Trust and Reputation in Internet Auctions

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- Introduction: Reputation systems and cooperation
- Hypotheses
- Empirical study: Analysis of internet auctions
- Discussion

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Reputation systems and cooperation:

- Internet auctions provide opportunities for exchange between anonymous actors.
- Exchange situations correspond to a one-shot prisoner's dilemma or trust game. Hence, buyers and sellers bear the risk that the other party will behave opportunistically.
 - "Rational" sellers will not deliver goods or they will deliver goods of poor quality.
 - "Rational" buyers will not pay or will pay less than agreed on.
- Expectation: Fraud on both sides will be frequent and markets will collapse if emerged at all.
- **However:** Fraud in Internet auctions is relatively rare.

Reputation systems and cooperation:

- Therefore, the question arises why internet auctions do function very well. Why is there such a high level of cooperation?
- The key to the answer is the reputation system. At least, rating transactions and giving access to the results for all actors interested is an important factor contributing to market efficiency.
 - In one-shot trust games reputation is a substitute for the repetition of games. By the reputation system "a shadow of future" is introduced.
- If buyers prefer sellers with reputation, sellers have an incentive to invest in reputation. They do that by behaving cooperatively. Reputation transforms the single-shot trust game in a repeated trust game for sellers.

Iterated Trust Game: (adapted with modifications from Kreps 1990 where this game is applied to employment relations)



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Iterated Trust Game:

- Define "seller's reputation" as "good" if he has cooperated in rounds n = 1, 2, 3, ..., n 1. Otherwise his reputation is "bad".
- Then the strategy profile
 - Strategy of buyer: Cooperate if seller's reputation is good, otherwise "defect"
 - Strategy of seller: "Always cooperate"
 results in a Nash-equilibrium if w, the "shadow of the future", is large enough:

$$U = R + wR + w^{2}R + w^{3}R + \ldots + w^{n}R$$
$$0 \le w \le 1$$
$$R/(1 - w) \ge T + wP/(1 - w)$$

Asymmetric trust game in favor of seller:

- Buyers are protected against exploitation by knowing the reputation.
- However, how can sellers protect themselves against opportunistic behavior of buyers?

A simple method is to choose a proper mode of transaction, i.e. claiming

- a) advance payment
- b) cash on (mail) delivery (C.O.D.).

Sellers protect themselves by choosing a trust game with the buyer in the role of a trustor and the seller in the role of a trustee.

Asymmetric trust game in favor of seller:

(e.g. payment in advance or C.O.D.)



C = Buyer pays in advance, seller delivers good quality.D = Buyer refuses to pay, seller does not deliver the product.Buyer is trustor, seller is trustee.

Hypotheses:

- H1 Sellers invest in reputation, and cooperation is the "normal" way of conduct.
- H2 The higher the reputation the higher the probability of a successful transaction.
- H3 Sellers claim advance payment or C.O.D.

What about price? For the buyer reputation increases the likelihood of the seller's cooperative behavior. Other things equal, reputation increases the quality of the product like a "brand name". Probably, buyers pay more if reputation is high.

H4 The higher the reputation the higher the last bid or auction price ("premium for reputation").

Empirical study: Auctions on ricardo.ch

- Homogeneous good: Nokia 8310 (approx. 700 CHF)
- 172 auctions from October 2001 to January 2002.
- 42 of 172 were first time sellers.
- In 125 of the remaining 130 auctions sellers had a positive average rating (four or five stars), i.e. nearly 100 percent of sellers are (mostly) cooperative (clear evidence for H1).
- Negative reputation is a rare exception. In the following we exclude the five cases with negative rating (N = 167).
- Reputation is measured as number of ratings for sellers with positive a average rating. Range: 0 to 102.
- For 85 of 167 offers bids were above the minimum bid resulting in a successful transaction.

