Trust Games, Lecture 1

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1 Introduction

- What is trust?
  - Dictionary Definitions:
    - 1 *a:* assured reliance on the character, ability, strength, or truth of someone or something. *b:* one in which confidence is placed
    - 2. dependence on something future or contingent.
- Trust can be a “lubricant” to economic activity
  - Can avoid the need for expensive contracting and enforcement.
  - Can avoid the trouble of building, maintaining and monitoring reputations.
- Parallel literature on Social Capital and Trust
  - “Social Capital refers to the connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them.” (Putnam 2000, p. 19)
  - The more connected and integrated we are, the better society functions.

- Basic questions for this area:

1. Are there natural preference for trust?
2. How have these shaped existing institutions?
3. Can we design future institutions to take advantage of trust?
4. Does the government have a role in building trust?

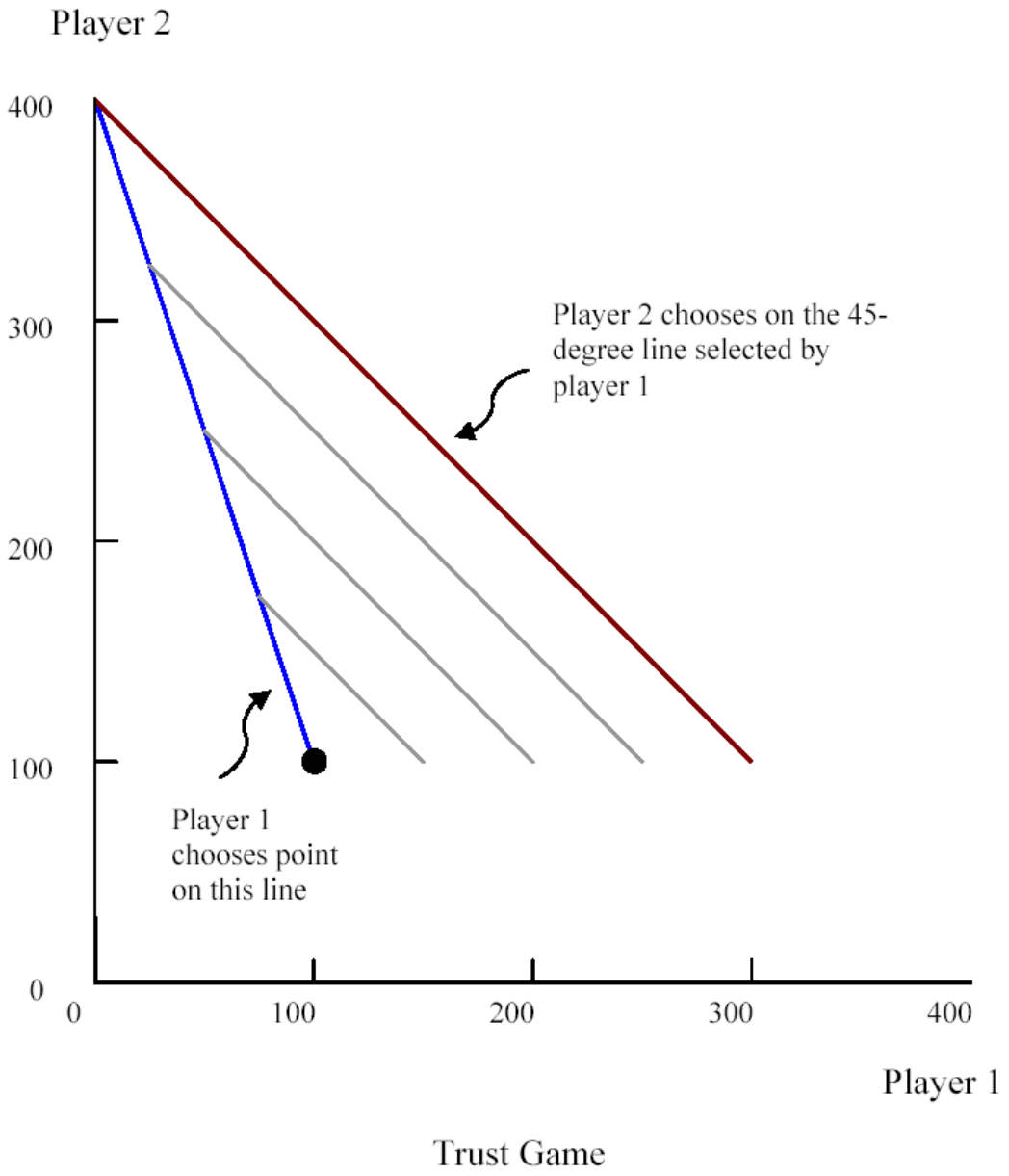
2 Trust Games

Two papers introduced similar games, but the first one gets the credit:

