Theft, Gift-Giving, and Trustworthiness: Honesty is Its Own Reward in Rural Paraguay*

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Abstract

Rural areas of developing countries often lack effective legal enforcement. However, villagers who know each other well and interact repeatedly may use implicit contracts to minimize crime. I construct a dynamic limited-commitment model in which a thief cannot credibly commit to forego stealing from his fellow villagers but may be induced to limit his stealing by the promise of future gifts from his potential victim. Using a unique survey from rural Paraguay which combines traditional data on production with information on theft, gifts, and trust, as well as with experiments measuring trust and trustworthiness, I test whether the data is consistent with predictions from the dynamic model. The results provide evidence that, in contrast with predictions from a one-period model with an anonymous thief, farmers do implicitly contract with one another to limit theft. Farmers who have more close family members in their village give fewer gifts, and farmers with plots which are more difficult to steal from give fewer gifts, experience less theft, and trust more. Gift-giving increases when trust is lower and the threat of theft is greater, turning the social capital literature on its head.

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1 Introduction

Due to a lack of legal enforcement in rural areas around the world, theft between farmers is a common occurrence.[1] Fifty percent of survey respondents in rural Paraguay[2] reported that some item was stolen from them in the past year. Among those from whom something was stolen, median theft accounted for a loss of two percent of annual income. Not only is theft large, it also changes investment decisions, as forty-two percent of respondents said there was at least one crop they were discouraged from planting because of fear of theft.

Casual observation in Paraguay suggests that there is less theft from fields which are more difficult to steal from, and that there is more theft of crops such as watermelon which, in being easy to consume, are of greater value to thieves. Forty-two percent of households also admit to giving gifts to a person who is known to be a thief in the hopes that this untrustworthy person will limit the amount he steals from them.

A paper by Becker (1968) portrays a rational anonymous thief who weighs the benefits of stealing against the costs of possible punishment. This one-period model predicts that there will be more theft when the potential gains are greater and the probability of getting caught is smaller. A Beckerian model cannot shed light on how social ties can limit theft. Thus, while Becker's model can explain the casual observations above with regards to theft, it cannot explain why the same households which are vulnerable to theft also give more gifts or why a household would give gifts to an untrustworthy neighbor.

Research has shown that farmers in rural areas have extensive knowledge of each other's actions, interact with each other on a daily basis, and contract over many aspects of their lives (Platteau & Nugent 1992, Udry 1994). Given the lack of anonymity and the long-term nature of relationships that characterize life in rural Paraguay, villagers should be able to use informal contracts[3] with one another to prevent excessive theft as well.

In this paper I expand on Becker's one-period model of a rational thief by constructing a dynamic limited-commitment model in which the formal

[1]Anthropologists have discussed theft between fellow villagers in the context of Mexico (Foster 1965), Vietnam (Paige 1975), Italy (Banfield 1958), and Malaysia (Scott 1985).

[2]The survey covered 225 households in rural Paraguay in 2002.

[3]Here, a contract does not refer to a formal written contract, but rather an unwritten system of sanctions and rewards.

judicial system is ineffective. An agent cannot credibly commit to refrain from stealing from another agent, and so must be induced to limit his theft by the promise of future gifts. [4] This type of model has been used to investigate efficient dynamic contracts in the absence of commitment with regards to sovereign debt (Kletzer & Wright 2000) and mutual insurance mechanisms (Ligon et al. 2002, Kocherlakota 1996), though it has not previously been applied to theft.

There is a large literature on property crime in the United States (Levitt 2004, Gould et al. 2002), but this literature focuses on anonymous urban crime by thieves who do not know the people from whom they are stealing. The model presented here is novel in the economic literature on crime, as most other papers do not consider interactions between thieves and their victims. Economists often model thieves interacting with other thieves, teaching each other methods or exerting peer pressure (Glaeser et al. 1996), or victims interacting in neighborhood watch programs (Huck & Kosfeld 2004). However, there are few models in which victims interact with thieves, and there are no empirical papers that I know of on the topic.

There are two notable papers which model interactions between thieves and victims from a theoretical perspective. While Akerlof & Yellen (1994) focus on urban crime and a community's decision to accept crime by gang members, Mui (1995) focuses on rural crime. One farmer sabotages a second farmer's product due to his feelings of envy, and the second farmer limits sabotage by giving gifts. The act of sabotage gives no monetary benefits in Mui's model, only serving to reduce the saboteur's envy. In the envy model thieves must be poorer than their victims, and gift-giving will occur even in the one-shot game.

Economists are accustomed to thinking of gift giving as something one does on the holidays, a means of trade, or a means of reciprocal exchange. The predictions of the dynamic limited-commitment model show that gifts are also given to potential thieves to deter theft. This is contrary to the predictions of fairness models in which agents reward actors with good intentions (Rabin 1993) or give gifts to reduce inequality (Fehr & Schmidt 1999), as well as contradicting predictions of mutual insurance models (Coate & Ravallion 1993) in which households give gifts to those households with whom they have fewer enforcement problems. Of course households give gifts for a myr-

[4] Udry (1994) finds that the inability to commit is more important than informational constraints in determining contracts in rural Nigeria.

iad of reasons: a preference for fairness, a form of mutual insurance, and a desire to appease potential thieves. This last reason for gift-giving, while not the only reason, has been generally ignored in the economic literature but is economically significant in rural Paraguay.

Using data from rural Paraguay, I test for evidence of contracting between thieves and their victims. Researchers in Paraguay and at the University of Wisconsin collected panel data from over 200 rural households in sixteen randomly selected villages of rural Paraguay at three points in time throughout the 1990's (Carter & Olinto 2003). I conducted a fourth round of data collection in 2002 adding questions designed to look specifically at the issues raised in this paper. In addition to the original, more standard, questions on income and production, detailed questions on theft experienced by a household, gifts they gave, and survey data on their level of trust in fellow villagers were added to the survey. I also ran a series of economic experiments measuring trust, trustworthiness, and risk aversion with the same households which responded to the survey. The main limitation of the dataset is the relatively small sample size of 223 households. There is a tradeoff though between data quality and quantity. This unique dataset combines repeated observations of real-world decisions made by the household, survey measures of trust and perceptions of theft, and experimental data on trusting and trustworthy behavior.

To empirically test the predictions of the model, I estimate a system of three equations using the generalized method of moments (GMM) with theft experienced, gifts given, and trust as the left hand side variables. Evidence is provided that farmers do contract with each other to limit theft, suggesting that the limited-commitment model constitutes an empirically important extension to the Beckerian model. Living closer to a police station actually increases the amount of theft experienced by a household, consistent with the local perception that the police are corrupt. Households with fields which do not border commonly used footpaths experience less theft, give fewer gifts, and have a greater level of trust in their fellow villagers. Thus people who own fields which are more difficult to steal from are doubly rewarded. They can give fewer transfers both in the form of theft and in the form of gifts to their fellow villagers.

Households which live in the same village with more of their close family members give fewer gifts. This contradicts the perception in the existing 'social capital' literature that relatives give each other more gifts than other households.[5] Putnam states that "in communities where people can be confident that trusting will be requited, not exploited, exchange is more likely to ensue." (Putnam 1993, page 172) However, these results are in accord with the predictions of the limited-commitment model if family members are either more trustworthy when acting with one another or if they monitor each other's fields more. Instrumenting for crop choice and controlling for wealth effects I find that households which plant the five most commonly stolen crops give significantly more gifts than households which do not. These results taken together show the importance of informal enforcement mechanisms to limit theft.

The remainder of this paper is organized as follows. Section 2 briefly discusses anthropological literature on theft and then lists eight stylized facts about theft in rural Paraguay. In Section 3, I lay out the dynamic limited-commitment model and compare the implications of that model with those of a Beckerian model. Section 4 describes the survey data and experiments while Section 5 uses the data to test the implications of the two models. Section 6 concludes.

2 Stylized Facts about Theft

Anthropologists discuss different reasons for sharing, including trade, altruism, reciprocity, and 'tolerated theft'. Blurton-Jones (1987) claims that due to diminishing marginal returns, it will not always pay the owner of a stock of food to defend it against a hungry village-mate who will be willing to fight harder for the food. Food taken under the guise of tolerated theft may be taken through force, or it may be passively transferred in an attempt to avoid force. Hawkes (1993) points out that a central difference between reciprocity and tolerated theft is that in the former those who acquire resources have control over *who* receives shares, while under the latter they only have control over as much of the resource as they can defend. Bliege-Bird & Bird (1997) found that when a sea turtle was caught in Australia's Torres Strait those households living near the butchering household, not near the household responsible for catching the sea turtle, received greater shares of the sea turtle, supporting the hypothesis of tolerated theft over reciprocity or trade.

[5] The giving we measure here does not include Christmas or birthday presents, only the giving of agricultural products or livestock.

Scott (1985) proposes another view of theft as an "everyday form of peasant resistance". In Malaysia the victims of theft tended to be the peasants who had mechanized instead of employing poorer peasants to do the same work. In Malaysia the threat of theft was used to ensure a continued stream of transfers specifically in the form of jobs, while in Paraguay it ensures a continued stream of transfers in the form of jobs, loans, and gifts.

I will now lay out some stylized facts about theft in rural Paraguay followed by evidence supporting each fact.

1. *The motivation for stealing 'smaller' items is different than the motivation for stealing 'larger' items.* Small items include all crops, chickens, pigs, and small tools such as machetes and hoes. Large items include cows, horses, and large tools such as chain-saws and tractors. For every item stolen from them, survey respondents were asked if they knew or suspected who stole it and if they said yes, they were asked a set of questions about the thief. Of those items for which the thief's identity was known, 70 percent of smaller items were stolen by a neighbor or a relative while only 18 percent of larger items were stolen by a neighbor (and none by relatives).