Reputation and successAbsolute nuof transaction (Logit):of rating		number tings	Log. of of rat	number ings ^a
	Model 1	Model 2	Model 3	Model 4
Reputation (n. of ratings)	0.022	0.033**	0.546^{+}	0.668*
	(1.55)	(2.68)	(1.69)	(2.00)
Starting bid	-0.069**		-0.074**	
Minimum bid increment	0.064		0.061	
Shipping costs	-0.234^{+}		-0.278*	
Gross minimum price ^b		-0.056**		-0.054**
Duration of auction in days	-0.068	-0.085	-0.058	-0.078
N. of supplementary accessories	0.006	0.862	0.081	0.508
Calendar time (centered)	-0.074**	-0.055*	-0.070^{*}	-0.042*
Constant	40.12**	31.24**	42.62**	29.87**
Wald $\chi^2(df)$	26.56(7)	18.86(5)	24.71(7)	23.33(5)
McFadden R ²	0.853	0.836	0.855	0.834

N = 167; Sign. at α = 0.1 (+), α = 0.5 (*), and α = 0.01 (**) (two sided tests, adjusted for clustering on 75 sellers); ^{*a*} ln(number of ratings + 1); ^{*b*} starting bid + minimum bid increment + shipping costs.

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Mode of Payment:

	Count	Pct.	Symmetry	R	М
Payment in advance	42	25.1	asymmetric in favor of seller	4	22.12 (6.0)
Cash on delivery	116	69.4	asymmetric in favor of seller	3	7.25 (5.0)
Buyer collects on cash	6	3.6	symmetric	2	1.67 (0.0)
Seller delivers on cash	2	1.2	symmetric	1	
Mail delivery on account	1	0.6	asymmetric in favor of buyer	0	
Credit card	0	0.0			
Total	167	100.0			

R = Rank order of asymmetry in favor of seller

M = Mean (and median) of reputation

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Effect of reputation on price (OLS/Tobit):	Absolute number of ratings		Log. of number of ratings ^a	
	Model 1	Model 2	Model 3	Model 4
Reputation (number of ratings)	0.455**	0.667**	9.132**	11.961**
	(3.26)	(4.81)	(3.35)	(3.69)
Starting bid	0.035	-0.022	0.038	-0.017
Minimum bid increment	2.441**	1.732^{+}	2.672**	1.967*
Shipping costs	-1.883^{**}	-1.839^{*}	-2.604**	-2.723**
Duration of auction in days	-2.409*	-4.159**	-2.594**	-4.355**
Number of bids	0.729	0.127	0.873	0.274
N. of supplementary accessoires	27.486**	22.409**	27.046**	21.914**
Calendar time (centered)	-0.858**	-0.736**	-0.827**	-0.700**
Calendar time squared	0.011**	0.011^{*}	0.011**	0.011^{*}
Constant	513.77**	564.15**	511.99**	562.80**
Wald $\chi^2(df)$		331.9(9)		303.1(9)
R^2 / McFadden R^2	0.679	0.099	0.689	0.102

N = 84 (OLS-models 1, 3), 167 (Tobit-models 2, 4); Sign. at $\alpha = 0.1$ (+), $\alpha = 0.5$ (*), $\alpha = 0.01$ (**) (two sided tests, adjusted for clustering on 75 sellers); ^a ln(number of ratings + 1) Trust and Reputation in Internet Auctions. Diekmann/Jann/Wyder GOR04, Duisburg, 3/30/2004, 12

Left- and right-censoring of the selling price:



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Conclusions:

Reputation can cause a high degree of cooperation and bring forward a well-running market.

- Negative reputation is the exception and positive reputation is the normal case. A high degree of cooperation can be observed.
- Sellers have incentives to invest in reputation. Customers interpret reputation as a signal for reduced transaction risks and are willing to pay a fee for it (like an insurance premium). A reputation premium is empirically detectable. In addition, reputation seems to influence the success of an auction
- Sellers almost exclusively choose asymmetric payment modes which reduce the risk of being exploited by a buyer. The risk is shifted to the customers who, however, can secure themselves by choosing sellers according to their reputation.