- Berg, Joyce, John Dickhaut, and Kevin McCabe. ”Trust, Reciprocity, and Social Norms,” *Games and Economic Behavior,* 1995, 10, 122-142.
- Van Huyck, John B.; Battalio, Raymond C.; Walters, Mary F. ”Commitment versus Discretion in the Peasant-Dictator Game.” *Games and Economic Behavior*, July 1995, 10(1), 143-7

The simple Trust Game has these parameters:

- Two subjects, each endowed with (M_1, M_2). In this example $M_1 = M_2 = 10$
- Player 1 can pass x, $0 \leq x \leq M$, to Player 2.
- Player 2 received kx, where $k > 1$. Typically $k = 3$.
- Player 2 can pass back y to Player 1.
- Earnings are thus $\pi_1 = M_1 - x + y$, and $\pi_2 = M_2 + 3x - y$.



Trust Game

What's the equilibrium?

Equilibrium:

- Basic Assumption: Money Maximization:

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  - subgame perfection predicts $y = 0$, so $x = 0$.
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- Basic Assumption: Money Maximization:
  - subgame perfection predicts $y = 0$, so $x = 0$.
- Alternative: Assume people like to be nice to those who have been nice to them.
  - Then there may be some $y(x)$ that is increasing on x, i.e. $y'(x) > 0$.
  - This means that even a money-maximizing player 1 will have some $x > 0$ that is best.
    - $\pi_1(x) = M_1 - x + y(x)$
    - $d\pi_i(x)/dx = -1 + y'(x) = 0$
    - The solution implies $x > 0$.

Berg, Dickhaut, McCabe (1995): 30 pairs. $M_1 = M_2 = 10, k = 3$ One decision.

- **Result:** returns correlated with trust, but...90% returned—player 1 loses money on average.

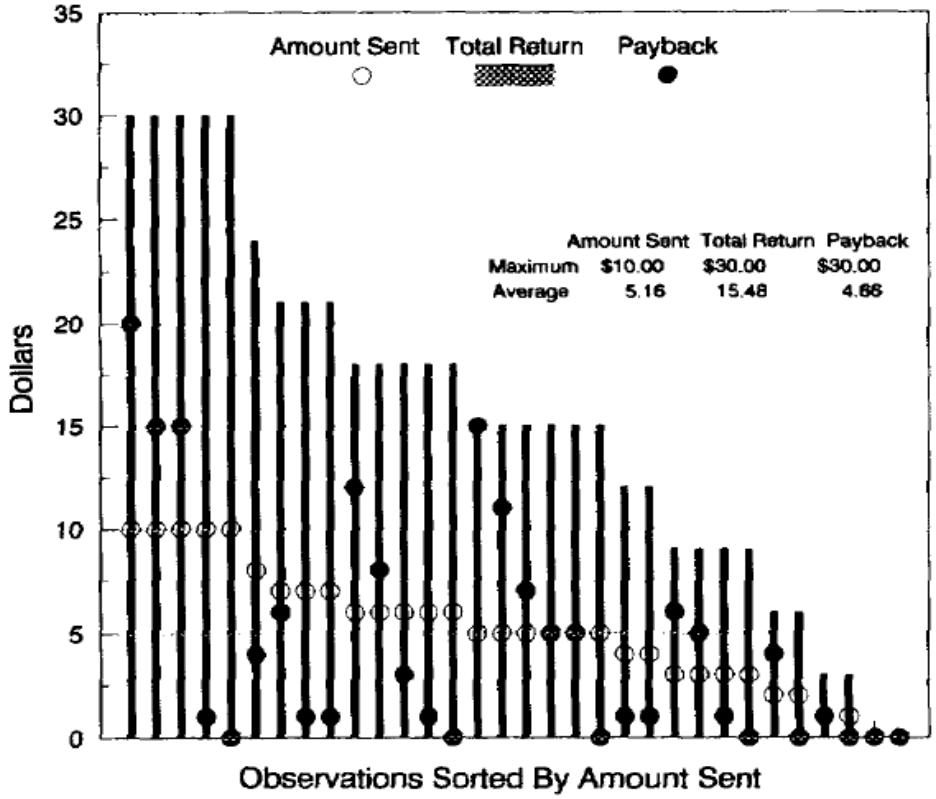

FIG. 2. Trust experiment results showing amount sent (○), total return (■), and payback (●). No history was provided to the subjects.

How much of trust is altruism versus a hope for reciprocity?
Cox, James C. "How to Identify Trust and Reciprocity." *Games and Economic Behavior*, 2004, 46, 260-281.

- **How would you separate altruistic feelings from a hope for reciprocity?**
  - That is, player 2 is reciprocal, so $y(x)$, and $y'(x) > 0$
  - Player 1 is either
    - $u_1 = \pi_1(x) = M_1 - x + y(x)$, a money maximizer, ...or
    - $u_1 = u(\pi_1, \pi_2)$, that is, he cares for the other person and reciprocity is not a constraint or not necessary for passing.
  - What experiment would allow you to tell these two motives apart?