   The theft of large items is more likely to be reported to the authorities than the theft of small items. It might be difficult to prove the identity of a thief who steals a bit of corn every week, but it is less difficult to prove the identity of the thief of a branded cow or a chain-saw. While only four percent of known thieves of small items were reported to the police, 64 percent of thieves of large items were reported. Sixty-six percent of the known thieves of small items were given gifts, lent money, or hired by the victim before the theft while only 36 percent of the known thieves of large items were given these transfers. Because of the difference in motivations underlying the theft of small and large items I will only focus on the theft of smaller items, and the word theft in the rest of these stylized facts and of this paper refers only to the theft of smaller items.

2. *Theft is common and economically important.* Forty-three percent of households had some small item stolen from them in the past year. The median value stolen, conditional on being stolen from was 100,000 Guaranies (around $17) which is a one percent loss of median household

income.[6]

3. *Victims know who is stealing from them.* Forty-seven percent of those who experienced theft knew or suspected who the thief was of at least one of the items stolen from them in the past year.[7]

4. *Thieves receive less disutility from thieving than do other households.* Seventy percent of the victims who suspected a specific perpetrator said the thief committed the crime because of poverty, two percent because of revenge and four percent because of envy. Twenty-five percent added in their own option of either habit or 'no shame' (*sin vergüenza*).[8]

5. *Victims do not report thieves to the police or punish them physically.* Only 14 percent of households which suspected the identity of the thief yelled at him and only four percent reported him to the authorities. Households were asked why they did not report a thief to the authorities. Nine percent were not reported because of fear of reprisal, 30 percent were not reported because the victim said reporting the theft wouldn't do any good, there was no place to report it, or it was too difficult and 57 percent were not reported because the victim didn't feel the crime was serious.

6. *Vigilance helps limit theft.* When a crop is planted closer to home, or on a plot which is not located along a major footpath, there is less theft. Table 1 compares crops planted on plots which no non-household member walks past and those planted on plots which one or more people walk past per week. Note that the amount of theft is not negligible. More is stolen from fields which more people walk past, though for only two of the crops is the difference significant. If many people walk past a field they all know what is planted there and when it will be ready to harvest, and they can easily stick a bit of produce in their pocket as they walk past. A similar analysis shows that crops are more likely to be stolen when they are planted on plots further from home.

[6] Total theft is two percent of median household income, while theft of small items is one percent.

[7] Local informants claim that even if they do not know exactly who stole from them that they can often narrow it down to one of two or three different households.

[8] One might think that even more victims would have chosen 'no shame' if it had been an option on the list.

Table 1: **Number of different people who walk past the field each week and amount stolen.** Standard errors in parenthesis, number of observations in brackets. The columns on the left are the total quantity of output stolen from fields past which no-one walks/people walk in the entire survey divided by the total quantity of crop output grown on those same fields. The columns on the right are the average percent stolen from all households in the survey. +/- is the sign of the difference in percentages stolen, and * means the difference is significant at the 10% level in a one-tailed t-test.

	% quantity stolen in survey		% quantity stolen for each household	
Crop	0 people	1 or more people	0 people	1 or more people
Banana	1.75%	4.20%	2.79%	3.39%
+			(2.17)	(1.80)
			[9]	[32]
Red Corn	0.17%	1.02%	0.47%	0.94%
+			(0.47)	(0.67)
			[54]	[115]
White Corn	0.00%	2.34%	0.00%	1.46%
+*			(0.00)	(0.71)
			[45]	[104]
Fresh Corn	0.57%	9.96%	2.22%	3.52%
+			(1.69)	(1.45)
			[51]	[123]
Melon	0.00%	2.57%	0.00%	2.45%
+			(0.00)	(1.59)
			[12]	[22]
Watermelon	0.39%	10.93%	0.83%	8.22%
+*			(0.62)	(4.61)
			[20]	[26]
Yucca	0.51%	0.57%	1.21%	1.06%
+/-			(0.79)	(0.32)
			[63]	[140]

7. *Households give transfers to thieving households to avoid being stolen from.* Households were given a list of options of actions they might undertake to avoid theft such as monitoring their fields at night or planting easily stealable crops further from footpaths. One option was "If you know someone is a thief, do you give him gifts to avoid getting stolen from?" Forty-two percent of households answered yes.

   In general, victims are on friendly terms with thieves. Sixty-six percent of the suspected thieves received gifts, work, or loans from their victim before the theft, while 82 percent were from the same village as the victim. In fact, the thieves are often close neighbors (54 percent) or relatives (16 percent) of the victim. Some households continue giving transfers to thieves even after they are stolen from, while others stop transfers after they are stolen from. The survey asked "Did you [give gifts to the thief/hire him/lend him money] before the theft? after the theft?" Twenty-seven percent of households continue giving some type of transfer to the thief after the theft and 54 percent stop giving some type of transfer to the thief after the theft.

8. *Investment decisions are distorted due to the potential of theft.* Another option on the list of things a household could do to prevent theft was to avoid planting more easily stealable crops in plots adjoining popular footpaths. Fifty-six percent of households claimed to do so. The survey also asked each household if there was a crop they would have wanted to plant, but didn't because of fear of theft. Forty-two percent of respondents said there was a crop they were discouraged from planting and eight percent said there was an animal they were discouraged from raising because of fear of theft.

These stylized facts can give us a simple characterization of rural theft in Paraguay. Households claim to give transfers (of corn, chicken, yucca) to those households who they know are not trustworthy. Additionally, these households are implicitly allowed to steal a basic amount in order to prevent them from stealing larger amounts. Households are sanctioned if they steal more than is acceptable by being cut off from future transfers.

3 Dynamic Limited-Commitment Model

3.1 Layout of Model

The description above is in accord with a model of limited-commitment. The farmer gives two types of transfers to the thief: gifts and prescribed theft. The thief cannot commit to steal only the prescribed quantity. If the thief does steal more than he is prescribed to steal, the farmer will know, and will punish him by cutting him off from future transfers (both gifts and prescribed theft).[9] This game is repeated forever. The following model is similar to models used by Ligon et al. (2002) Kocherlakota (1996), and Kletzer & Wright (2000).

Before each period there is uncertainty as to what the cost of stealing will be in that period. For example, a farmer may be home eating his mid-morning breakfast when a potential thief walks past his field. If that is the case, the thief can much more easily pick a few watermelons as he walks by since nobody is there to see him. On the other hand, the farmer may be working in the field when the potential thief walks past, and then it will be quite difficult to steal. The farmer can give gifts, which do not depend on the state of nature (i.e., do not depend on how easy it is to steal in that period) and are not costly for the thief, and he can prescribe theft, which is state dependent (depending on how easy it is to steal in that period) and costly for the thief as he must wait for the moment when no one is around or sneak out in the rain to avoid being seen.

Note that the thief prefers his transfer as a gift, rather than as prescribed theft, so as not to incur the costs of theft. The farmer also prefers giving gifts because the value of the transfer he has to give to maintain the thief's utility at some level is smaller when it is in the form of a gift. If the farmer were able to give a state-contingent gift then there would never be any theft in equilibrium, but, as he is not, there will be some prescribed theft, even though it is costly for both agents.

Before the state is realized, the farmer sets the level of prescribed theft for every possible state and the size of the state-independent gift he will give the thief at the end of the period, if he finds that the thief has stolen no more than was prescribed. The state of nature is then realized and the thief decides how much to steal (and steals that amount). At this point the farmer

[9] If the farmer doesn't give the gift, the thief can punish him by stealing.

is no longer able to change his promised gift level. The farmer observes how much the thief stole and decides whether or not to give him the gift. If the thief stole more than the prescribed amount, the farmer has no reason to give him the gift. If the thief stole the prescribed amount then the farmer may transfer him the gift.

The farmer plants a crop with sure output y^1, and the thief plants a crop with sure output y^2. If output were risky then theft would serve an insurance function, but for the purposes of this paper I assume no output uncertainty.[10] The farmer transfers a 'gift' of ω to the thief. This transfer does not depend on the state of nature. He also prescribes a permissible (p) amount of theft r_s^p for every possible state (s) of nature. In equilibrium the farmer consumes $y^1 - \omega - r_s^p$ and the thief consumes $y^2 + \omega + r_s^p$.

If the thief deviates, stealing an amount r_s^d greater than the prescribed amount r_s^p, he receives trustworthiness disutility from doing so, akin to his feeling of guilt or pride.[11] The more disutility an agent gets from stealing the more 'trustworthy' he is. This disutility from stealing is $t(r_s^d)$ and it increases in the amount stolen at a non-decreasing rate (i.e., $t'(\cdot) > 0$ and $t''(\cdot) \geq 0$). Trustworthiness disutility can be negative for small levels of theft, meaning that the thief receives utility from stealing. It is only necessary that the function be convex. The cost of stealing is $c(s, r_s)$, which is different in each state of nature. This cost also increases in the amount stolen at a non-decreasing rate, in every state (i.e $c'(s, \cdot) > 0$ and $c''(s, \cdot) \geq 0 \ \forall s$). Note that all theft is costly, but only deviation level theft yields trustworthiness disutility.

If this were not a repeated game and the thief and farmer only met once, then there would be a high level of deviation theft and no gift given. Recall that the timing of the model is 1) the farmer sets the gift level and the level of prescribed theft in each possible state, 2) the state is realized and the thief decides whether to steal the prescribed amount or some greater amount so as to maximize his momentary utility, 3) the farmer decides whether or not to give the thief the gift. One can use backwards induction and see that in the one-shot game the farmer will never give the gift. Knowing this, the thief will steal the amount which maximizes his momentary utility (and is in

[10] Fafchamps & Minten (2004) show that crop theft does increase with transitory poverty.

