ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

CHAIRS OF SOCIOLOGY

Experiments with Signaling Games. Evidence from Russia and Switzerland

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Trust problems arise in sequential exchange when trustor is uncertain of whether trustee will reciprocate a utility transfer.

In our model we assume that trustees have same preferences but act under different structural conditions.

A long-term type plays a repeated game while a short-term type is in a one-shot situation.

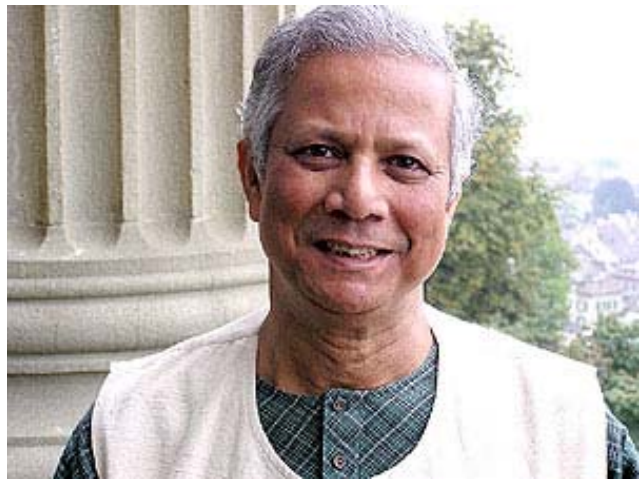
Trustors prefere long-term relationships but do not know the type of the trustee.

Can the situation of trustor and long-term trustee be improved if trustee could credibly communicate his type?

Example 1: Engagement rings

In the US, men are expected to spend up to 3 monthly wages on an engagement ring.

Example 2: Children



Muhammad Yunus, Gr¨under der Grameen Bank und Gewinner des Friedens-Nobelpreises 2006.

The Grameen Bank preferably lends money to women. Women take care of children and are less probable to be fly-by-nights.

Cover Story

Market with buyers and two type of sellers

- Anonymous buyers and sellers trade with each other
- Short-term seller: single transaction
- Long-term seller: repeated transactions

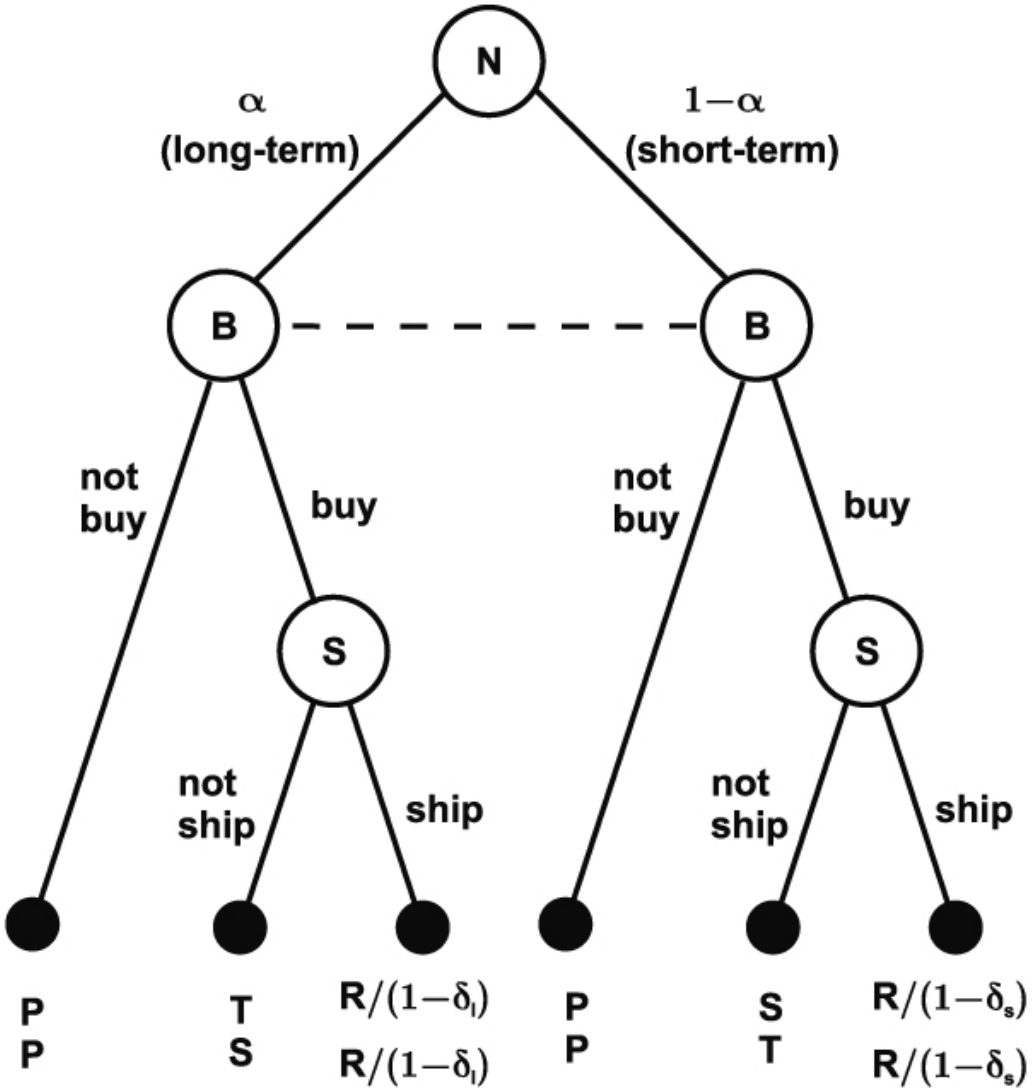
Interactions between buyers and sellers

- Consist of either one or several transactions
- Buyer sends money; seller sends good
- If either player does not send, interaction is over.