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- *Condition A:* Standard Trust game, with price of 1/3 ($k = 3$) for passing payoff.
- *Condition B:* Player 1 is a Dictator with price of 1/3 for passing payoff. Player 2 makes no choices
- *Condition C:*
  - Let S be the set of x's by Player 1 in a Trust Game.
  - Let $F(y)$ be the distribution of amounts returned
  - Endow subjects in a pair at $\pi'_1 = M_1 - x$ and $\pi'_2 = M_2 + x$, for some $x \in S$.
  - Player 1 makes no choices and Player 2 is a dictator.
  - This time the allocation is not voluntary so there is only altruism, not reciprocity present.
  - Let y' be the amount Player 2 passes and let $F'(y')$ be the distribution of y''s.
  - Then the question is, if $F(y) > F'(y)$ for all y?
- Player 1 in A vs B is an indicator of Trust in excess of altruism.
- Player 2 in A vs C is an indicator of Reciprocity in excess of altruism

Results: A. Trust

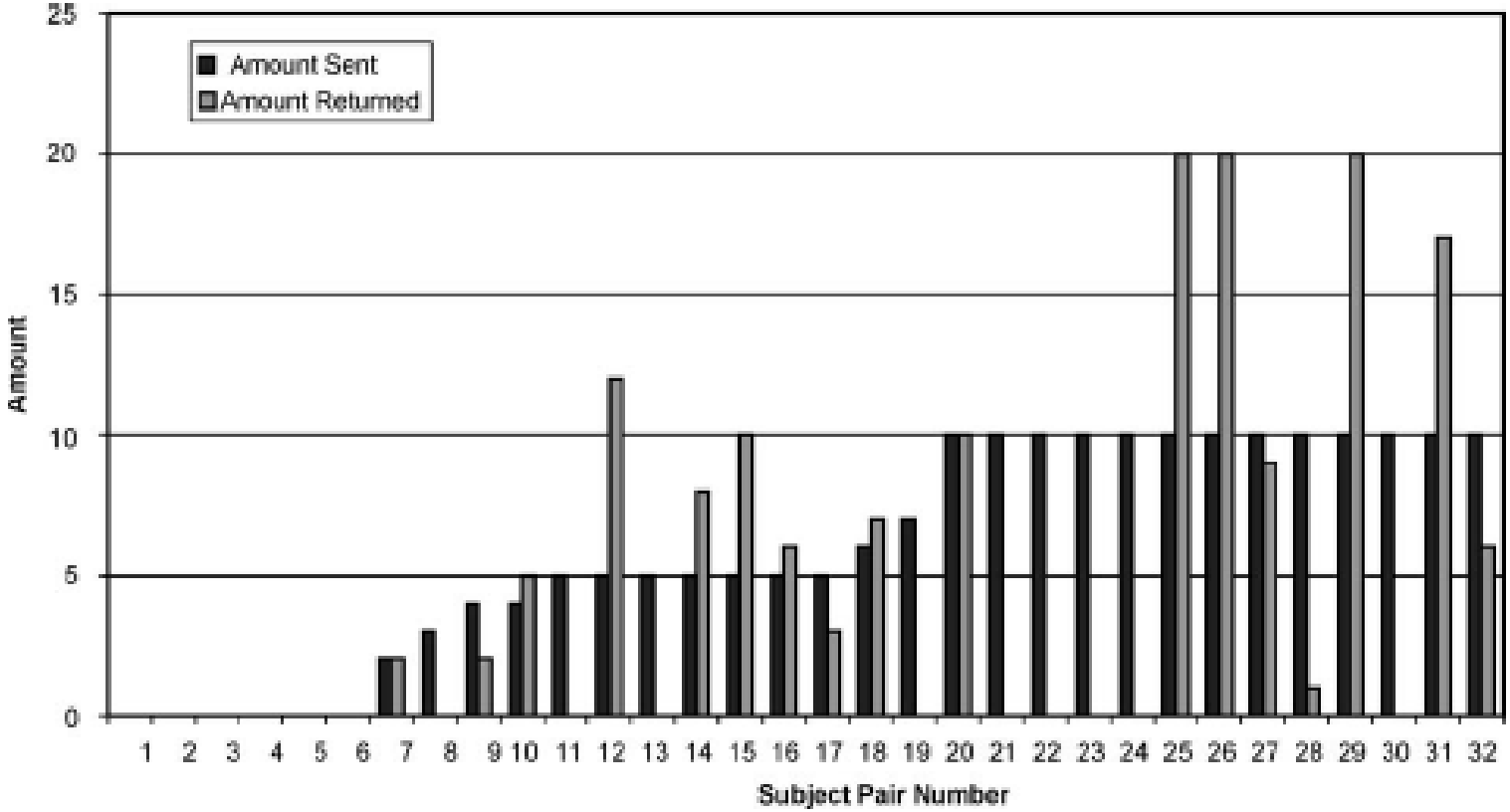


Fig. 1.

