended 110%	Seller <a href="#">dtervo</a> ( <a href="#">1623</a> ★ )	Oct-30-04 00:51	<a href="#">592910</a>
A good example of a model customer! Highly recommend!	Seller <a href="#">dtervo</a> ( <a href="#">1623</a> ★ )	Oct-30-04 00:51	<a href="#">592975</a>





	Thinkpad	Beanie Baby
Price	578.6 (413.6)	11.1 (4.3)
Seller's eBay rating	12,442 (11,628)	2,634 (4,371)
No. observations	264	555