Sellers‘ investments

- Before an interaction, seller can make an investment
- Buyer is informed about seller‘s investment

Trust game with incomplete information



- Buyer (player B): not buy, buy
  Seller (player S) ship, not ship
- α: Probability of long-term seller
- δ_l: discount factor long-term seller, $R/(1-\delta_l) > T > P$
- δ_s: discount factor short-term seller, $T > R/(1-\delta_s) > P$

Trust game with incomplete information

Buyer never buys if

$$\alpha R/(1-\delta_l) + (1-\alpha)S < P$$

Sellers can, at cost c, engage in an action observable by the buyer.

Costly actions are credible signals of seller's type only if

(long-term seller) $R/(1-\delta_l) - P > c$ and

(short-term seller) $T - P < c$

Experimental design

	Treatment				
	Nizhniy		Zurich		
	no invest	invest signal	no invest	invest signal	invest ad
Seller type	(3 sessions)	(5 sessions)	(3 sessions)	(3 sessions)	(3 sessions)
short-term (10/15 rounds)	150	250	150	150	132
long-term (5/15 rounds)	75	125	75	75	66
	225	375	225	225	198

Table 2: Number of interactions by treatment and seller type. In each session 10 subjects played either in the role of a buyer or seller. Subjects played 15 rounds with alternating partners. One third of the interactions involved a long-term seller.

Experimental design

Interaktion

Testrunde 2 von 2

Sie sind ein **Verkäufer** und werden mit demselben Käufer

etwa 3 mal

ein Geschäft machen können.

Bevor sich der Käufer entscheidet, ob er mit Ihnen ein Geschäft machen will, haben Sie die Möglichkeit, in ein **Signal an den Käufer** zu investieren.

Sie können einen Betrag **zwischen 0 und 175 Punkten** in das Signal investieren und das Signal an den Käufer senden. Die investierte Punktzahl wird Ihnen von Ihrem Guthaben abgezogen.

Ihre Investition: 60

Signal senden

Ihr Guthaben in dieser Interaktion beträgt:

175 Punkte

Interaktion

Testrunde 2 von 2

Sie sind ein **Käufer**.

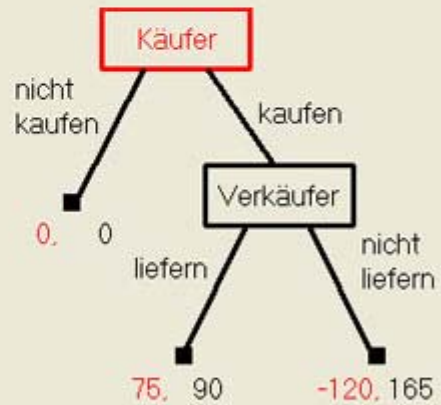
Der Verkäufer hat **60 von 175 Punkten** in ein Signal an Sie investiert.

Sie können sich jetzt entscheiden, ob Sie mit diesem Verkäufer ein Geschäft machen möchten oder nicht.

nicht kaufen | kaufen

Ihr Guthaben in dieser Interaktion beträgt:

175 Punkte



Hypotheses

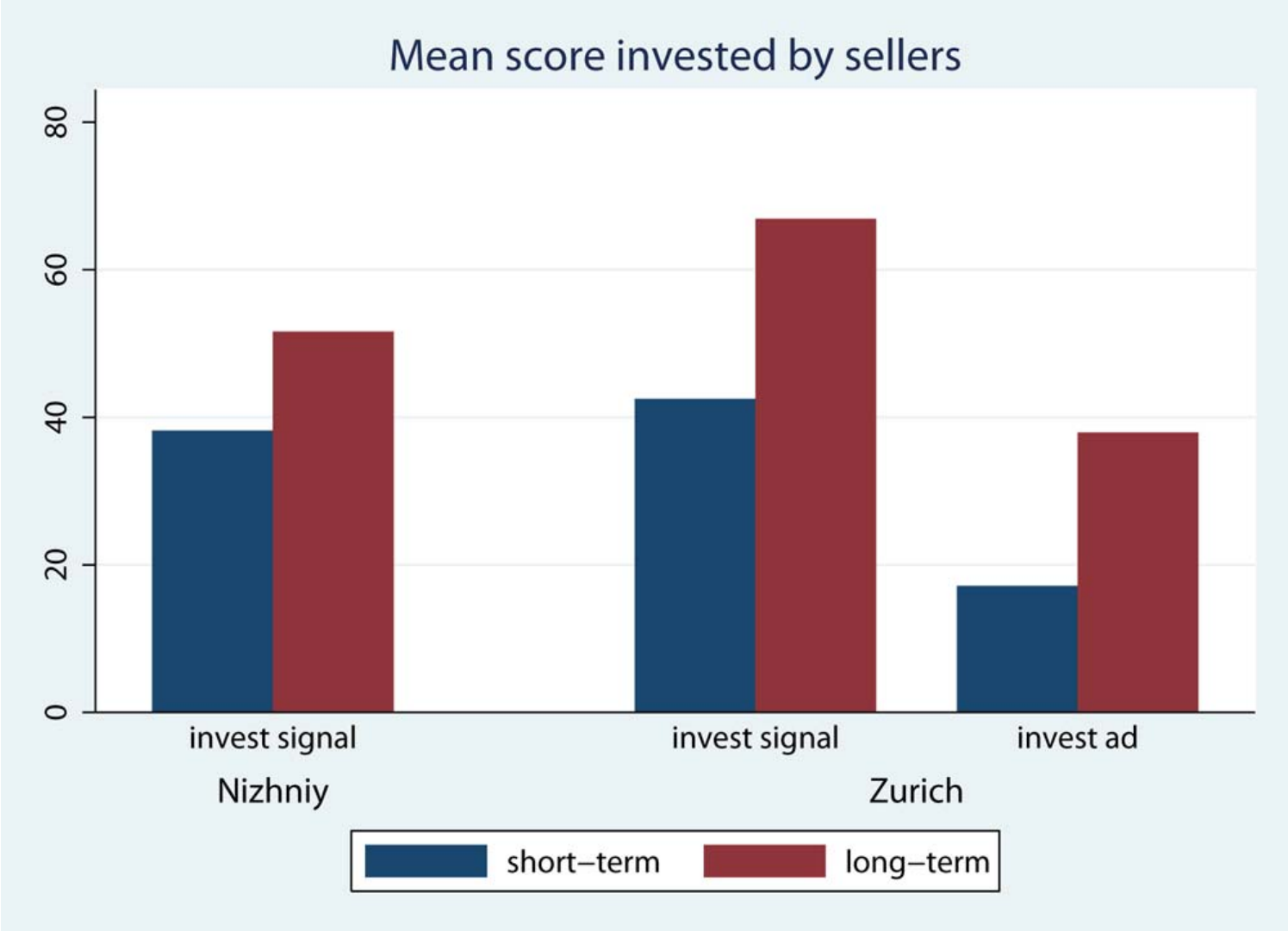
H1: Buyer decisions to buy are more frequent under the treatment condition than under the control (i.e. without investment possibility).

H2: Amounts invested by long-term sellers are higher than amounts invested by short-term sellers.

H3: The higher the amount invested by a seller, the higher the probability that the buyer buys.

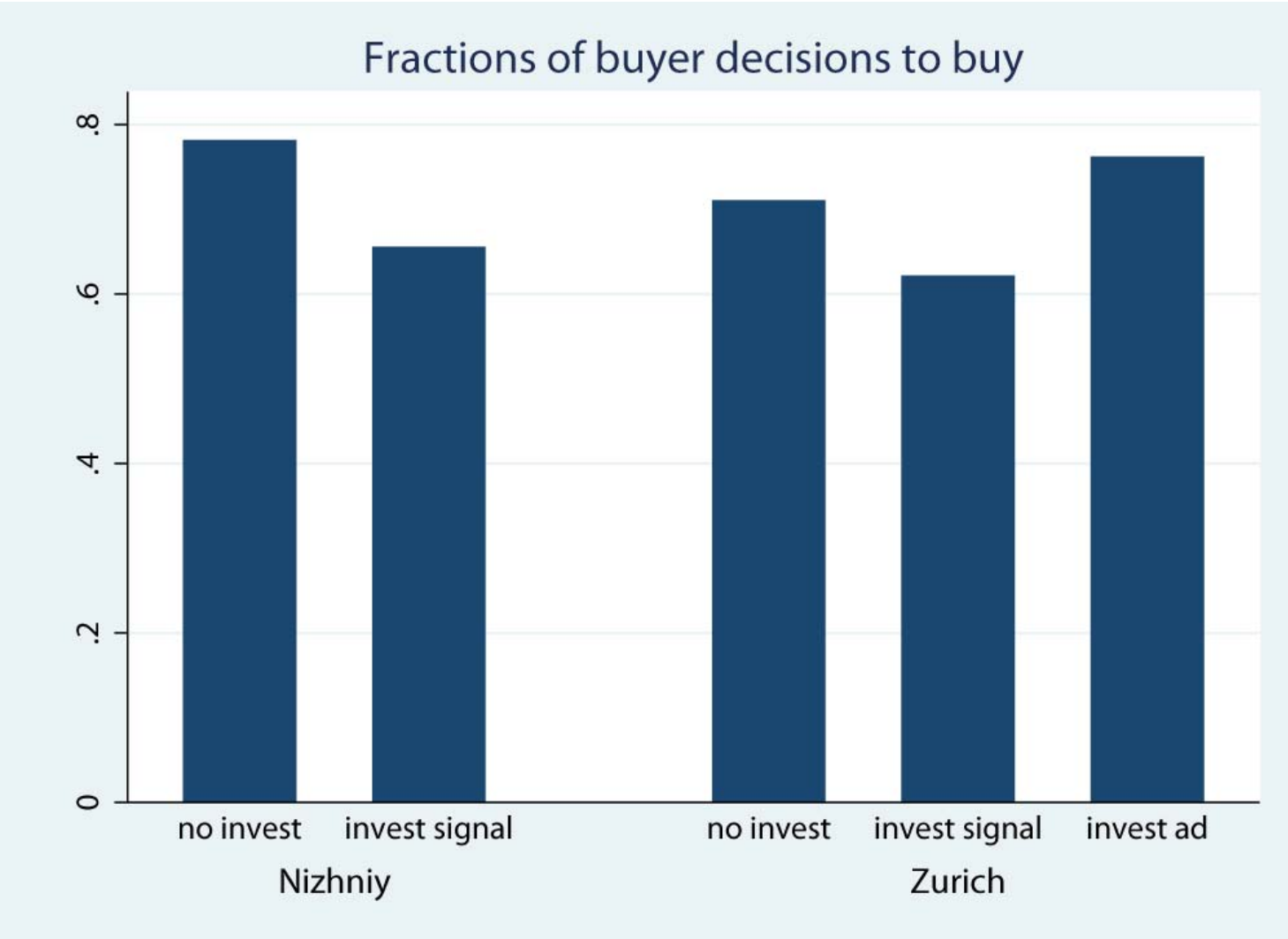
H4: The higher the amount invested by a seller, the higher the probability that the seller ships.