[11] Andreoni & Miller (2002) and Fehr & Gächter (2000) used experiments to show that individuals have heterogeneous preferences, some being selfish and others altruistic or reciprocating. Posner (1998) uses "moral pride" as an explanation for non-self interested behavior (i.e., some people do not like to think of themselves as thieves).

general greater than the prescribed amount).

3.2 Punishment for Deviating

In the infinitely repeated game, an equilibrium with no stealing above the prescribed amount is enforceable with threat of punishment. Abreu (1988) proves that all perfect equilibria can be found using the worst perfect equilibria for each player as punishment when that player deviates. As autarky is the unique Nash equilibrium for the single-period game, permanent autarky is one sub-game perfect Nash equilibrium for the infinitely repeated non-cooperative game and a potential candidate for the punishment strategy.

Abreu (1988) discusses that it is often possible to design 'stick and carrot' punishments which are more harsh than simple reversion to autarky. These strategies employ a 'stick' punishment taken in the first few periods after deviation, followed by a more desirable 'carrot' played until another player deviates. The existence of a 'stick and carrot' punishment depends on the existence of an action the non-deviating agent can undertake which will make the deviator worse off no matter what action he undertakes.[12]

In the current model, if the thief deviates, there is no 'stick' the farmer can use which is worse than autarky, i.e., giving no transfer.[13] On the other hand, there is a 'stick' worse than autarky which the thief can employ. He can steal more than the amount maximizing his momentary utility for a few periods, in order to punish the farmer. The thief wouldn't want to enforce this punishment, because he prefers stealing his optimal amount and no more than that. If the thief failed to impose the punishment and stole only the optimal amount after the farmer deviated, the farmer could not impose any punishment on him harsher than autarky. Thus, this 'carrot and stick' punishment by the thief is not credible, and so autarky is the worst sub-game perfect Nash equilibrium in this game.

[12]In Abreu's oligopoly example the punisher produces a high amount, making the deviator worse off than he would have been with the Cournot-Nash reversion solution of producing a medium amount.

[13]The comparative statics derived from the model would not change if the farmer had access to some costly punishment he could impose on the thief in addition to cutting off future gifts, though the level of cooperation would be higher.

3.3 Finding the Constrained-Efficient Frontier

The deviation continuation utility (utility from autarky) for the farmer is D^1 and for the thief D^2. I assume that in autarky the thief receives trustworthiness disutility for whatever he steals. The farmer and thief's momentary utility functions are represented by $v(\cdot)$ and $u(\cdot)$ respectively. The value function for the continuation utility of the farmer is $V(\cdot)$, and U represents the thief's continuation utility.

The Pareto efficient frontier is found by maximizing the farmer's utility subject to keeping the thief's (ex-ante expected) utility at U for all possible U. The probability of each state of nature is π_s and β is the discount factor. The Inada conditions hold, with $\lim_{y\to 0} u'(y) = \infty$, $\lim_{y\to\infty} u'(y) = 0$, $u'(\cdot) \geq 0$, and $u''(\cdot) < 0$ (and likewise for $v(\cdot)$). The gift and prescribed theft are constrained to be non-negative. The farmer's maximization problem is:

$$V(U) = \max_{\omega,\{U_s,r_s^p\}_s} \sum_s \pi_s[v(y^1 - \omega - r_s^p) + \beta V(U_s)]$$

subject to the following constraints.

$$\sum_s \pi_s[u(y^2 + \omega + r_s^p) - c(s, r_s^p) + \beta U_s] = U \tag{1}$$

$$u(y^2+\omega+r_s^p)-c(s,r_s^p)+\beta U_s \geq u(y^2+r_s^d)-c(s,r_s^d)-t(r_s^d)+\beta D^2 \quad \forall s, r_s^d \tag{2}$$

$$v(y^1 - \omega - r_s^p) + \beta V(U_s) \geq v(y^1 - r_s^p) + \beta D^1 \quad \forall s \tag{3}$$

$$r_s^p \geq 0 \quad \forall s \tag{4}$$

$$\omega \geq 0 \tag{5}$$

The first constraint is the promise keeping constraint which ensures that the thief's expected utility is maintained at some level. The second and third are the thief and the farmer's incentive compatibility (IC) constraints which ensure that in each state of nature the agents are at least indifferent between the equilibrium strategy and deviating. The last two are non-negativity constraints on theft and the gift.

The contract can be computed recursively, given an initial value for U, by solving the dynamic program for the initial transfers, prescribed theft, and continuation utilities in each possible state s. Then in the next period one solves the program again given the new value for the target utility level

U (which will equal U_s from the previous period, depending on which state was realized).

The amount of deviation level theft the thief would undertake when not in equilibrium will solve his maximization problem so that $r_s^{*d} = \text{argmax}_r\, u(y^2 + r) - c(s,r) - t(r)$ over all $r_s^{*d} \geq 0$. If the thief's IC constraint (2) binds, it will only bind for $r = r_s^{*d}$, and so one can ignore all $r \neq r_s^{*d}$. Interestingly, households for which $u'(y^2) < c'(s,0) + t'(0)$ for every possible state s will have a corner solution. These are households with such a high trustworthiness disutility that they will never steal more than the prescribed amount no matter what. This is a good motivation for dividing the model into two agents, one who is a potential thief and one who is not.

The first-order condition for U_s simplifies to

$$V'(U_s) = -\frac{\lambda + \mu_s}{1 + \nu_s}. \tag{6}$$

where λ is the multiplier on the promise keeping constraint (1), $\mu_s \pi_s$ on the thief's incentive compatibility constraint (2), $\nu_s \pi_s$ on the farmer's incentive compatibility constraint (3), $\phi_s \pi_s$ on the theft non-negativity constraint (4), and ξ on the gift non-negativity constraint (5). I can also use the envelope theorem to show that

$$V'(U) = -\lambda. \tag{7}$$

The first order conditions with respect to r_s^p is

$$\frac{v'(y^1 - \omega - r_s^p)}{u'(y^2 + \omega + r_s^p) - c'(s, r_s^p)} - \frac{(\phi_s + \nu_s v'(y^1 - r_s^p))}{(1 + \nu_s)(u'(y^2 + \omega + r_s^p) - c'(s, r_s^p))} = \frac{\lambda + \mu_s}{1 + \nu_s}. \tag{8}$$

Combining the first order conditions with respect to r_s^p (8) and U_s (6) with the envelope condition (7) we see that λ equals the ratio of marginal utilities in the previous period if prescribed theft was positive and the farmer's IC constraint didn't bind and λ equals the ratio of marginal utilities in the current period if neither agent's constraints bind and prescribed theft is positive.

3.4 Characterization of Contracts

It is possible to prove a proposition related to one found in Ligon et al. (2002), and as the proof is almost identical it is omitted here for the sake of brevity. The history of states up to and including date t is $h_t = (s_1, s_2, \ldots, s_t)$.

Proposition 1. *Any constrained-efficient contract can be characterized as follows: There exist S state dependent intervals* $[\underline{\lambda}_s, \overline{\lambda}_s]$ *such that* $\lambda(h_t)$ *evolves according to the following rule. Let* h_t *be given and let s be the state which occurs at time t; then*

$$\lambda(h_t) = \begin{cases} \underline{\lambda}_s & \textit{if } \lambda(h_{t-1}) < \underline{\lambda}_s \\ \lambda(h_{t-1}) & \textit{if } \lambda(h_{t-1}) \in [\underline{\lambda}_s, \overline{\lambda}_s] \\ \overline{\lambda}_s & \textit{if } \lambda(h_{t-1}) > \overline{\lambda}_s \end{cases} \tag{9}$$

where $\underline{\lambda}_s = -V'(\underline{U}_s)$, *and* $\overline{\lambda}_s = -V'(\overline{U}_s)$. *I define* $\underline{U}_s$ *as the lowest sustainable continuation payoff that the thief could receive in state s so as to just satisfy his IC constraint (2). Likewise* $\overline{U}_s$ *is the highest sustainable continuation payoff that the thief could receive in state s so as to just satisfy the farmer's IC constraint (3). This completely characterizes the contract once an initial value for* $\lambda(h_{t-1})$ *is given.*

Thus we see that, if possible, the transfers are fixed so as to keep the ratio of marginal utilities ($\frac{v'(y^1-\omega-r_s^p)}{u'(y^2+\omega+r_s^p)-c'(s,r_s^p)}$) constant over time and over states. If some constraint is binding, the ratio will be changed by the minimum possible to satisfy the constraints.

3.5 Comparative Statics

I will now derive comparative statics to look at the effects of changes in exogenous features such as a) the cost of stealing ($c(s, r_s)$), b) trustworthiness ($t(r_s)$), and c) risk aversion on endogenous variables such as i) gifts given (ω) ii) prescribed theft (r_s^p) and iii) trust.

I consider trust to be an endogenous variable (while trustworthiness is an exogenous variable effecting trust).[14] Hardin (2002) emphasizes that trust is relational (i.e., two peoples' level of trust depends on their ongoing interaction) as is the case here. He defines trust as "encapsulated interest". One agent (the farmer) trusts a second agent (the thief) because he knows the thief values the continuation of the relationship, and because of that he will take the interests of the farmer into account. Levi (2001) claims that distrust raises the "transaction costs" of cooperation.

[14] Much of the social capital literature considers trust to be endogenous, though there is a strain of empirical work which considers trust to be exogenous and looks at the effects of trust without looking at its causes.