A vs. B: Trust versus Dictator

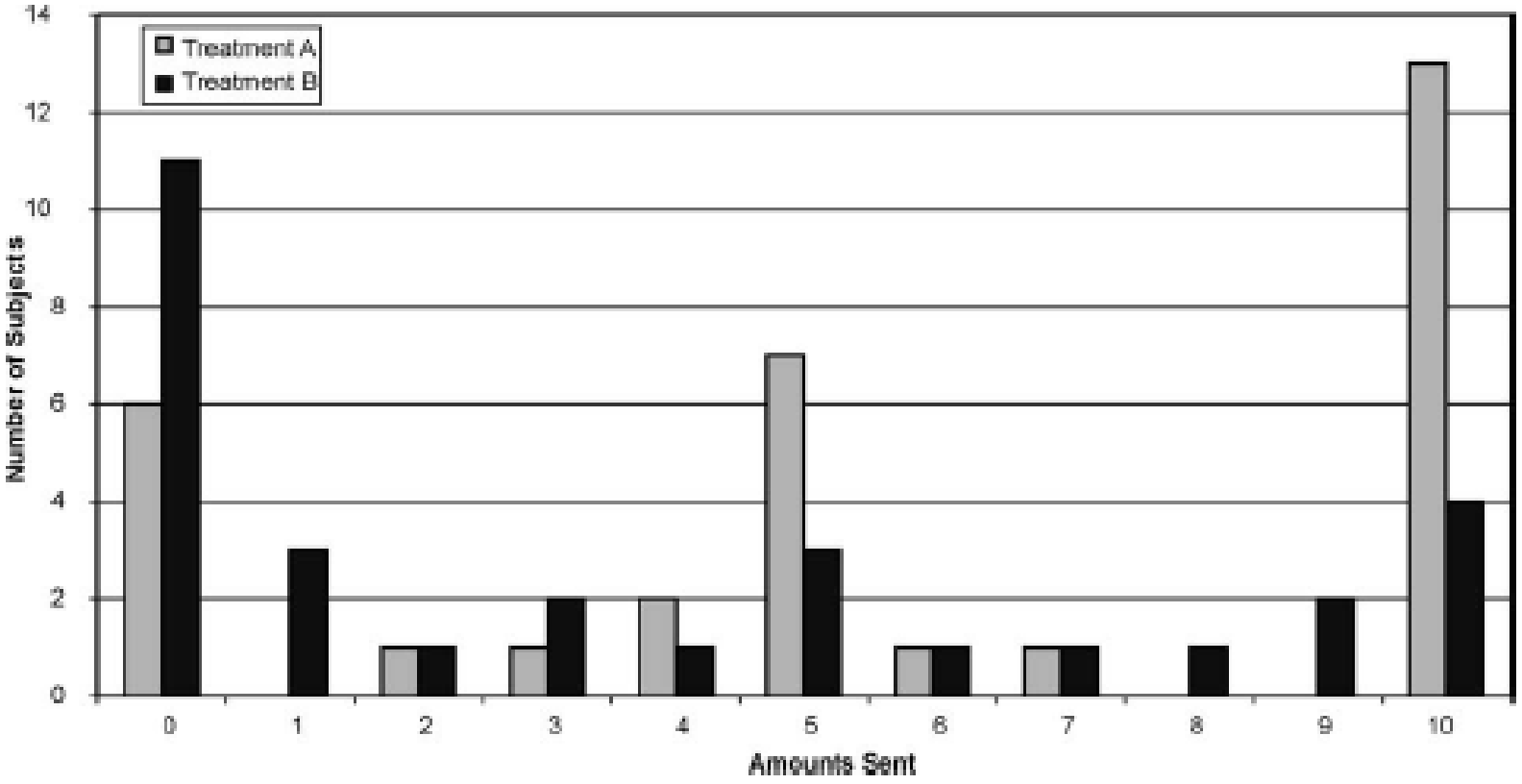


Fig. 2.