Results: Sellers‘ investment decisions



Nizhniy signal: t = 2.95, p < 0.01; Zurich signal: t = 5.48, p < 0.001;
Zurich ad: t = 3.25, p < 0.01; t-test with robust standard errors

Results: Buyers‘ buying decisions



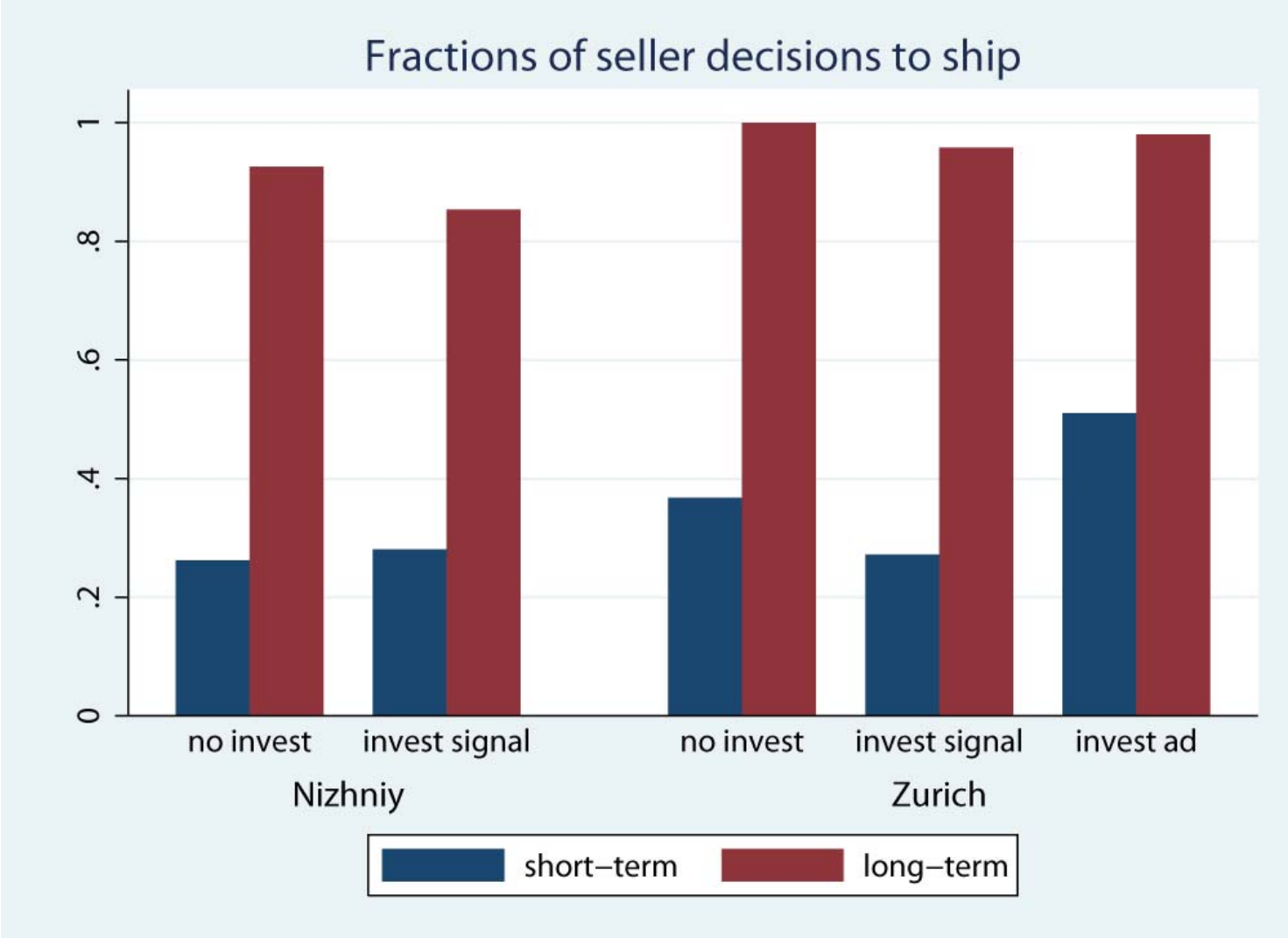
Nizhniy: z = −1.87, p = 0.062; Zurich: no invest vs. signal: z = −1.08, p = 0.279; signal vs. ad: z = 1.72, p = 0.086; no invest vs. ad: z = 1.28, p = 0.201; z-test with robust standard errors