In accord, I measure (lack of) trust as the sum of the multipliers on the thief's incentive compatibility constraint (2) over states ($\sum_s \pi_s \mu_s$) given some reference utility U for the thief. This reference utility could be the thief's utility in a world in which theft was impossible. This Lagrange multiplier is a measure of how the farmer's maximized expected utility reacts to a slight relaxation of thief's incentive compatibility constraint. If the thief's incentive compatibility constraint were never binding, and he would never steal anything in any state, then the multiplier will equal zero, and the farmer has complete trust in the thief. As the thief becomes more and more willing to steal and more costly to convince not to steal the multiplier increases and the farmer trusts him less. This corresponds with Hardin's definition of trust in that as the thief's utility in autarky increases he cares less about the continuation of the gift-giving relationship with the farmer. Then he becomes more costly to convince not to steal and the farmer trusts him less.

Looking at Equation (8) one finds that when $\phi_s = 0$ (prescribed theft is greater than zero) and $\nu_s = 0$ (the farmer's constraint does not bind), U_s is a non-decreasing function of $\omega + r_s^p$. Because Equation (8) has to hold in each state of nature and each period, states which offer higher continuation utility must also prescribe more theft, and so each U_s is an increasing function of the prescribed theft r_s^p in that state and of $\omega + r_s^p$.

If the thief's incentive compatibility constraint (2) is binding, then as his trustworthiness decreases (i.e., as $t(\cdot)$ falls for all theft levels) he must have both higher consumption and higher continuation utility (since I have shown above that the two must go in the same direction). Thus, contrary to what one might expect, *ceteris paribus*, more trustworthy agents consume less and have lower utility. A farmer gives transfers to those agents who are not trustworthy in order to avoid being stolen from. Trustworthy agents provide a lower threat, and so do not have to be bribed by being given transfers.[15]

It has been shown that a less trustworthy agent has higher consumption, but does this come from a higher gift ω or higher prescribed theft r_s^p? Because this less trustworthy agent has a higher continuation utility (U_s), his momentary utility must be higher in the next period as well. As theft is costly, the farmer will prefer to increase the thief's momentary utility through gifts rather than through prescribed theft when possible. This can also be seen by noting that for a less trustworthy agent $\underline{U}_s$ will be higher, and so in

[15]I have assumed that villagers know each other's levels of trustworthiness, so a thief cannot misrepresent himself as being untrustworthy in order to receive more gifts.

the stochastic steady state he will consume more. As the gift is not costly, most of this higher consumption will come through a higher gift.

When a farmer has less trustworthy neighbors, his trust decreases as well. Because $V'(U_s) = -\frac{\lambda+\mu_s}{1+\nu_s}$ the higher U_s obtained by less trustworthy agents implies that $\frac{\lambda+\mu_s}{1+\nu_s}$ must be higher as well. As λ does not depend on the state s, and it cannot be the case that both agents' incentive compatibility constraints bind, if the thief's IC constraint (2) binds then $\nu_s = 0$. Thus the higher continuation utility U_s obtained by less trustworthy agents implies that μ_s is higher as well. This means that a less trustworthy thief causes the farmer to be less trusting.

An analysis of the effects of a change in the cost structure of stealing is similar to the analysis of a change in trustworthiness. If the thief's IC constraint (2) is binding in a period in which it is easy to steal, and the probability of that easy state increases or the marginal cost in that state decreases the thief will steal more when deviating. The thief will have to have increased consumption $(\omega + r_s^p)$ and continuation utility U_s to compensate him. While a change in trustworthiness affects the thief's momentary utility when deviating in all states, a change in the marginal cost of stealing only affects momentary utility when deviating in the state in which the cost changes. A decrease in the cost of stealing in all states will cause an increase in the size of the gift, similar to the case of a decrease in trustworthiness disutility. An increase in the variance of the cost of stealing, on the other hand, will cause an increase in theft in the states in which theft is easiest. As an easy state becomes more probable or the marginal cost in a state decreases, the weighted average of U_s also increases, causing the weighted average of μ_s to increase, which means that the farmer's level of trust is lower when it is easier to steal.

One can show that as the farmer becomes more risk averse he gives more gifts. As the farmer's risk aversion increases, his continuation utility from autarky (D^1) decreases. (This is because in autarky his consumption level will vary more as he will get stolen from more in easy states and less in difficult states.) As this relaxes his incentive compatibility constraint (3) the total transfer he gives will increase. Because he is more risk averse and because theft is costly he must give a higher (state-independent) gift, and not higher (state-dependent) prescribed theft.

3.6 Model with Crop Choice

Imagine that a farmer can choose between planting two crops. The more 'easily stealable' crop (e.g. watermelon) has a higher value per handful but a slightly lower quantity output. The less 'easily stealable' crop (e.g. cotton) has a lower value per handful but a slightly higher quantity output. Assume that in a world with no theft the more easily stealable crop would be more profitable. Given the possibility of theft, the less easily stealable crop may be more profitable, and so the potential for theft may affect crop choice. If fear of theft discourages a farmer from planting a more profitable crop, there will be a decrease in efficiency due to the lack of enforcement.[16]

Conditional on crop choice the comparative statics derived in the previous section should still hold, although they will not hold if one does not condition on crop choice. As a thief becomes less trustworthy he will be transfered a higher gift if the farmer continues planting the same crop. If the thief becomes so untrustworthy that the farmer switches to a lower value crop, then a less trustworthy thief will actually receive a gift which is lower in value. (The same analysis holds as the probability of a low cost state goes up).

Imagine two farmers who are both indifferent between planting the high value and low value crops, but for historical reasons one chooses to plant the high value crop and the other chooses to plant the low value crop. Using an analysis similar to that for a decrease in trustworthiness, I find that the farmer who plants the more easily stealable crop will give more gifts and trust less.

3.7 Comparative Statics from a One-Period Anonymous Model

I derived comparative statics from a dynamic limited-commitment model above, and now derive comparable comparative statics from a Beckerian (one-period anonymous thief) model. In a simple Beckerian model, an anonymous thief decides whether or not to steal by comparing the gains from stealing with the probability of being caught and punished. The probability of being caught in this model and the cost of stealing in the dynamic limited-commitment model can be measured by quite similar variables in the data. As the probability of being caught rises, the potential thief becomes less likely

[16]The Coase theorem does not hold because of the inability of the thief to commit to limiting theft.

to choose to steal. Also, as a farmer plants crops which are more valuable per handful stolen theft will increase.

It is possible to extend the Beckerian model to account for the risk aversion of the farmer. In the one-period anonymous model, a farmer who is more risk averse would rather spend a fixed amount on protection than run a greater risk of being stolen from. Thus, a more risk averse farmer will monitor more, increasing the thief's probability of being caught. Thus, a more risk averse farmer will experience less theft than a less risk averse farmer.

The Beckerian model can also be extended to take into account trust and trustworthiness. If the potential thief receives trustworthiness disutility when he steals, as a potential thief becomes more trustworthy he is less likely to choose to steal. One can also define trust, in a rather ad hoc way, as the probability with which a farmer thinks his neighbors will choose to steal from him. In this case, as the probability of being caught rises, a neighbor's trustworthiness rises, or the farmer's risk aversion increases, the farmer will become more trusting.

Though the simple model of a one-shot game and an anonymous thief can be extended to account for trust and trustworthiness, it will not give comparative statics for gifts given. The fact that it is a one period model and the thief is anonymous precludes the potential for using transfers as a means of contracting in order to limit theft.

3.8 Comparison of One-Shot and Limited-Commitment Predictions

Let us review and compare the comparative statics implied by the limited-commitment and one period models of theft. Comparative statics have been derived for the three endogenous variables: gifts given, theft experienced, and trust. The three main categories of exogenous variables are the cost of stealing, the risk aversion of the farmer, and the trustworthiness of his neighbors. Also, the crop choice decision is made by the farmer in the model before his other decisions regarding gifts and theft, so, one can derive comparative statics for that variable as well. I will look at each in turn, and a summary of the comparative statics can be found in Table 2.

The limited-commitment model predicts that as the cost of stealing goes up a farmer will a) give a lower total value of gifts, b) experience less theft, and c) trust more. As the farmer becomes more risk averse he should a)

Table 2: **Comparative statics from the limited-commitment model and a one-period anonymous (OPA) model**

	Theft (Th)	Giving (G)	Trust (Tr)
Cost of stealing (C)	$\frac{dTh}{d\text{Var}(C)} > 0$	$\frac{dG}{dC} < 0$	$\frac{dTr}{dC} > 0$
Implied by OPA?	$\frac{dTh}{dC} < 0$	$\frac{dG}{dC} \lesseqgtr 0$	Yes
Risk aversion (γ)	$\frac{dTh}{d\gamma} < 0$	$\frac{dG}{d\gamma} > 0$	$\frac{dTr}{d\gamma} \lesseqgtr 0$
Implied by OPA?	Yes	$\frac{dG}{d\gamma} \lesseqgtr 0$	$\frac{dTr}{d\gamma} > 0$
Trustworthiness (Tw)	$\frac{dTh}{dTw} \lesseqgtr 0$	$\frac{dG}{dTw} < 0$	$\frac{dTr}{dTw} > 0$
Implied by OPA?	$\frac{dTh}{dTw} < 0$	$\frac{dG}{dTw} \lesseqgtr 0$	Yes
Plant stealable crop (Pl)	$\frac{dTh}{dPl} \lesseqgtr 0$	$\frac{dG}{dPl} > 0$	$\frac{dTr}{dPl} < 0$
Implied by OPA?	$\frac{dTh}{dPl} > 0$	$\frac{dG}{dPl} \lesseqgtr 0$	Yes

give more gifts and b) experience less theft. The limited-commitment model also shows that a farmer with more trustworthy neighbors should a) give more gifts and b) trust more. Lastly, the limited-commitment model shows that, all else equal, if a farmer plants more easily stealable crops he will a) give more gifts and b) trust less (while the effects on the level of theft are indeterminate). In general, the one-shot model of an anonymous thief makes no predictions about gift-giving. On the other hand, some of the predictions about theft experienced which are quite strong in the one-period model are indeterminate in the dynamic limited-commitment model.