A vs. C: Reciprocity versus Altruism

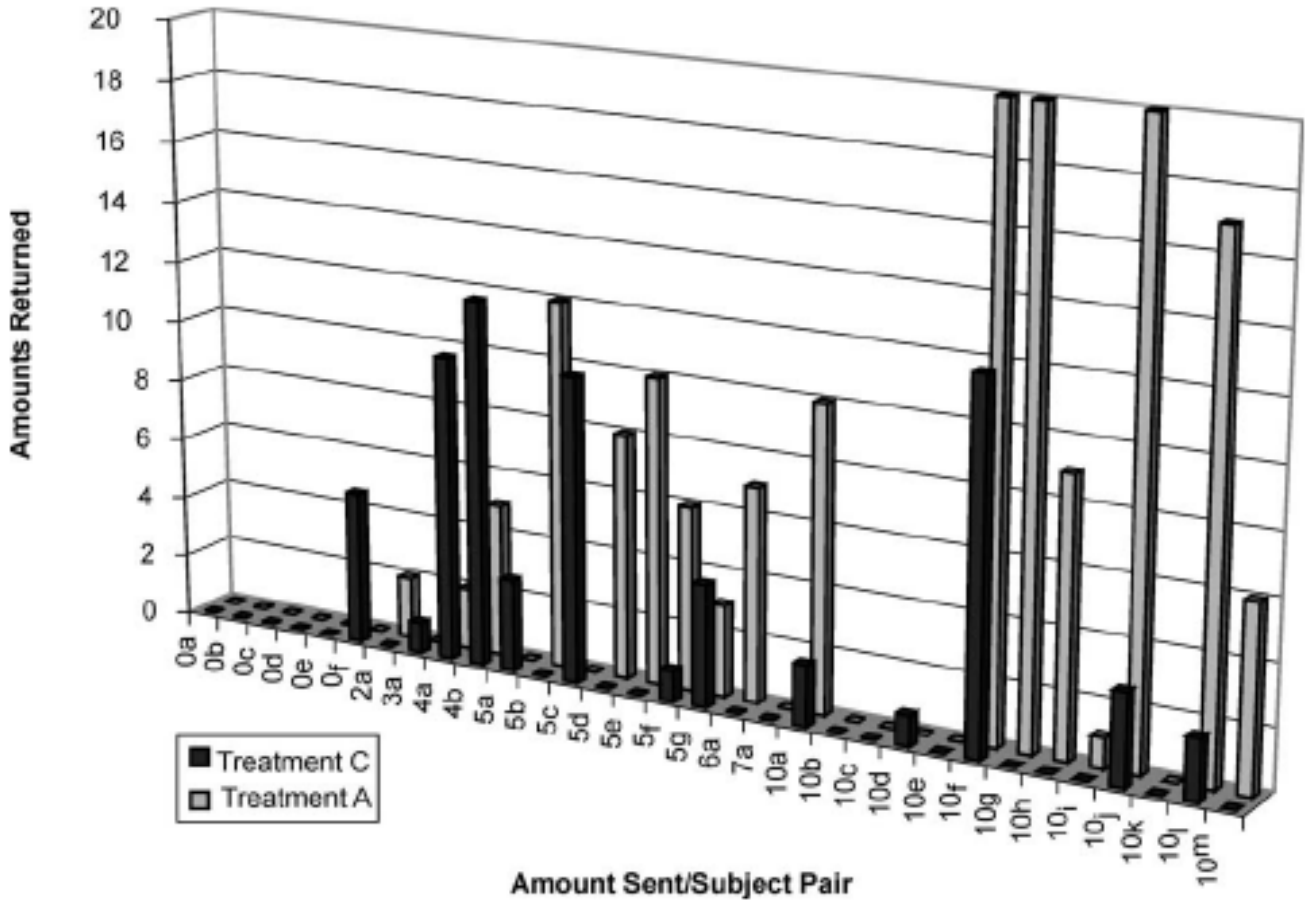


Fig. 3.

Table 1
Decomposition tests for trust and reciprocity

Parametric and nonparametric tests of first- and second-mover data

Data	Send mean	Return mean	Means tests	Epps–Singleton tests	Mann–Whitney tests
Tr. A	5.97 [3.87] {32}	4.94 [6.63] {32}	…	…	
Tr. B	3.63 [3.86] {30}	…	…	…	
Tr. C	…	2.06 [3.69] {32}	…	…	
Tr. A send vs. Tr. B send	…	…	2.34 (0.010)[a]	16.05 (0.010)	−2.35 (0.010)[a]
Tr. A return vs. Tr. C Return		…	2.88 (0.018)[a]	6.94 (0.219)	−1.55 (0.061)[a]

Tobit analysis of second-mover data

$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\theta}$	LR test
4.20	0.680	−0.759	0.158	5.98
(0.060)	(0.034)[a]	(0.124)	(0.008)	(<0.025)

[a] Denotes a one-tailed test. p-values in parentheses. Standard deviations in brackets. Number of observations in braces.

