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Heterogeneous Households A within-subject test of asymmetric information between spouses in Kenya

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Abstract

To identify which spouses respond to asymmetric information, I play two dictator games with each member of the couple. One decision is kept secret from the respondent's spouse, while another choice is public. Most people give the same amount in public and secret, while a minority behave opportunistically and give more to their spouse in public and less in secret. The types identified in the lab also behave differently at home. For those who behave opportunistically in the lab, greater knowledge about finances at home is associated with worse opportunism in the lab, suggesting that for these couples complete information at home is not due to trust but rather is an endogenous response to non-cooperative behavior. The paper highlights that allowing for heterogeneous types changes the conclusions we draw about appropriate models of the household and suggests that laboratory games can be used to identify household types useful in the interpretation of field data.

Keywords

Households; Asymmetric Information; Dictator Game

1. Introduction

Asymmetric information between spouses has been suggested as a possible cause of inefficiency in household decisions. Recent field and laboratory studies find evidence that spouses take advantage of private information (Ashraf (2009), Iversen et al. (2011), Mani (2011), Munro et al. (2013), Kebede et al. (2014)) and thus conclude that asymmetric information must be one of the driving causes of inefficiency in the household. However, these previous empirical studies test only for average treatment effects, and by design cannot tell us if all spouses behave a bit opportunistically or if most people do not respond to private information and only a few take severe advantage. Allowing for heterogeneous types could lead to different conclusions about the appropriate model of the household: is asymmetric information the primary cause of inefficiency in most households or is another explanation necessary?

I use a series of dictator games played between spouses in Kenya to measure the fraction of spouses that respond to asymmetric information, identifying who reacts opportunistically and who does not. One allocation is made in public: the respondent knows that his choice could be revealed to his spouse. Another allocation is made in secret. Choices in the secret spouse game were hidden by the fact that respondents played additional games with strangers that paid off anonymously, thus the respondent and his spouse did not know if his final payment was determined by a secret spouse game or an anonymous game. The design is within-subject, meaning that all respondents play both the public and secret game, allowing a characterization of not only the average difference in giving across the information condition but also categorization at the individual level.

I find that distinguishing between heterogeneous types in responses to asymmetric information is important in both the lab and field data. In the lab, respondents give an average of 8 percentage points more in the public game than in the secret game, an increase of 18 percent over baseline giving in the secret game that is statistically different from zero. The average difference suggests that spouses do respond opportunistically to asymmetric information. However, when I take advantage of the within-subject design and examine responses at the individual level, I find that most people do not take advantage of asymmetric information. Respondents give the same amount in public and secret in 49 percent of games. Only 36 percent behave opportunistically, giving more in public and less in secret. Because those who respond opportunistically give so much more in the public game than in secret, the average difference between games is large and statistically significant. Interestingly, I also find that 14 percent give more in the secret game, when their generosity cannot be observed. While, this unexpected behavior may indicate mistakes in allocations, it could instead be a meaningful behavior that would be missed in a between-subject design.¹

To confirm that the types identified in the games are meaningful outside the lab, I examine survey measures of spousal knowledge of income and expenditures at home, and find that better information at home indicates different things for different respondents. For those who do not respond to asymmetric information in the lab, I find that better information at home is positively but insignificantly associated with greater generosity in the lab, indicating that for these respondents communication is positively correlated with cooperation. For those who take advantage of private information in the lab, better information at home is associated with greater opportunism in the lab, indicating that instead of voluntary communication, more complete information at home is likely indicative of closer monitoring by a suspicious spouse. The results from the field data confirm that the types identified in the lab are meaningfully different, and highlights that cross-section survey data about information between spouses should be interpreted carefully. While for some couples high levels of information may reveal cooperation, for others better information indicates an endogenous response to non-cooperative behavior.

This paper makes two primary contributions: a substantive contribution to the household literature, and a methodological contribution to the intersection of the field and laboratory

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¹The possibility of mistakes in allocation is discussed in section 4.2.2.

experimental literatures. First, I show that there are at least two types of spouses: those who react opportunistically to the availability of asymmetric information and those who do not. While others have suggested the existence of these two types theoretically (Chen (2013)) and others can infer the fraction of a sample that falls into either category (Ashraf (2009)), this study is the first to document the existence of these different types of spouses directly. I further show that identifying these types changes the interpretation of survey measures of information between spouses. This suggests that household models should allow for heterogeneous information types and strategic endogenous responses between spouses, and include non-information causes of inefficiency for those who do not react to asymmetric information.