4 Data

In 2002 in Paraguay I collected an exciting new data set combining traditional survey data on production with non-standard questions measuring real-world economic variables such as theft experienced and agricultural giving. Respondents were also asked their level of trust. To complement the survey data and be better able to answer questions raised by the model, I also ran experiments measuring the trust, trustworthiness, and risk aversion of the respondents. It is quite unusual to have both detailed economic survey data and experimental measures.

In 1991 the Land Tenure Center at the University of Wisconsin in Madison and the Centro Paraguayo de Estudios Sociológicos in Asunción worked together in the design and implementation of the original survey of 300 rural Paraguayan households in sixteen villages in three departments (comparable to states) across the country. This was a random sample, stratified by land-holdings. The original survey was followed up by subsequent rounds of data collection in 1994, 1999, and, most recently, I collected the last round in 2002. All rounds include detailed information on production and income. In 2002 I added questions related to theft experienced, levels of trust, and gifts given. Although the data set is rather small, with only 223 households interviewed in 2002, it is quite detailed, reducing potential omitted variable problems.

Theft experienced and gifts given were measured as defined by the respondents themselves. For every crop which the household planted in the last year they were asked the total amount they produced. Then they were asked how much of that was consumed within the household, how much was fed to animals, how much was given away to friends or fellow villagers, how much was stolen, and how much was still in storage. A similar procedure was used for animals owned and their derivates (such as eggs, honey, and milk), and for extractives (such as firewood and coal). Households were also asked what tools were stolen from them in the last year, and to list any other items stolen from them. Summary statistics can be found in Table 3. Note that gifts given are approximately three times the size of theft (of small items) experienced. Given the dynamic limited-commitment model, it would be efficient on the equilibrium path for gifts to be larger than theft. In addition, the measure of gifts includes gifts given to limit theft and those given for other reasons.

I also carried out two economic experiments among survey respondents, one measuring trust and trustworthiness, and the other measuring risk aversion. A more detailed description of the games can be found in Schechter (2004), but I will describe them briefly here. After three or four days of surveying in each village the enumerators invited a player from each household which had participated in the survey to play the games. 188 of the 223 families surveyed sent a family member to play the game.[17] Between the two

[17]The nine households surveyed in the Japanese immigrant village did not participate in the games. Excluding the Japanese, who are much wealthier than the rest of the

Table 3: **Summary Statistics**

Variable	Mean	(Std. Dev.)
Theft Experienced[a]	111,000	(336,000)
Gifts Given	306,000	(524,000)
Annual Income	28,300,000	(72,100,000)
Family Size	5.6	(2.4)
Adult Males	1.8	(1.2)
Close Relatives in Village	3.16	(3.0)
No one Passes Field	44%	
Km to Police	4.06	(2.66)
# of Stealable Crops	2.3	(1.1)
Village Median Land Owned	24.44	(67.18)
Obs	223	

[a]The relevant exchange rate is approximately 4,800 Guaranies to the dollar.

games, the players won an average of two days' wages in a period of two or three hours.

The game's instructions were given in a group setting in each village with no questions allowed. Then the players were called into the room one at a time, given a second explanation, and allowed to ask any questions in private. The risk game was played first. The investor was given a sum of money (equivalent to two-thirds of one day's wages) and was given five choices of how much (if any) to invest. The experimenter then rolled a die to determine the investor's payoffs.

After that the trust game was played.[18] I ran the trust/investment game originally described in Berg et al. (1995). The trustor was given a sum of money. In the first move, the trustor decided how much, if any, to send to an anonymous trustee.[19] Any money sent to the trustee was tripled. The trustee

population, those households which did not send a player were wealthier and had younger household heads.

[18]As is often the case when games are played in rural villages the games were not double blind (Barr 2003, Karlan 2003). This is due to the importance of making sure players with varying levels of education understand the games, and difficulties in running experiments in a village setting.

[19]As the villagers all played together, they knew the pool from which their partner was drawn, though they did not know with whom they were paired up.

made the second move, deciding how much money to return to the trustor. Under the assumption of selfish preferences, the only sub-game perfect Nash equilibrium is for the trustor to send no money to the trustee, using backward induction to infer that the trustee will never return any money. Money sent by the trustor is commonly used to measure his trust that the anonymous trustee will return his money. Money returned by the trustee is used to measure his trustworthiness.

In order to have measures of both trust and trustworthiness from every household in the survey, I had every player play the role of trustor first and then the role of trustee. Burks et al. (2003) find that playing both roles in the trust game decreases both the amount sent and the share returned. They hypothesize that playing both roles reduces the player's sense of responsibility for the well being of his partner. If this is the case, then playing both roles will decrease correlation between the measure of trustworthiness and altruism, and will allow trustworthiness to be measured more purely.

5 Empirics

5.1 System Estimation Before Controlling for Crop Choice

5.1.1 Methodology

In Section 3 of this paper I derived comparative statics from two models for the three endogenous variables: gifts given, theft experienced, and trust, with regards to exogenous changes in the cost of stealing, the risk aversion of the farmer, and the trustworthiness of his neighbors. Before controlling for crop choice the regressors are all exogenous and so there is no need to instrument. Thus, I estimate a system of equations

$$\begin{aligned} y_1 &= x\beta_1 + u_1 \\ y_2 &= x\beta_2 + u_2 \\ y_3 &= x\beta_3 + u_3 \end{aligned}$$

in which y_1 is gifts given, y_2 is theft experienced, and y_3 is trust. Because this system is just identified and because there are no instruments the system analysis will simplify to equation by equation OLS (Zellner & Theil 1962).

When estimating this system, the measure of y_1 is the log of one plus the value of theft experienced, y_2 is measured as the log of one plus the value of gifts given. The variable y_3 is trust as measured by the World Values Survey question "What share of your fellow villagers would try to take advantage of you if they had the opportunity?", where the answers are 1-all, 2-more than half, 3-half, 4-less than half, and 5-none. In Appendix A I run the same analysis but use the experimental measure of trust rather than the survey measure and the results become somewhat weaker. In this setting I feel that the survey measure of trust is more appropriate because it measures how much respondents trust their fellow villagers given that they know the system of rewards and sanctions they can impose on each other. Trust as measured by the experiment is anonymous trust when no rewards or sanctions are possible.

The variables used as exogenous regressors common to all three equations include variables representing risk aversion, the cost of stealing, and the trustworthiness of neighbors. The amount the household bet in the risk experiment is included as a measure of (lack of) risk aversion, as the more they bet, the less risk averse they are. An indicator variable for households which did not participate in the experiments is included as well. I also include household size and the number of adult males to represent the cost of stealing. It is more difficult to steal from a household with more adult males, as a family member will be working in the fields more often. I include a variable indicating if any non-household member walks past the family's main plot in any given week, which effects the cost of stealing as well. If no non-household member walks past a field then people do not know what crop is in the field or when it will be ripe, and will look more out of place if they are seen walking past the field. Fields on commonly used footpaths are easier to steal from. I also include the number of households within 250 meters of the surveyed household so that the indicator for no-one walking past the field is not just proxying for a household having few neighbors, but actually represents a characteristic of the plot in which crops are planted.

I also include variables representing the trustworthiness of neighbors and villagers. I have GPS data on each household in the survey and the measure of trustworthiness from the experiment. I combine these to measure neighbor trustworthiness as the level of trustworthiness of the least trustworthy of the household's four closest neighbors. I focus on the level of trustworthiness of the least trustworthy person rather than the median because the model predicts that it is the least trustworthy people who must be contracted with to reduce theft. I focus on close neighbors because the evidence presented in Section 2 in Stylized Fact #7 suggested that close neighbors are often the culprits. A proxy for village level trustworthiness comes from a community-level survey and is the answer to the question "What share of people in this village contribute with time or money to church?"[20]

A last proxy for trustworthiness is the number of households in the village with members who are close relatives of the surveyed household. Close family members include parents, children, or siblings of the household head or his wife. They do not include cousins or other extended family members. A potential thief may experience a larger trustworthiness disutility when stealing from his own relative. Note that having close family members as neighbors who help monitor the fields could also make it more difficult for thieves to steal from that household, thus working through the cost of stealing as well as trustworthiness.

The log of household wealth, median land-holdings in the village, the number of years the household has lived in the village, and the distance between the house and the nearest police station are also included as controls. I do not control for village fixed effects in the analysis in the main text to preserve precious degrees of freedom, though I have bootstrapped clustered standard errors.[21] In Appendix B I show the results from a specification including village fixed effects, and although the standard errors on the coefficients are all much larger, the results are quite similar.

5.1.2 Implementation

When not controlling for crop choice I estimate the system of equations using equation by equation OLS. Note that given omitted variables such as crop choice the results shown in Table 4 may be biased, but they give an interesting overview of the situation. A variable which represents an increase in the cost of stealing is 'No-one passes field'. Households with fields which non-household members do not walk past give a significantly lower total value

[20] The community-level survey also asked what share of people in the community contribute with time or money to communal goals (which include electrification and road building). While contributing to electrification may be considered a gift to the community, contributing to the church is a better measure of religiosity and, potentially, trustworthiness.

[21] The resampling scheme is applied separately in each village, as suggested by Davison & Hinkley (1997).

Table 4: **Correlates of gift giving, theft experienced, and trust before controlling for crop choice using OLS.** Bootstrapped clustered standard errors in parenthesis. *-90%, **-95%, and ***-99% significant.