The last row of Table 1 reports tobit estimates of the parameters of the following relation between amounts sent, S_t and amounts returned, R_t in treatments A and C:

$$R_t = \alpha + \beta D_t S_t + \gamma S_t + \varepsilon_t, \tag{7}$$

where

$$D_t = \begin{cases} 1 & \text{for treatment A data,} \\ 0 & \text{for treatment C data.} \end{cases} \tag{8}$$

Sidebar on Statistical Tests

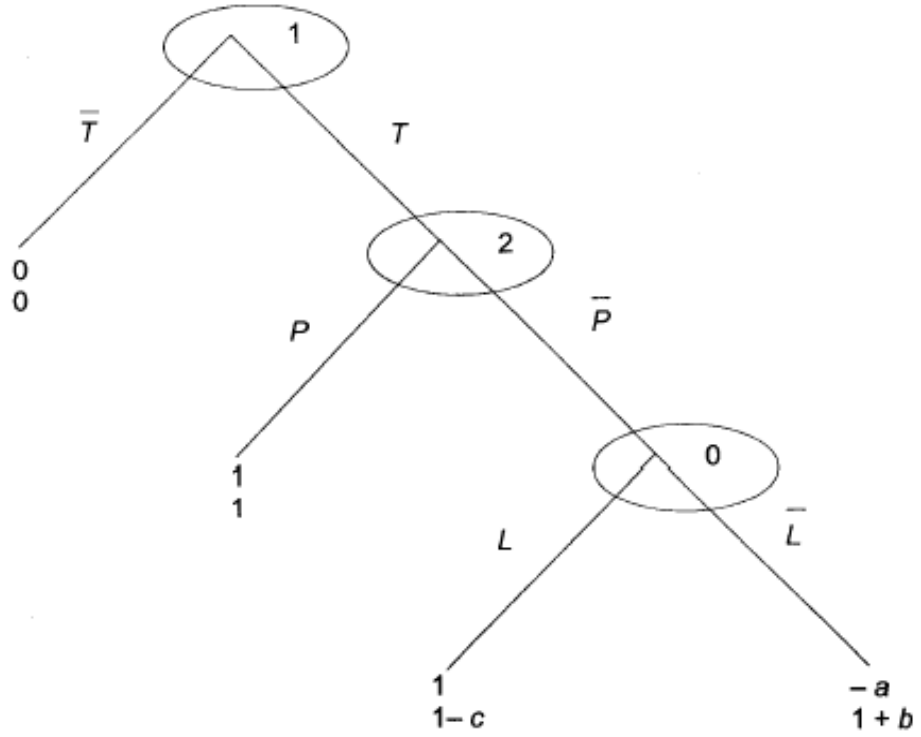
- Tobits: For regressions where the dependant variable (amount returned here) has limited values, i.e. $0 \leq y \leq 3x$.
- Non-parametric tests: When the sample has lots of noise, these can help you get power.
  - Mann-Whitney is a test of whether one sample tends to be higher in value than the other.
  - Take two samples (A and C), and combine them into one sample.
  - Rank the combined sample from highest to lowest value of y.
  - If there is no effect of the treatment, then there should be no “bunching” of A or C toward one end, or toward both ends.
  - The Mann-Whitney tests for differences in the “sum of the ranks" of the two samples.
  - This is called nonparametric because it doesn’t use the values of the samples or paramters

of the distribution of the samples (mean and variance) for the tests, but just the rankings.

Trust and Contract Enforcement

- Bohnet, Frey & Huck (2001)
  - "More Order with Less Law."
    - When there is imperfect enforcement, higher levels of enforcement can crowd out altruistic compliance.

FIGURE 1. The Contract Game with Monetary Payoffs



Note: Player 1 chooses between T (her trusting move) and $\overline{T}$ (her nontrusting move). After T, player 2 chooses between P(erformance) and nonperformance ($\overline{P}$). After $\overline{P}$, chance decides whether player 2 is held L(iable) or not ($\overline{L}$). The end nodes show the two players' respective payoffs.

$p = 0.1, 0.5,$ or 0.9

– Most compliance is with Low. Either High or Medium followed by low erodes compliance

- Gneezy and Rustichini, “A Fine is a Price.” *Journal of legal studies,* 2000 vol:29 iss:1 pg:1

> The deterrence hypothesis predicts that the introduction of a penalty that leaves everything else unchanged will reduce the occurrence of the behavior subject to the fine. We present the result of a field study in a group of day-care centers that contradicts this prediction. Parents used to arrive late to collect their children, forcing a teacher to stay after closing time. We introduced a monetary fine for late-coming parents. As a result, the number of late-coming parents increased significantly. After the fine was removed no reduction occurred. We argue that penalties are usually introduced into an incomplete contract, social or private. They may change the information that agents have, and therefore the effect on behavior may be opposite of that expected. If this is true, the deterrence hypothesis loses its predictive strength, since the clause ‘‘everything else is left unchanged’’ might be hard to satisfy.

- – This is a real-world example that “social contracts" or sanctions can be “crowded out" by official sanctions, and they may be more efficient.

Correlating Trust in the Lab and Trust Measured in Surveys

Glaeser, Laibson, Sheinkman and Soutter, "Measuring Trust", *Quarterly Journal of Economics,* Aug 2000, Vol. 115, No. 3: 811-846.