Results: Buyers' buying decisions

	Nizhniy	Zurich	N+Z	N+Z RE	N+Z RE
signal	-1.047*	-1.250	-1.120**	-1.400***	(dropped)
	(0.454)	(0.671)	(0.379)	(0.331)	
sig.*invest	0.010	0.017*	0.013**	0.016***	0.016***
	(0.006)	(0.009)	(0.005)	(0.003)	(0.003)
round	-0.025	-0.085***	-0.055***	-0.067***	-0.068***
	(0.024)	(0.022)	(0.016)	(0.016)	(0.016)
ad		0.058	0.045	-0.027	(dropped)
		(0.603)	(0.566)	(0.455)	
ad*invest		0.008	0.007	0.011	0.012
		(0.012)	(0.012)	(0.007)	(0.008)
swiss			-0.306	-0.345	(dropped)
			(0.248)	(0.291)	
const.	1.483***	1.607***	1.693***	2.045***	
	(0.313)	(0.371)	(0.264)	(0.306)	
W	7.73	20.65***	24.61***	44.18***	-
R^2	0.03	0.05	0.04	-	-
N(subj.)	40	44	84	84	78
N(dec.)	600	648	1248	1248	1158

Logit regression models with buyer decision in first game of interaction as the dependent variable.

Results: Sellers‘ shipping decisions



Conclusions

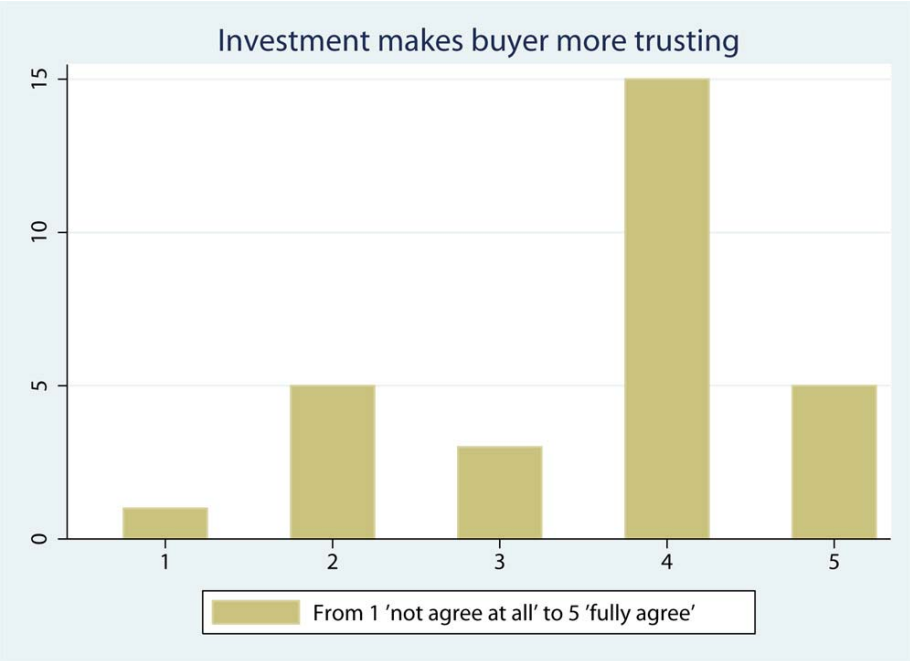
Long-term sellers indeed invested higher amounts than short-term sellers.

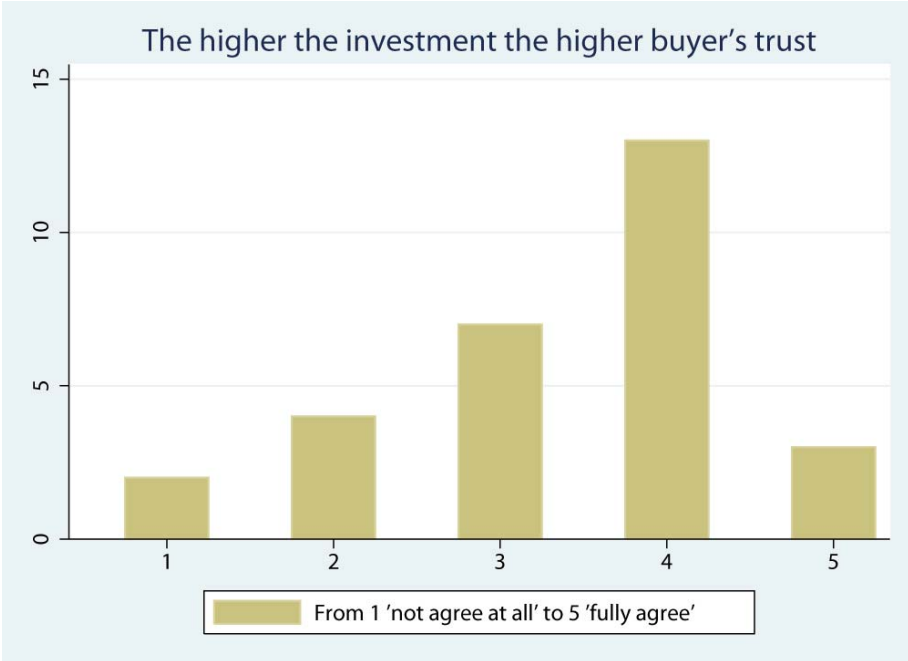
The larger a seller‘s investment in a signal was, the higher was a buyer‘s propensity to buy.