	Log(Theft)	Log(Giving)	Trust
Bet	0.072	−0.019	−0.007
	(0.095)	(0.083)	(0.037)
Didn't Play Games	0.613	−0.064	−0.445
	(0.619)	(0.626)	(0.320)
No One Passes Field	−0.749**	−0.808**	0.298*
	(0.329)	(0.316)	(0.152)
# HHs in 250 m Radius	0.037	−0.064***	−0.009
	(0.026)	(0.024)	(0.013)
# Adult Males	−0.191	0.242*	0.012
	(0.139)	(0.134)	(0.071)
Family Size	0.025	0.095	0.003
	(0.085)	(0.066)	(0.038)
Log(Wealth)	0.123	0.275***	−0.051
	(0.097)	(0.096)	(0.047)
# Close Relatives in Vill	−0.076	−0.111**	0.042
	(0.057)	(0.053)	(0.028)
Years in Village	0.010	0.023***	0.012***
	(0.009)	(0.009)	(0.004)
Vill Median Land Owned	−0.021	−0.109***	0.016
	(0.031)	(0.031)	(0.016)
Neighbor Trustworthiness	0.336	1.719	1.109**
	(1.094)	(1.070)	(0.524)
% of Vill Helps Church	−0.029***	−0.006	0.016***
	(0.010)	(0.009)	(0.005)
Kilometers to Police	−0.113*	0.055	0.017
	(0.063)	(0.050)	(0.029)
R^2	0.115	0.254	0.110
Obs.	223	223	223

of gifts, experience significantly less theft and trust significantly more. In fact, a household which possess no plot which no-one walks past experiences approximately 80 percent more theft and gives 80 percent more gifts than a household which has a plot no-one walks past. One might think that the reason households with fields which no-one walks past give fewer gifts and experience less theft is that people who live on the outskirts of town have no neighbors to whom to give gifts. But, this result continues to hold even when including the number of households in a 250 meter radius of that household as an explanatory variable. Thus, this result is not caused by certain households having fewer neighbors, but is directly related to the number of people walking past the field. Households with more adult males do get stolen from slightly less, but they also give more gifts (though this may be because they produce more and so have more to give). The results for the cost of stealing show that a dynamic limited-commitment model is supported above and beyond the predictions of a one-period model, as both gifts given and theft experienced increase when the cost of stealing goes down.

At a first glance, the results on trustworthiness do not show evidence of gift-giving being used to limit theft. The higher the share of the village helping with church projects, the less theft a farmer experiences and the more trusting he is. The limited-commitment model predicted that in more trustworthy villages, farmers would give fewer gifts and could not sign the comparative statics for theft experienced. As his least trustworthy close neighbor becomes more trustworthy, a farmer trusts more, but there is no effect on gifts or theft.

However, a different measure of trustworthiness, the number of close family members living in the same village, does show effects consistent with the dynamic limited-commitment model. Households with *more* close family members in the village give significantly *fewer* gifts, experience less theft, and trust more. For every additional family member living in their village, a household gives approximately ten percent fewer gifts. This is contrary to what one might expect, i.e., that households with more close family members would give more gifts, not less, and contrasts with the view of gifts held by Putnam (1993) and Platteau (1997). This result fits directly with the limited-commitment model's predictions that as trustworthiness increases gifts given decrease and trust increases, while the effect on theft experienced is ambiguous.

The coefficients on risk aversion are all insignificant, perhaps because the measure of risk aversion is only for one member of the household and not for the family as a whole.[22] I also find that households in villages with higher median land holdings give fewer gifts. This result should not hastily be used to conclude that households in these villages are more trustworthy, as I have not yet controlled for crop choice and villages with large land-holdings plant quite different crops than do villages with smaller land-holdings. Wealthier households give significantly more gifts but do not experience more theft than poorer households. This effect is not as large economically as one might expect. A household that is ten percent wealthier gives less than three percent more gifts. This implies that although wealthier households do give a higher total value of gifts, they give a smaller proportion of their wealth than do poorer households. The relatively small coefficient on wealth suggests that models in which gifts are given out of altruism or in order to mitigate envy are not driving the results. It suggests that thieves are stealing simply because they desire the object they are stealing, and that farmers are giving in order to limit the amount taken.

Households which live closer to a police station actually experience more theft, which is what one might expect if the police were corrupt and participating in the theft.[23] To test that distance to a police station was not proxying for local development I estimated the system including both distance to a police station and distance to a paved road but the distance to the police station maintained a significant negative coefficient while the coefficient on distance to a paved road was insignificant.

5.2 System Estimation Controlling for Crop Choice

5.2.1 Methodology

When controlling for crop choice, an endogenous decision made by the farmer, it will have to be instrumented for. There are multiple potential instruments for crop choice. Instead of using OLS I must now estimate the system of

[22] I also have information showing if the household did not take out credit for fear of putting themselves at risk, but this variable also had an insignificant coefficient.

[23] I do not believe this effect is due to the fact that police stations may be placed where crime is worst. These police stations have been there a long time. Additionally, these results refer to the theft of smaller items, while the police focus on combating cattle theft, armed robberies, and homicide.

equations using GMM. The system of equations estimated is

$$\begin{aligned} y_1 &= x\beta_1 + v\gamma_1 + u_1 \\ y_2 &= x\beta_2 + v\gamma_2 + u_2 \\ y_3 &= x\beta_3 + v\gamma_3 + u_3 \end{aligned}$$

where x are the exogenous regressors and v is crop choice. The instrument set z includes all of the elements of x, as well as a set of instruments for crop choice. The moment conditions require that $\mathrm{E}(z'u_g) = 0$ for every equation g.

Define the matrix of regressors

$$X_i = \begin{pmatrix} x_{i1} & 0 & 0 \\ 0 & x_{i2} & 0 \\ 0 & 0 & x_{i3} \end{pmatrix}$$

for each individual i so that x_{i1} includes all of the regressors in the first equation (including both x and v), x_{i2} includes all of the regressors in the second equation, etc. The matrix X is obtained by stacking the matrices X_i for all individuals. The matrix of instruments Z has a similar structure. The matrix Y is obtained by stacking the individual vectors

$$Y_i = \begin{pmatrix} y_{i1} \\ y_{i2} \\ y_{i3} \end{pmatrix}$$

I estimate the coefficients in the following way.

1. Estimate an initial consistent estimator of β and call it $\widehat{\widehat{\beta}}$. For this step I use the 2SLS estimator.

   $$\widehat{\widehat{\beta}} = [X'Z(Z'Z)^{-1}Z'X]^{-1}X'Z(Z'Z)^{-1}Z'Y$$

2. From this one obtains the residual vectors $\widehat{\widehat{u}}_i = y_i - X_i\widehat{\widehat{\beta}}$

3. Using these residuals, I estimate the optimal weighting matrix $\widehat{W} = (N^{-1}\sum_{i=1}^{N} Z_i'\widehat{\widehat{u}}_i\widehat{\widehat{u}}_i'Z_i)^{-1}$

4. Using this weighting matrix one can obtain the optimal linear GMM estimator

   $$\widehat{\beta} = [X'Z\widehat{W}Z'X]^{-1}X'Z\widehat{W}Z'Y$$

5.2.2 Implementation

The most commonly stolen crops in the survey are watermelons, melons, bananas, corn, and yucca. The dynamic limited-commitment model predicts that a household planting these crops the will give more gifts and trust less. Crop choice is included as an explanatory variable indicating how many of the above listed crops the household planted. Note that crop choice is measured as the number of easily stealable crops planted rather than the total value planted in these crops. This is the appropriate choice if it is the decision to plant watermelons, and not how many to plant which effects theft, i.e., if whether a farmer plants 200 watermelons or 1000, the thief steals the same amount.[24]

While conserving degrees of freedom in comparison with including a dummy for each of those five crops planted, using the number of crops planted as an explanatory variable imposes a linearity on the effect of crop choice. I have also tried using the square and the log of the number of commonly stolen crops which are planted, as well as converting the count data into an indicator variable for planting three or more of those crops and the results are not substantially different.[25]

As crop choice is endogenous I instrument for the number of crops planted in 2002 with the village prices of bananas, watermelon, and yucca in 1999, as well as an indicator variable for whether or not the household planted a green manure cover crop in 2002. In Appendix D I show results when including the number of stealable crops planted in 1999 as an additional instrument for the number planted in 2002. I use past rather than current prices to avoid incorporating effects the amount planted in a year may have on the price in that year.

The planting of green manures is a relatively new soil conservation technique in Paraguay. The households which plant green manures are not necessarily the households with the worst soil. They tend to be households which are curious and enjoy trying new crops. The planting of green manures is potentially a good instrument for crop choice because households which plant

[24]This seems true from casual conversations with farmers and is also suggested by the coefficients found in Table 4 on wealth which showed that more wealthy farmers give fewer gifts and experience less theft as a proportion of income than poorer farmers (though more overall).

[25]The results when using the number of crops planted or the square of the number planted are the strongest. This suggests that the effect of planting more easily stealable crops increases at an increasing rate.

Table 5: **'First stage' regression of crop choice on the exogenous variables using OLS with and without including instruments.** Bootstrapped clustered standard errors in parenthesis. *-90%, **-95%, and ***-99% significant.