- Background:
  - The General Social Survey asks this question about Trust:
    - "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?
  - Question has been repeated on World Values Survey in many different countries.
  - The question has been used as a basis for measuring "trust" and "social capital" around the world.
  - Knack and Keefer, *QJE,* 1997 used this question to argue that trust can predict economic growth across countries.
- Question for these authors: Is trust on the survey correlated with trust in the lab?
- Explore this with Harvard undergraduates

- 258 Harvard UGs answer a survey, which includes the "trust question" plus a ton of other personal and demographic variables:
  - Age, economic background, numbers of friends, love life, important life events that may enhance or spoil trusting attitudes (e.g. being robbed, receiving charity, lending money to a friend, being lent money from a friend).
- 196 of these made it back to the lab to play two versions of a trust game
  - Trust Game 1: Standard Berg, Dickhaut, McCabe set up, with $k = 2$ rather than $k = 3$.
    - Subjects saw their partner
    - Were asked if they knew their partner and asked how many friends they had in common.
    - "Trust" is measured as the amount sent
    - "Trustworthiness" is measured by the amount sent back.
    - Some of these included a "promise" condition where the responder could promise to repay a certain amount.
  - Game 2: Envelope Drops
    - Subjects report their values for and envelope with $10 in it, addressed to the subject, that will be randomly dropped somewhere in Boston.

  - Higher values indicate more trust.

- General Results:
  - Measures of past trusting behavior are *better* than attitudinal questions on a survey at predicting actual *trusting* behavior in the experiment. This is based on an index of trusting behaviors developed by the authors. The trust question had only a 22.4% correlation with the amount sent, and the envelope drop had only 14.6% correlation.
  - However, survey did do better at predicting the trustworthiness. The trust question had 34% correlation with the conditional amount sent back.
  - They interpret this as very weak evidence for the predictive power of the trust question.
- Other interesting findings:
  - Social connections matter: The number of friends between the subjects overwhelmed most other measures for predicting trust.
  - Race matters: people of different races did not trust each other as much (based on 12 observations).
  - Social variables matter: Those who earn more have better educated parents, work fewer hours for pay, are members of volunteer organizations. They also have a more active love life.

TABLE III
AMOUNT SENT AS A FUNCTION OF SENDER CHARACTERISTICS

	(1)	(2)	(3)	(4)	(5)
Different sexes	−0.670	−0.128	−1.043	−0.358	−0.643
	(1.130)	(1.112)	(1.120)	(1.106)	(1.082)
Promise	0.043	−0.097	0.440	−0.038	−0.153
	(1.024)	(1.015)	(1.040)	(.992)	(0.995)
Male	0.147	0.623	−0.028	0.457	−0.013
	(1.197)	(1.174)	(1.148)	(1.149)	(1.138)
White	−0.330	−0.640	0.055	−0.227	−0.329
	(1.030)	(1.025)	(1.031)	(1.003)	(1.006)
Freshman	−0.205	−0.434	−0.254	−0.970	−0.305
	(1.136)	(1.125)	(1.092)	(1.081)	(1.086)
Only child	−1.620	−1.724	−1.555	−1.775	−1.569
	(1.53)	(1.474)	(1.496)	(1.530)	(1.492)
GSS trust	0.220				
	(1.022)				
Trust index		−0.094			
		(0.222)			
Trust strangers			2.209		
			(1.060)		
Trusting behavior index				0.403	
				(0.214)	
Mean reservation value					0.417
					(0.312)
Constant	13.361	13.009	9.836	12.707	13.336
	(2.448)	(1.735)	(2.272)	(1.648)	(1.639)
Adj. R^2	−0.059	−0.050	−0.009	−0.007	−0.034
Observations	93	90	92	93	95

Standard errors are in parentheses. All regressions are ordinary least squares.