Under the control (i.e. without investment possibility) buyers decided more often to buy than under the treatment condition

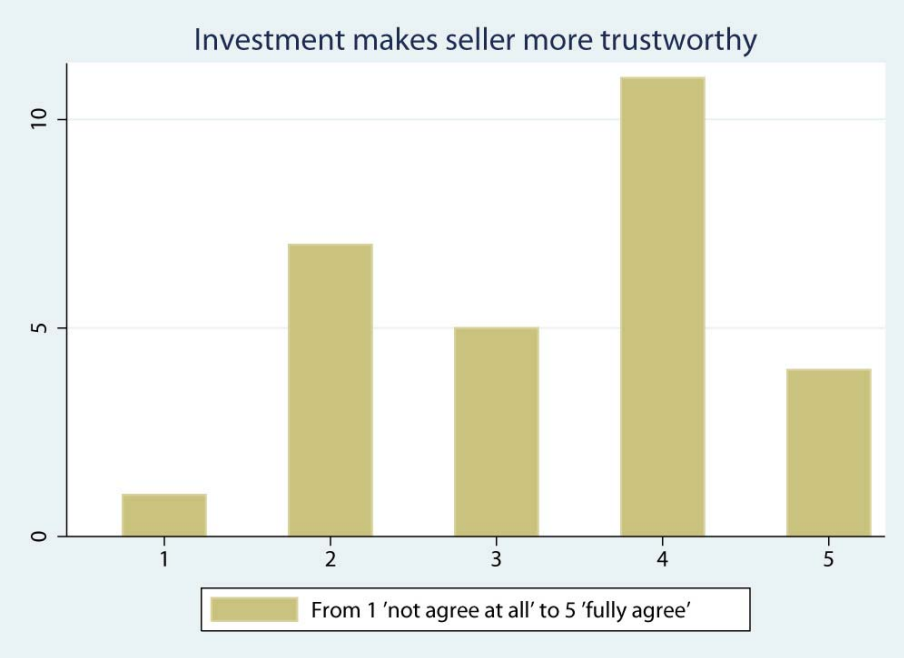
The amount invested did not affect sellers shipping decision

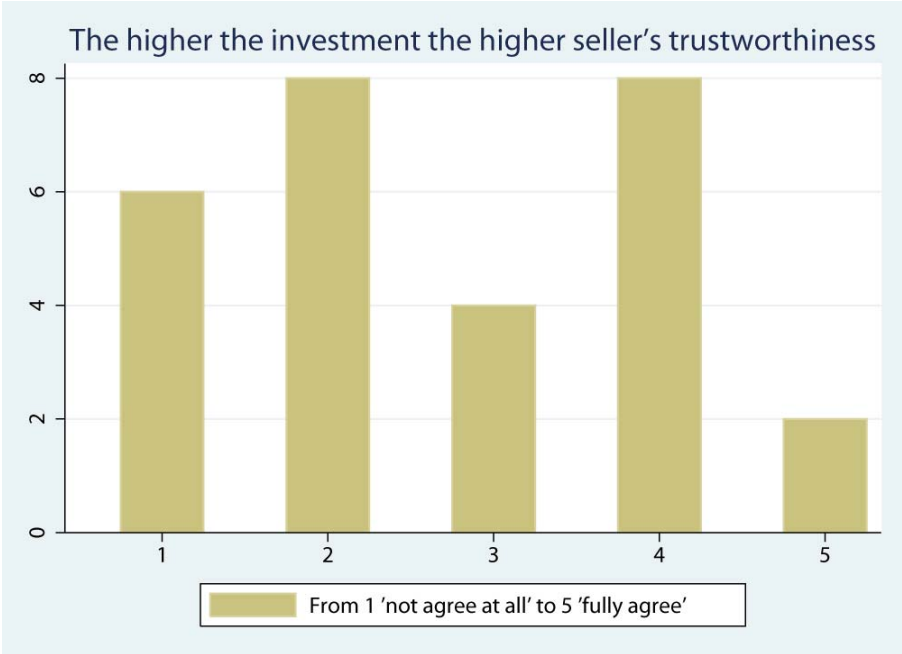
Questionnaire on seller‘s strategy





Questionnaire on buyer‘s strategy





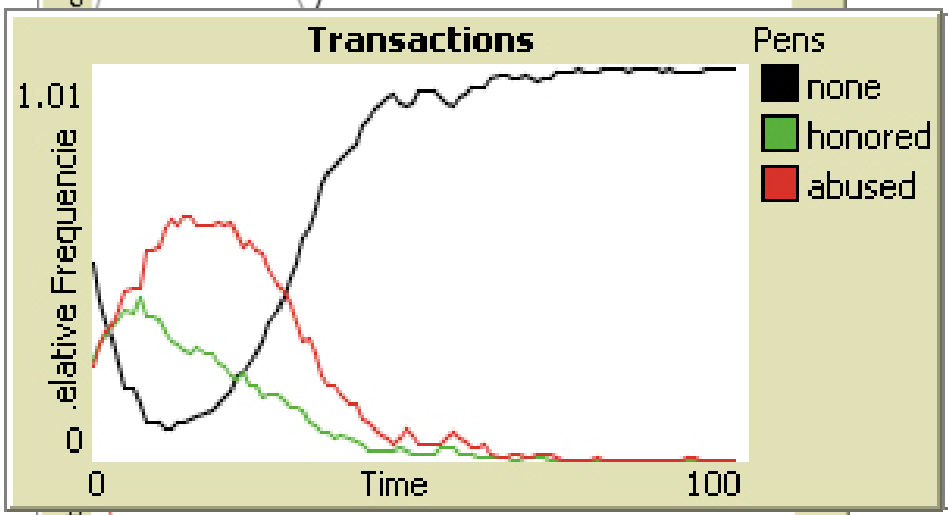
Agent-based simulation of trust game with signaling