Second, the paper's main contribution is that it shows laboratory games can be used to identify meaningfully different types of households in their responses to asymmetric information, and thus suggests that field experimentalists could use games to identify sub-groups that may respond differently to new programs. For example, suppose one were charged with evaluating the effect of a new technology that made financial resources held in formal institutions more or less observable to the account holder's spouse. Examples could include joint bank statements available to both spouses (Schaner (2014)) or mobile money accounts that are more easily concealed (Aker et al. (2014)). The primary outcome measured is the amount of money held in the financial institution, while the true outcomes of interest are empowerment in household decision-making and the cost-effectiveness of the technology relative to other possible interventions. Understanding that the same average treatment effect on money held in the financial institution could be generated by most clients responding a little or only a few clients responding a lot, and that the conclusions drawn about empowerment in household decision-making or the cost-effectiveness of the program depend heavily on how many clients change their behavior and by how much, one would really like to identify the clients for whom asymmetric information matters and how the program affects only them. Field experimentalists often examine treatment effects by subgroup for just this reason, looking for differences by gender, own share of household income, or reports of financial decision-making power. This study shows that within-subject dictator games can identify meaningfully different types of people in how asymmetric information affects their household. In the future, field experiments studying the effect of policies that affect information between spouses could consider using laboratory games to identify those for whom we think information matters most.

The paper is organized as follows: Section 2 reviews the previous literature; Section 3 describes the sample and experimental design; Section 4 presents the results; Section 5 concludes.

2. Literature review

The Collective model is currently the most commonly used model of the household.² The model assumes two agents who make choices that affect one another, and through some form of bargaining, arrive at decisions that are Pareto optimal.³ The assumption of efficiency is justified by the idea that because spouses interact frequently, they must know each other's preferences, resources, and choices, and must also be able to come to binding agreements that at least do not leave utility on the table (Browning, Chiappori, and Weiss (2011)). While formally the assumption of efficiency is what defines the Collective model, practically the notion of efficiency rests on the assumptions of complete and perfect information and perfect contracts between spouses.

In the developing world the empirical evidence on efficiency in household decisions is mostly negative, especially in Africa.⁴ Bobonis (2009) and Attanasio and Lechene (2014) find in favor of efficiency in expenditure decisions in Mexico, while Duflo and Udry (2004) and Robinson (2012) find against efficiency in expenditures decisions in Cote d'Ivoire and Kenya respectively. Udry (1996) finds against efficiency in agricultural investment decisions in Burkina Faso, while Kebede et al. (2014), Iversen et al. (2011), and Mani (2011) reject productive efficiency in laboratory games played between spouses in Ethiopia, Uganda, and India respectively.

Alternative models that do not assume efficiency at the outset are classified as non-cooperative models, and allow for limited commitment or asymmetric information about resources, choices, or preferences.⁵ The theoretical literature has not yet settled on a canonical form of the non-cooperative model, in part because we do not know whether asymmetric information, limited commitment, or both are features of the typical non-cooperative household.

The existence of asymmetric information between spouses regarding finances has been documented around the world. Some have suggested that women's use of rotating savings and credit organizations (ROSCAs) in Kenya is consistent with income hiding (Andersen and Balland 2002), and spouses have been shown to spend money differently when it arrives in secret in Ghana (Castilla and Walker (2013a and 2013b), Niger (Aker et al. (2014)), and the Philippines (Ashraf (2009)). Spouses invested significant resources in obtaining information about their spouse's finances in Kenya (de Laat (2008)). Poorly informed couples in Kenya were also more likely to secure money in private savings accounts

²The original Unitary model of the household (Samuelson (1956), Sen (1966), Becker (1973)) assumes that the household makes decisions as if it were a singular, unified actor. The Unitary model is not discussed here because it has been widely dismissed by the empirical literature (Alderman et al. (1995)). Note that the Unitary model is a special case of the Collective model in which the bargaining weights are unaffected by external factors.