	# of Stealable Crops		
Bet	0.002	0.012	−0.004
	(0.037)	(0.036)	(0.043)
Didn't Play Games	0.027	0.188	−0.079
	(0.284)	(0.292)	(0.309)
No One Passes Field	−0.115	−0.129	−0.051
	(0.142)	(0.137)	(0.155)
# HHs in 250 m Radius	−0.030***	−0.025**	−0.016
	(0.011)	(0.012)	(0.011)
# Adult Males	−0.025	−0.006	−0.059
	(0.060)	(0.060)	(0.061)
Family Size	0.121***	0.112***	0.117***
	(0.038)	(0.037)	(0.041)
Log(Wealth)	0.034	−0.003	−0.021
	(0.045)	(0.049)	(0.054)
# Close Relatives in Village	−0.023	−0.021	−0.008
	(0.024)	(0.024)	(0.026)
Years in Village	0.001	0.003	0.006
	(0.004)	(0.005)	(0.236)
Vill Median Land Owned	−0.049***	−0.051***	−0.036**
	(0.012)	(0.012)	(0.014)
Neighbor Trustworthiness	0.786*	0.856*	1.007**
	(0.471)	(0.468)	(0.504)
% of Village Helping in Church	−0.003	−0.003	0.001
	(0.004)	(0.004)	(0.004)
Kilometers to Police	0.012	0.027	0.043
	(0.026)	(0.027)	(0.033)
Plant Green Manure		0.375*	0.472**
		(0.213)	(0.236)
Village Watermelon Price in 1999		0.280**	0.419***
		(0.110)	(0.117)
Village Banana Price in 1999		−0.008	−0.005
		(0.035)	(0.038)
Village Yucca Price in 1999		−0.499	−0.771
		(0.840)	(0.766)
# of Stealable Crops in 1999			0.263***
			(0.091)
R^2	0.226	0.264	0.328
Wald Test for Inst. Sig.		9.937 ($p = 0.96$)	29.396 ($p = 1.00$)
F Test for Inst. Sig.		2.620 ($p = 0.92$)	6.120 ($p = 1.00$)
Obs.	223	223	177

green manures tend to be more adventurous in their crop choice and plant more of the easily stealable crops. On the other hand, as a thief would never want to steal a green manure, the planting of green manures should have no direct effect on gift giving, theft, or trust.

When estimating a system of equations using GMM, there is no real first stage regression as there is with 2SLS. However, I include a table with the regression of crop choice on all of the instruments, similar to a 'first-stage' regression to give the reader some idea of the correlates of crop choice. Table 5 shows the determinants of crop choice both including and excluding the instruments (as well as after including past crop choice). The F-statistic and the heteroskedasticity consistent Wald-statistic testing the joint significance of the four instruments are 2.62 and 9.94 respectively which means that the instruments are jointly significant at above the 95% level.

Households in villages with high median land-holdings plant fewer of these more easily stealable crops. Farmers in these villages are much larger scale farmers and tend to plant soy and wheat for export. Farmers with more trustworthy neighbors plant more easily stealable crops, perhaps because they worry less about theft. Households living in more densely populated areas plant fewer stealable crops, hinting at why they give fewer gifts before controlling for crop choice. Larger families plant more of the more easily stealable crops. The planting of a green manure and the price of watermelons in 1999 are both highly significant in predicting current crop choice, as is past crop choice.

Table 6 shows the GMM results. The first three columns estimate the system using many explanatory variables, while the last three columns use fewer, due to concerns of degrees of freedom. Hansen's J-statistic tests whether the instrument set is uncorrelated with the errors (Hansen 1982). The J-statistics for the system are 10.66 and 11.39 (for the larger and smaller set of explanatory variables respectively) with p-values of .70 and .75. Though we know that these tests tend to be weak with small data sets (Kocherlakota 1990), the hypothesis that the instruments are exogenous cannot be rejected.

Households which plant more easily stealable crops give significantly more gifts, though there is no significant effect on theft or trust. A household planting one easily stealable crop gives approximately double the value of gifts as a household planting no easily stealable crop. A household planting two of the crops gives triple the value of gifts as a household planting none. This is in accord with the predictions of the limited-commitment model, and slightly contrary to those of the one-period model which predicts that theft

Table 6: **Correlates of gift giving, theft experienced, and trust controlling for crop choice using GMM.** Bootstrapped clustered standard errors in parenthesis. *-90%, **-95%, and ***-99% significant.

	Log(Theft)	Log(Giving)	Trust	Log(Theft)	Log(Giving)	Trust
Bet	0.077	−0.042	−0.004			
	(0.112)	(0.080)	(0.041)			
Didn't Play Games	0.998	−0.130	−0.386			
	(0.697)	(0.595)	(0.357)			
No One Passes Field	−0.891**	−0.634**	0.326*	−0.957***	−0.901***	0.153
	(0.390)	(0.311)	(0.174)	(0.359)	(0.302)	(0.174)
# HHs in 250 m Radius	0.043	−0.022	−0.013			
	(0.044)	(0.029)	(0.018)			
# Adult Males	−0.202	0.264*	0.012	−0.193	0.184	−0.025
	(0.166)	(0.135)	(0.076)	(0.172)	(0.125)	(0.073)
Family Size	0.050	−0.037	0.004			
	(0.157)	(0.099)	(0.054)			
Log(Wealth)	0.085	0.261***	−0.045	0.024	0.140*	−0.015
	(0.115)	(0.090)	(0.054)	(0.096)	(0.073)	(0.043)
# Close Relatives in Village	−0.076	−0.093*	0.033	−0.056	−0.083*	0.022
	(0.066)	(0.053)	(0.032)	(0.059)	(0.048)	(0.029)
Years in Village	0.011	0.022***	0.012***			
	(0.010)	(0.008)	(0.004)			
Vill Median Land Owned	−0.015	−0.053	0.012			
	(0.054)	(0.042)	(0.023)			
Neighbor Trustworthiness	0.184	0.925	1.111*	1.995	1.837	0.365
	(1.392)	(1.181)	(0.578)	(1.562)	(1.264)	(0.652)
% of Village Help in Church	−0.028**	−0.001	0.015***			
	(0.011)	(0.009)	(0.006)			
Kilometers to Police	−0.110	0.049	0.017			
	(0.072)	(0.052)	(0.032)			
# of Stealable Crops	0.055	1.223*	−0.066	−0.365	0.964*	−0.053
	(0.928)	(0.630)	(0.325)	(0.672)	(0.545)	(0.301)
Overidentification (J) Test		10.657 ($p = 0.70$)			11.386 ($p = 0.75$)	
Obs.	223	223	223	223	223	223

will go up as a household plants more easily stealable crops but not gifts.

Also, while the coefficient on wealth remains significant, it decreases in size a bit after controlling for crop choice. The fact that wealthy households give a smaller proportion of their wealth in gifts than do poorer households, suggests that thieves are not stealing due to envy and that victims are not giving due to altruism or inequality aversion. It supports the dynamic limited-commitment model in which farmers give gifts in order to limit the amount stolen from them.

The only variables which lose significance are village median land-holdings and the number of households in a 250 m radius. After controlling for crop choice, households in villages with large median land-holdings and households in densely populated areas do not give significantly fewer gifts than other households. This is because those households planted significantly fewer of the easily stealable crops and that is what causes them to give fewer gifts.

The main results which held before controlling for crop choice still hold. Households with fields which no-one passes still give fewer gifts, experience less theft, and trust more. Households in the same village with close family members still give significantly fewer gifts, experience less theft, and trust more. As there are many reasons why people give gifts, only one of which is the desire to limit theft, the fact that the coefficient on the number of close relatives in the village in the gift-giving equation is significant is quite convincing.

6 Conclusion

Rural theft in Paraguay is not carried out by anonymous agents. Farmers claim to know who is stealing from them and have designed a system of informal sanctions and rewards to limit the amount of theft they experience. I have laid out a dynamic limited-commitment model in which a potential thief cannot commit to refrain from stealing. A farmer will thus give him gifts, and promise him continued gifts in the future if he limits his level of theft to some acceptable level. This model yields new predictions above and beyond those of a one-period Beckerian model with a rational anonymous thief. These results also contrast with many models of fairness and gift exchange in which increased trust is associated with more gift-giving rather than less.

Using an unusual new data set from rural Paraguay I test whether this model has predictive power over a one-period model with an anonymous thief. The data set includes extensive information on theft experienced, gifts given, and survey measures of trust, as well as panel data on past production decisions. In addition, it includes measures of trustworthiness, trust, and risk aversion from a set of economic experiments carried out with the survey respondents. This experimental data provides novel controls which allow me to partially overcome omitted variable bias.

In rural Paraguay the predictions of the limited-commitment model are supported. Households with more close relatives living in the same village give less gifts, contrary to what one might expect. These households give less gifts because they know that their family members are less likely to steal from them, and so they do not need to entice them away from theft by giving them gifts. Households from which it is more difficult to steal give less gifts, experience less theft, and trust more. I conclude that farmers in Paraguay do use giving and the promise of future giving as a means of limiting theft.

A Using Experimental Trust Rather than Survey Trust

In the main text I used the measure of self-reported trust from the survey as a dependent variable. In this appendix I use the experimental measure of trust instead. This restricts the number of observations to the 188 respondents who participated in the experiments. This also allows us to remove the indicator variable for didn't play in games. As seen in Table 7, although all of the previously significant variables in the trust regression lose significance, most of the results found in the main text continue to hold for the gifts and theft part of the system. The only significant predictor of trust in the trust experiment is the size of the bet in the risk experiment. This corresponds with results found in Schechter (2004) showing that play in the trust game actually measures a combination of trust and risk aversion.

Both the fact that significant predictors of self-reported trust are not significant in predicting trust in the experiment, and the fact that the J-statistic when using experimental trust is much higher and the hypothesis that all the moment conditions hold can be rejected, are not unexpected given the new measure of trust being used. The experiment measures generalized trust in an anonymous setting with no recourse to future punishments. The survey question asks whether or not a farmer trusts his fellow villagers. The farmer knows his village-mates and in which situations he can and can not trust each of them and the punishments he would be able to impose on each of them. Whereas the number of years a household has lived in the village, and whether or not they have a field which no one passes predict relational trust between village-mates, they do not effect generalized anonymous trust. On the other hand, there are surely omitted variables such as social norms and upbringing which determine generalized trust but not the much more specific relational trust.

B Using Village Fixed Effects

In the analysis in the main text village fixed effects were included. As there are 16 villages (and three equations), including village fixed effects uses up valuable degrees of freedom in a small data set. On the other hand, it is of interest to see how the results change when including village fixed effects. If I include village fixed effects, I can no longer use past village level prices

Table 7: **Correlates of gift giving, theft experienced, *and experimental trust* using GMM.** Bootstrapped clustered standard errors in parenthesis. *-90%, **-95%, and ***-99% significant.