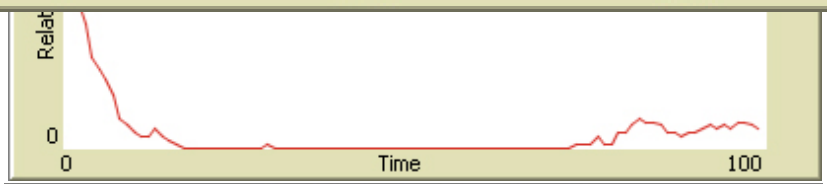
- Population of 800 agents, 400 buyers and 400 sellers
- α*400 long-term and (1-α)*400 short-term types
- Random matching of buyers and sellers
- 800 interactions per generation
- Replicator dynamics: $p' = p\ \pi/\Pi$
  - successful strategies increas in number
  - more successfull strategies increas faster
- Mutation rate r=0.001

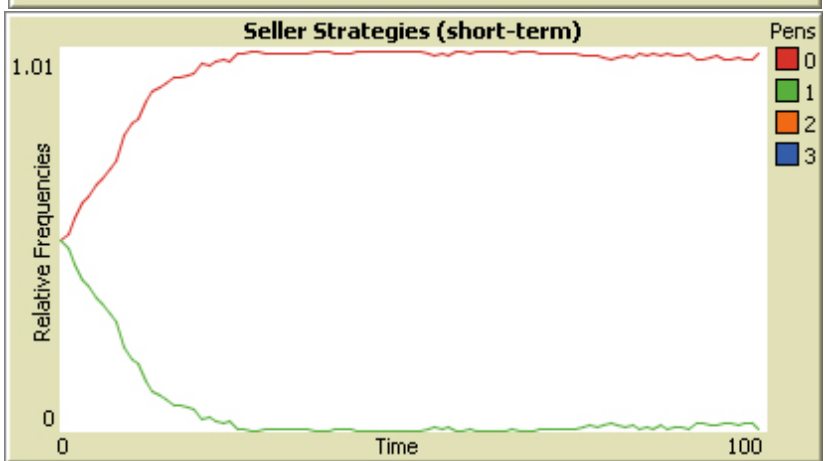
Strategies

- Buyer (contingent on investment decision of seller): S = {(¬b, ¬b), (b, ¬b), (¬b, b), (b, b)}
- Seller: S = {(¬s, ¬i), (s, ¬i), (¬s, i), (s, i)}