³The Collective model concludes that the household acts as if it is maximizing a weighted utility function, with utility weights a function of the bargaining weights. Bargaining weights usually thought to be determined by external factors such as wages and legal structures, and recently some have suggested that the amount of effort needed to generate income may also matter (Dasgupta and Mani (2013)). The canonical form of the Collective model was developed in Manser and Brown (1980) and McElroy and Horney (1981), and solidified in Chiappori (1988) and Chiappori (1992).

⁴Households in the developed world behave largely efficiently. See Bergstrom (1997) and Chiappori and Donni (2009) for reviews of the literature.

⁵Representative non-cooperative models include Lundberg and Pollak (1993) (limited commitment), Bloch and Rao (2002) (incomplete information), Chen (2013) (imperfect information and limited commitment), and Ligon (2002) (limited commitment).

(Schaner (2014)). In the laboratory, spouses in Ethiopia (Kebede et al. (2014)) and India (Castilla (2014)) behaved less cooperatively in secret than when their decisions would be revealed to their spouses.

While many studies suggest that at least some spouses hold private information, all of the experimental work cited above emphasizes the average amount of or response to asymmetric information, and does not examine or highlight what fraction of household suffer from information problems. These previous studies cannot tell us if all spouses respond strategically to private information, or if only some do. Further, it is possible that only very few spouses act opportunistically when given access to private information, but they react so strongly that the average measured effect is large and statistically different from zero.

It is difficult to measure responses to asymmetric information at the individual level in quasi-experimental studies and field experiments, but is straight forward in laboratory experiments. Between-subject games can be used to measure the fraction of the spouses that respond to asymmetric information. Castilla (2014) finds that when given the option, 25 percent of respondents in India choose to hide winnings from their spouse, while in Kenya, Jakiela and Ozier (2014) find that 28 percent of people were willing to pay a fee to hide their winnings from their spouse and extended family. However, while between-subject games can be used to measure the existence of a response to asymmetric information or the average extent of the response, to measure both at the individual level requires within-subject games. Using a within-subject design, each individual can be observed making decisions in secret and in public, allowing a description of not only the average response to asymmetric information but also detailed measurement of the distribution of individual behavior.⁶

There are two studies in the non-household laboratory experimental literature that use a within-subject design to study the effect of information on giving between community members. Leider et al. (2009) study the motives to share between friends and strangers at Harvard University, and find that on average people give more when their actions will be observed. While these authors have within-subject data, they do not use it to examine the distribution of individual responses to asymmetric information. In a study of the motives to share between neighbors in rural Paraguay, Ligon and Schechter (2012) use within-subject dictator games to measure the relative importance of altruism and reciprocity, and emphasize that on average people give more when their actions will be revealed. However, a substantial fraction (36 percent) do not respond to asymmetric information.

In this study, I use within-subject dictator games to identify which spouses respond to asymmetric information and by how much, then relate the types identified in the lab to survey data of information regarding finances at home. By using laboratory games as a tool to identify types of spouses, I am able to detect heterogeneous behaviors at home which suggest a more nuanced conclusion about the appropriate non-cooperative model of the household.

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⁶Within-subject laboratory games do have limitations. Most importantly, subjects may behave differently in the game they play second because of their exposure to the first game, thus the first and second games are not true counterfactuals (Charness, Gneezy, and Kuhn (2012)). Order effects in this experiment are discussed in sections 4.2.1.

3. Experimental design, setting, and sample

3.1. Experimental design

The experimental design focuses on two dictator games: the secret spouse and public spouse games. In all games, the respondent was given several tokens and told that he could keep the tokens for himself or give some to his partner. In the secret spouse game, the respondent was asked to make an allocation between himself and his spouse, and told that his decision would certainly remain hidden from his spouse. In the public spouse game, the respondent again divided tokens between himself and his spouse, and was told that his spouse may be informed of his decision. All respondents played both the public and secret spouse games.

To obscure decisions in the secret spouse game, each respondent also played several games that could pay off anonymously. The other games included: the traditional dictator game, in which the respondent divided tokens between himself and an anonymous stranger; the spouse stranger game, in which the respondent divided tokens between his spouse and an anonymous stranger; and the stranger stranger game, in which the respondent made an allocation between two anonymous strangers. Results from the standard dictator games are briefly discussed, but the stranger games are not highlighted in this work; they are the topic of another paper (Hoel (2014)). In addition to the two spouse games, each respondent also played two of the three stranger games, selected at random.