	Log(Theft)	Log(Giving)	Trust	Log(Theft)	Log(Giving)	Trust
Bet	0.113	−0.024	0.206**			
	(0.115)	(0.078)	(0.087)			
No One Passes Field	−0.741*	−0.657*	0.008	−0.742*	−0.724**	0.050
	(0.443)	(0.343)	(0.340)	(0.397)	(0.321)	(0.310)
# HHs in 250 m Radius	0.041	−0.016	0.051			
	(0.051)	(0.028)	(0.039)			
# Adult Males	−0.205	0.236*	−0.111	−0.327**	0.147	−0.156
	(0.178)	(0.143)	(0.128)	(0.154)	(0.124)	(0.130)
Family Size	−0.015	−0.043	−0.074			
	(0.183)	(0.115)	(0.112)			
Log(Wealth)	0.116	0.350***	0.115	0.094	0.301***	0.132
	(0.133)	(0.097)	(0.098)	(0.118)	(0.086)	(0.088)
# Close Relatives in Village	−0.047	−0.101*	−0.004	−0.019	−0.051	−0.008
	(0.076)	(0.056)	(0.064)	(0.073)	(0.051)	(0.065)
Years in Village	0.006	0.021**	−0.007			
	(0.013)	(0.010)	(0.010)			
Vill Median Land Owned	−0.225	−0.287	0.228			
	(0.425)	(0.359)	(0.309)			
Neighbor Trustworthiness	−0.946	0.176	−0.896	−0.448	0.655	−0.144
	(1.619)	(1.261)	(1.302)	(1.500)	(1.225)	(1.307)
% of Village Help in Church	−0.024*	−0.014	−0.011			
	(0.013)	(0.009)	(0.011)			
Kilometers to Police	−0.102	0.011	−0.028			
	(0.088)	(0.065)	(0.063)			
# of Stealable Crops	0.483	1.498***	0.442	0.363	0.961*	0.442
	(0.973)	(0.569)	(0.681)	(0.773)	(0.506)	(0.613)
Overidentification (J) Test		17.802 ($p = 0.96$)			16.977 ($p = 0.95$)	
Obs.	188	188	188	188	188	188

Table 8: **Correlates of gift giving, theft experienced, and trust using GMM *with village fixed effects.*** Bootstrapped clustered standard errors in parenthesis. *-90%, **-95%, and ***-99% significant.

	Log(Theft)	Log(Giving)	Trust
No One Passes Field	−0.421	−1.159***	0.330
	(0.464)	(0.385)	(0.213)
# Adult Males	−0.415**	0.213	−0.044
	(0.171)	(0.160)	(0.088)
Log(Wealth)	−0.100	0.193	−0.083
	(0.156)	(0.127)	(0.085)
# Close Relatives in Village	−0.057	−0.054	0.089**
	(0.076)	(0.078)	(0.040)
Neighbor Trustworthiness	0.577	0.096	0.696
	(2.381)	(1.972)	(1.013)
# of Stealable Crops	1.438	1.904**	0.421
	(1.076)	(0.831)	(0.466)
Overidentification (J) Test		1.389 ($p = 0.29$)	
Obs.	177	177	177

as instruments. As the planting of green manure alone is not a strong instrument, I use both the planting of a green manure and past crop choice as instruments here. I include the same explanatory variables as in the right hand side columns of Table 6. The results in Table 8 are weaker than before, but the main trends still hold. Households with fields off of main footpaths still experience less theft, give fewer gifts, and trust more; households with more close relatives living in their village give fewer gifts, experience less theft, and trust more; and households planting more easily stealable crops give more gifts. This is reassuring evidence that the findings in previous sections of this paper are not due to unobserved village effects.

C Excluding the Japanese Households

One of the sixteen villages in the survey, from which nine households responded, consists of households of Japanese heritage. These households are much wealthier than the households of Paraguayan or Brazilian heritage, and they plant mostly soy and wheat for the export market. To be sure that the inclusion of these nine households is not biasing the results I reestimate the system of equations excluding these households. The results in Table 9 which do not include the Japanese are quite similar to the earlier results.

D Including Past Crop Choice as an Instrument

In the main text the instruments used for past crop choice were past village level prices and whether or not the household planted a green manure. In this appendix we also include crop choice in 1999 as an instrument for crop choice in 2002. Including past crop choice limits the sample size from 223 to the 177 households for whom data is available in both 1999 and 2002. Although the value of lagged variables as instruments has been questioned, past crop choice has strong predictive power for current crop choice (as shown in Table 5). The system results when including past crop choice as an additional instrument for current crop choice are shown in Table 10. Even after including lagged crop choice as an instrument the hypothesis that the instruments are exogenous cannot be rejected. Again, the main trends do not change.

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Table 9: **Correlates of gift giving, theft experienced, and trust using GMM *excluding the Japanese.*** Bootstrapped clustered standard errors in parenthesis. *-90%, **-95%, and ***-99% significant.

	Log(Theft)	Log(Giving)	Trust	Log(Theft)	Log(Giving)	Trust
Bet	0.081	−0.044	−0.007			
	(0.119)	(0.081)	(0.041)			
Didn't Play Games	0.940	−0.215	−0.339			
	(0.749)	(0.612)	(0.372)			
No One Passes Field	−0.810*	−0.584*	0.284	−0.887**	−0.789**	0.121
	(0.415)	(0.327)	(0.183)	(0.379)	(0.309)	(0.176)
# HHs in 250 m Radius	0.044	−0.019	−0.017			
	(0.045)	(0.031)	(0.019)			
# Adult Males	−0.220	0.289**	−0.011	−0.224	0.170	−0.024
	(0.183)	(0.144)	(0.082)	(0.175)	(0.123)	(0.073)
Family Size	0.039	−0.063	0.023			
	(0.178)	(0.118)	(0.059)			
Log(Wealth)	0.104	0.297***	−0.070	0.112	0.247***	−0.046
	(0.128)	(0.097)	(0.056)	(0.115)	(0.084)	(0.050)
# Close Relatives in Village	−0.073	−0.101*	0.033	−0.048	−0.088*	0.024
	(0.068)	(0.053)	(0.033)	(0.064)	(0.049)	(0.030)
Years in Village	0.007	0.018*	0.015***			
	(0.011)	(0.010)	(0.005)			
Vill Median Land Owned	−0.296	−0.354	0.182			
	(0.407)	(0.346)	(0.154)			
Neighbor Trustworthiness	0.254	0.900	1.096*	1.241	1.015	0.540
	(1.477)	(1.198)	(0.603)	(1.471)	(1.182)	(0.621)
% of Village Help in Church	−0.031***	−0.003	0.017***			
	(0.012)	(0.009)	(0.006)			
Kilometers to Police	−0.160**	0.024	0.031			
	(0.080)	(0.062)	(0.033)			
# of Stealable Crops	0.121	1.408*	−0.176	−0.600	0.880	−0.064
	(1.089)	(0.738)	(0.354)	(0.827)	(0.619)	(0.335)
Overidentification (J) Test	12.743 ($p = 0.83$)			11.101 ($p = 0.73$)		
Obs.	214	214	214	214	214	214

Table 10: **Correlates of gift giving, theft experienced, and trust using GMM *including past crop choice as an instrument.*** Bootstrapped clustered standard errors in parenthesis. *-90%, **-95%, and ***-99% significant.

	Log(Theft)	Log(Giving)	Trust	Log(Theft)	Log(Giving)	Trust
Bet	0.050	−0.043	0.009			
	(0.119)	(0.085)	(0.045)			
Didn't Play Games	0.612	0.171	−0.194			
	(0.775)	(0.688)	(0.441)			
No One Passes Field	−0.718*	−0.956***	0.479**	−0.665*	−1.163***	0.335*
	(0.409)	(0.359)	(0.204)	(0.386)	(0.339)	(0.195)
# HHs in 250 m Radius	0.045	−0.008	−0.009			
	(0.031)	(0.023)	(0.016)			
# Adult Males	−0.266	0.259*	−0.002	−0.379***	0.146	−0.073
	(0.171)	(0.151)	(0.088)	(0.138)	(0.125)	(0.076)
Family Size	0.023	−0.008	−0.025			
	(0.117)	(0.084)	(0.049)			
Log(Wealth)	−0.109	0.170	−0.057	−0.117	0.126	−0.014
	(0.119)	(0.107)	(0.068)	(0.094)	(0.087)	(0.052)
# Close Relatives in Village	−0.089	−0.107*	0.054	−0.078	−0.097*	0.029
	(0.065)	(0.062)	(0.036)	(0.063)	(0.059)	(0.034)
Years in Village	0.009	0.024**	0.014**			
	(0.012)	(0.010)	(0.006)			
Vill Median Land Owned	0.003	−0.023	0.023			
	(0.038)	(0.040)	(0.023)			
Neighbor Trustworthiness	0.889	1.664	1.185*	1.785	1.814*	0.424
	(1.355)	(1.169)	(0.618)	(1.298)	(1.088)	(0.572)
% of Village Help in Church	−0.030***	0.000	0.017***			
	(0.011)	(0.009)	(0.006)			
Kilometers to Police	−0.168**	0.014	0.055			
	(0.081)	(0.069)	(0.037)			
# of Stealable Crops	0.088	1.301***	0.200	0.133	1.140***	0.138
	(0.454)	(0.364)	(0.203)	(0.412)	(0.341)	(0.200)
Overidentification (J) Test		8.776 ($p = 0.28$)			11.316 ($p = 0.50$)	
Obs.	177	177	177	177	177	177

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