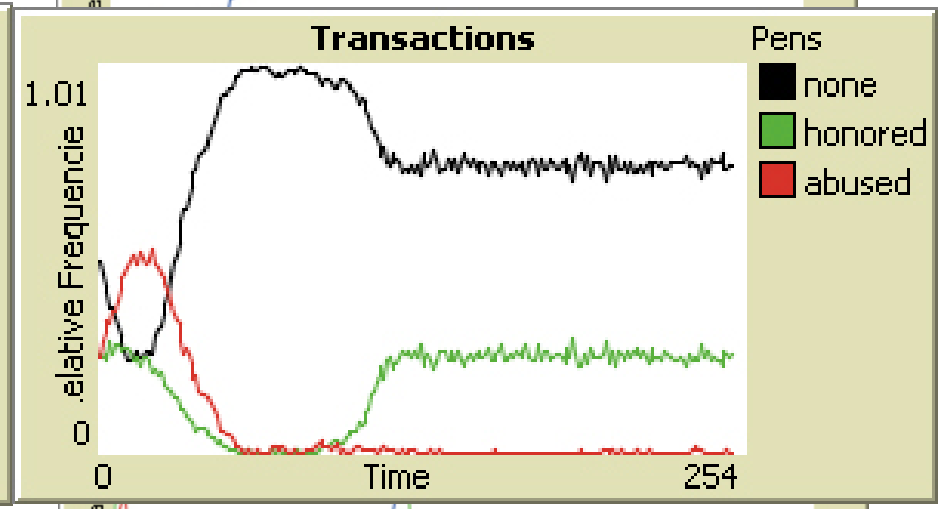
$\alpha < \alpha^*$

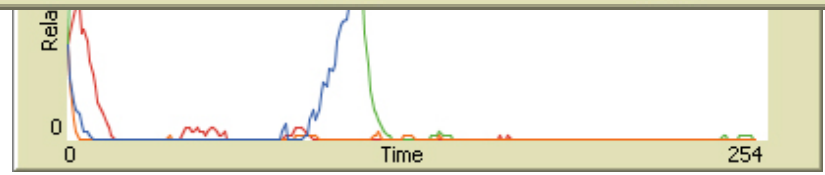


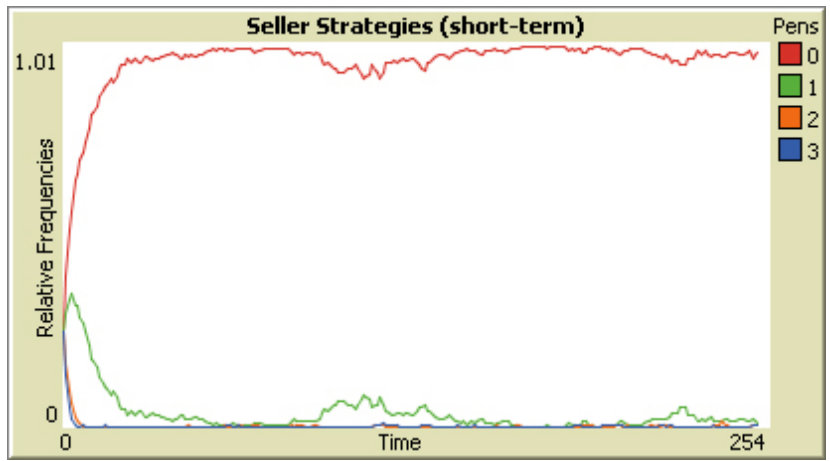




$\alpha < \alpha^*, c > c^*$







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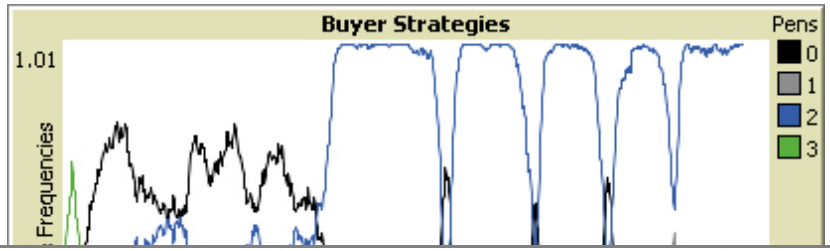

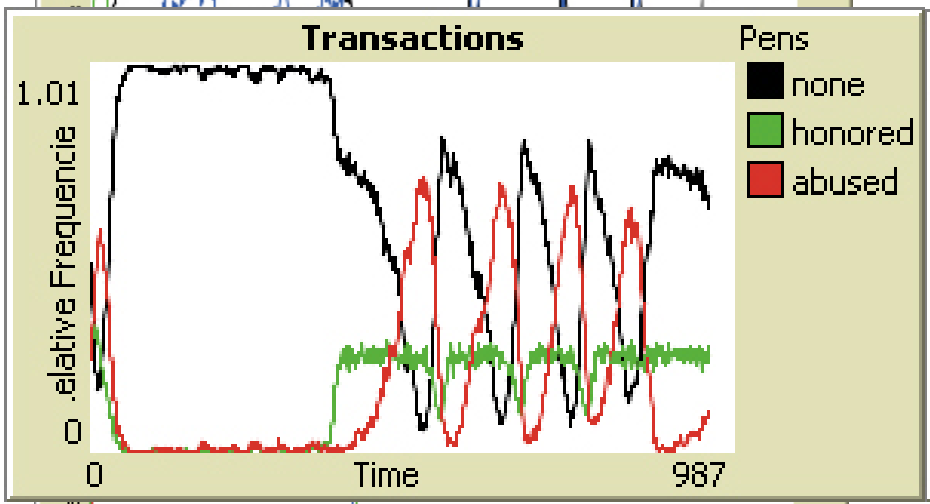

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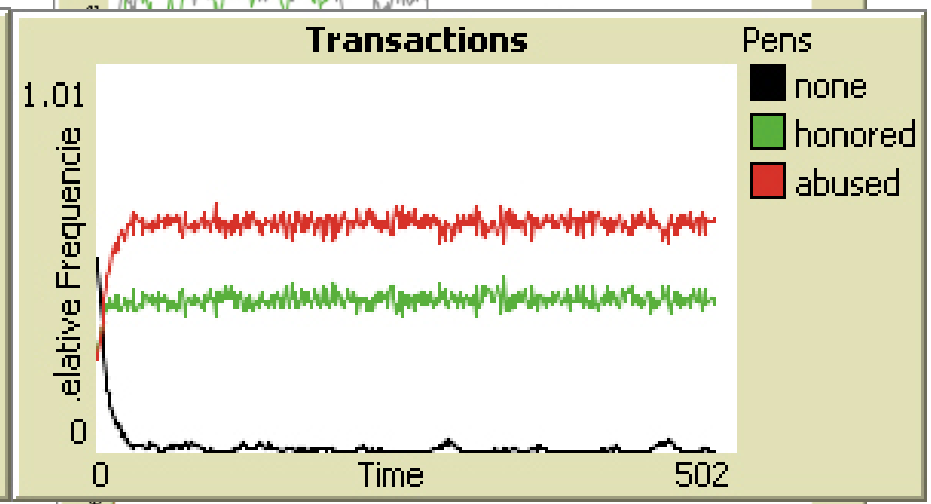

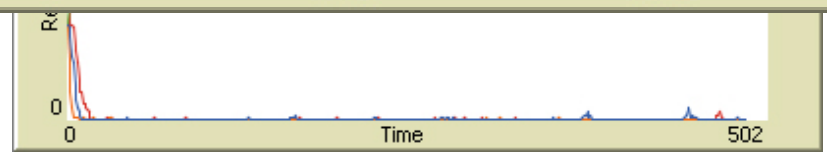

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