The order of the games was randomized. The spouse games were always played consecutively, with the starting game (secret or public) randomized. The order between the spouse games and the other two games selected was also randomized.

Each game was played over three stakes (five, ten, and twenty five tokens), always played in increasing order. Multiple stakes were used to test for the consistency of choices across multiple rounds and over increasing financial stakes.⁷ Tokens were worth 20 Kenyan shillings (about \$0.22) if kept and 30 Kenyan shillings (\$0.32) if given away. The price of giving was set at less than 1 to test for efficiency between spouses.⁸ The maximum possible payout from one game was 750 Kenyan shillings (about \$8.25), which was 48 percent of average male income over the previous week and 112 percent of average female weekly income.

In total, each respondent made twelve choices: (two spouse games + two stranger games) x three stakes. Respondents were informed that all of their choices would be entered into a computer at the office and one would be chosen at random to pay out.⁹ If a respondent or his spouse won a public spouse game, both were informed of the token amount, its division, and the amounts of money taken home by each spouse from that game. If one or both partners' public spouse game were not chosen to pay out, their decisions in the public spouse games remained secret. For all other selected games, no one was informed of how their winnings were generated. It was emphasized that because respondents could win any game for

⁷Choices were remarkably consistent across stakes; see Online Appendix D, available on the author's website.

⁸The inefficiency of choices is not highlighted in the main paper, but is discussed in Online Appendix B, available on the author's website.

⁹The computer also picked random partners for the stranger games, drawn from all subjects who played the games that week.

themselves, and could receive money from their own, their spouse's, or a stranger's game, they could be sure that their choices in the secret spouse game would remain secret. It was also clear that if a respondent won the public spouse game, he could not also win the secret spouse game. Thus respondents could not infer their spouse's choices in the secret game because they are obscured by anonymous payouts, and could certainly not infer their behavior in both the public and secret games because at most only one paid out.

Winnings from the games were distributed one week later at the end of a follow-up interview. Respondents were not informed by the study team how much their spouse took home from the games in total; however, because respondents were required to attend with their spouses and likely returned to their home together, it is possible that respondents discussed their winnings with their spouse after leaving the study site. Because it was essential to speak with both the respondent and his spouse at the same time, this limitation was logistically unavoidable. While the existence of the anonymous games afforded respondents plausible deniability, it is possible that some felt that walking home with their spouse undermined the secrecy of their decisions in the secret spouse game.

My design is most closely related to that of Ligon and Schechter (2012). My public spouse, secret spouse, and secret stranger games are analogous to their Revealed-Chosen, Anonymous-Chosen, and Anonymous-Random games.¹⁰ I also used their games script as a template for my own, then worked with my local staff to adapt the structure and word choice to the Kenyan context.

3.2. Setting

The study is set in Siaya county in southwestern Kenya's Nyanza Province. A review of the ethnography of the region can be found in Online Appendix E, available on the author's website. Siaya is a relatively population dense rural agricultural area. The sample was drawn from the population within walking distance of five rural town centers. All of the towns are small, the largest with a population of 15,433 in 2009 (Siaya town).¹¹

3.3. Sample selection, logistics, and sample characteristics

Subjects were required to be married, currently living with their spouse, over the age of 18, and available to participate in two interviews a week apart. Polygynous families were not eligible to participate.¹²

Potential subjects were recruited with the help of local administrators (village elders). For each town center, all of the proximate villages that covered the area of the town were identified and their elders contacted. Note that a "village" is an official administrative unit in

¹⁰The stranger stranger game in my study is analogous to Konow (2000)'s Benevolent Dictator treatment, and my spouse stranger game is a hybrid of the standard dictator game and the Benevolent Dictator treatment. These games are used to study inequity aversion, material utility, and household bargaining in Hoel (2014).

¹¹<https://www.opendata.go.ke/>

¹²Polygynous families were excluded because the household bargaining structures between three or more adults are likely to be very different from traditional models of two adult households. In the 2009 Kenyan census, 8 percent of men and 14 percent of women over the age of 18 in the Nyanza Province reported that they were in polygynous marriages. By contrast, 57 percent of men and 55 percent of women over 18 said they were in single-spouse marriages. (Author's calculations using IPUMS International data, Minnesota Population Center.) Fenske (2013) documents the decline of polygyny across Africa.