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TABLE VI

INFLUENCE OF SOCIAL CONNECTION ON AMOUNT SENT AND RETURN RATIO

	Amount sent as function of sender and pair characteristics				Return ratio as function of recipient and pair characteristics			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Amount sent					0.0143	0.0151	0.0170	0.0140
					(0.0069)	(0.0069)	(0.0066)	(0.0069)
Promise	−0.0796	0.0308	0.0416	−0.0597	−0.0548	−0.0539	−0.0358	−0.0691
	(1.0060)	(1.0153)	(1.0319)	(1.0380)	(0.0511)	(0.0515)	(0.0501)	(0.0519)
Different sex	−0.2899	0.0455	−0.2118	−0.2243	0.0067	0.0331	0.0328	0.0050
	(1.1372)	(1.1890)	(1.1750)	(1.1657)	(0.0530)	(0.0577)	(0.0528)	(0.0536)
Male	0.3777	0.5750	0.6190	0.6453	0.0477	0.0622	0.0458	0.0448
	(1.1950)	(1.2007)	(1.2168)	(1.2251)	(0.0589)	(0.0621)	(0.0570)	(0.0584)
White	−0.3568	−0.1940	−0.2490		0.0589	0.0497	0.0567	
	(1.0082)	(1.0203)	(1.0274)		(0.0541)	(0.0553)	(0.0527)	
Freshman	0.3029	−0.0344	0.0387	0.0215	−0.0557	−0.0668	−0.0730	−0.0641
	(1.1270)	(1.1251)	(1.1484)	(1.1406)	(0.0549)	(0.0550)	(0.0532)	(0.0553)
Only child	−1.9766	−1.6304	−1.8404	−1.7288	−0.2222	−0.2447	−0.2149	−0.2302
	(1.5499)	(1.5724)	(1.5906)	(1.5966)	(0.0933)	(0.0944)	(0.0909)	(0.0950)
Trusting behavior index	0.3997	0.3788	0.4020	0.3964	0.0027	0.0061	0.0021	0.0061
	(0.2157)	(0.2199)	(0.2206)	(0.2216)	(0.0153)	(0.0153)	(0.0148)	(0.0153)
GSS trust	0.1581	0.1978	0.1580	0.2080	−0.1004	−0.1057	−0.1048	−0.0800
	(1.0136)	(1.0260)	(1.0323)	(1.0461)	(0.0530)	(0.0537)	(0.0516)	(0.0541)
Months since first meeting	0.1016				0.0060			
	(0.0614)				(0.0032)			
Number of common friends		0.0310				0.0026		
		(0.0321)				(0.0017)		
Different nationality			−0.2174				−0.1749	
			(1.2509)				(0.0616)	
White sender, Nonwhite recipient				−0.7496				−0.1092
				(1.4726)				(0.0623)
Nonwhite sender, white recipient				−0.2350				−0.1231
				(1.1579)				(0.0665)
Nonwhite sender, non-white recipient				−0.1040				−0.0893
				(2.5213)				(0.1250)
Constant	12.0169	11.6161	12.2148	12.1904	0.4327	0.4058	0.4533	0.5433
	(2.4486)	(2.5578)	(2.4951)	(2.5012)	(0.1501)	(0.1527)	(0.1462)	(0.1455)
Adjusted R^2	−0.0006	−0.0224	−0.0337	−0.0433	0.159	0.1457	0.2029	0.1471
Observations	92	92	92	92	89	89	89	89

Standard errors are in parentheses. All regressions are ordinary least squares.

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TABLE VII
SOCIAL CAPITAL, STATUS, AND THE RETURNS TO SOCIAL CAPITAL

	Amount sent as a function of sender characteristics (1)	Return ratio as a function of sender characteristics (2)	Financial returns to sender as a function of sender characteristics (3)	Financial returns to recipient as a function of sender characteristics (4)
Promise	−0.0450	−0.0103	0.1881	−0.2331
	(0.1010)	(0.0491)	(1.2238)	(1.5552)
Different sex	−0.8162	0.0887	2.0264	−2.8426
	(1.1147)	(0.0541)	(1.3510)	(1.7168)
White	0.2571	0.0114	0.4036	−0.1470
	(1.0743)	(0.0519)	(1.3021)	(1.6546)
Male	−0.1849	0.1008	2.8013	−2.9861
	(1.1733)	(0.0565)	(1.4220)	(1.8070)
Freshman	0.3741	−0.0174	0.4294	−0.0553
	(1.2394)	(0.0602)	(1.5021)	(1.9088)
Only child	−2.5365	0.0578	0.7949	−3.3314
	(1.5545)	(0.0780)	(1.8840)	(2.3941)
Father with college degree	−0.3324	0.1407	2.3978	−2.7302
	(2.0752)	(0.0987)	(2.5151)	(3.1961)
Hours worked for pay	−0.1441	−0.0092	−0.2273	0.0832
	(0.0869)	(0.0043)	(0.1053)	(0.1338)
Number of close friends	−0.0919	0.0112	0.1684	−0.2603
	(0.0658)	(0.0032)	(0.0798)	(0.1014)
Hours spent volunteering	0.0306	0.0261	0.6893	−0.6586
	(0.2031)	(0.0099)	(0.2462)	(0.3128)
Sexual partner	2.8618	0.1726	4.7588	−1.8969
	(1.4861)	(0.0723)	(1.8012)	(2.2889)
Beer servings	0.0471	0.0136	0.3399	−0.2929
	(0.1243)	(0.0063)	(0.1507)	(0.1915)
Amount sent		0.0118		
		(0.0065)		
Constant	13.7772	−0.0690	5.8516	22.9256
	(2.7993)	(0.1591)	(3.3926)	(4.3112)
Adjusted R^2	−0.0061	0.308	0.2006	0.0735
Observations	93	89	93	93

Standard errors are in parentheses. All regressions are ordinary least squares.