Kenya, with “villages” as sub-units of “towns”, each with clearly defined geographic boundaries and leadership structures. Elders were asked to compile a list of all couples meeting the eligibility criteria. Couples were then assigned a random number to determine the order in which they were contacted to be scheduled for an interview, stratified by town center. While it is possible that village elders listed couples they would like to participate in the study first, the randomized order of contact ensured that the sample was representative of the complete list the elders provided. It is also possible that elders excluded some couples purposefully, but anecdotally this did not appear to be a problem.¹³

Couples were scheduled for interviews held at a central location in each town with respondents playing along side people from around the town but not necessarily from the same village. Initial interviews took place on 19 days in September and October 2011. While it is possible that respondents had heard details about the study from friends or neighbors who had already participated, only 3 percent of respondents said they knew someone who had already participated. The analysis includes controls for day fixed effects.

Couples arrived at the survey site together, then were split for their individual surveys. The survey was executed in Dholuo, the most common native language in the study area.¹⁴ All interviews were conducted one-on-one with an enumerator. The initial interview began with a questionnaire about demographics, family finances, material wealth, expenditures, transfers, savings and loans, and decision-making in the household. English versions of the survey are available on the author's website and Dholuo versions are available on request. 415 couples were interviewed at baseline, and 406 couples met all of the study criteria. Of these, 392 had complete game records.¹⁵ Table 1 shows demographic and financial characteristic summary statistics of the sample.

The games were played after the baseline survey, again conducted one-on-one with a trained field assistant reading from a script in Dholuo. An English version of the game scripts can be found in Appendix A. The respondent was given tokens (bottle caps) to divide between himself and his partner. The respondent indicated his choice by placing the bottle caps in cups labeled “Self,” “Spouse,” or “Stranger” in Dholuo. To assist respondents in understanding the monetary consequences of their choices, each was given a sheet showing the value of a number of tokens if given or kept. A copy of this sheet can be found in Appendix A. After the respondent made his choice, the field assistant repeated the choice and its monetary consequences to the respondent, and asked if that was the division the respondent wanted. The respondent was allowed to change his choice as many times as he liked.¹⁶ The respondent was asked questions to confirm their understanding at every stage. In total, the baseline survey and games took an average of 90 minutes.

¹³Occasionally a couple would come to a study site asking to be interviewed even though they were not on the schedule. There were very few who were not on our sampling list but who were eligible for the study. The most frequent requests came from couples in polygamous unions, who were not eligible to participate.

¹⁴All subjects in the sample speak Dholuo. The survey and game scripts were forward and back translated by the study team.

¹⁵Some couples were excluded because one or more of the six spouse game decisions was missing or recorded incorrectly.

¹⁶5.4 percent made one change to their initial allocation, 3.7 percent made 2-5 changes, 6 percent made 6 changes, and 0.4 percent made 7 or more changes. The existence of a reallocation is statistically significantly negatively correlated with transfers to spouse for men. All other demographic and financial variables are not statistically significantly correlated with reallocation, including education. The order of the games is not statistically significantly correlated with the number of changes.

Respondents returned one week later to participate in a follow-up interview and collect their winnings from the games. Payouts from the games ranged from 0 to 1270 shillings. The average payout per respondent was 316 KSH. The mean payout was 20 percent of baseline reported weekly male income, and 49 percent of weekly female income.

4. Results

4.1. Between-subject analysis

Before analyzing responses to asymmetric information at the individual level, I first use the data as if respondents played only one of the public or secret games and describe the average difference in behavior across information conditions. I include observations only from the first spouse game each respondent played, when their behavior is unaffected by exposure to the second spouse game. This between-subject analysis mimics those used previously in the experimental literature studying household behavior (e.g. Iversen et al. (2013), Kebede et al. (2014), Mani (2011)), and is analogous to between-subject field experiments (e.g. Ashraf (2009)) and natural experiments studied with cross-sectional surveys (e.g. Chen (2013)). I begin by presenting basic summary statistics of play in the public and secret games, then show the differences in average behavior in a regression format that controls for game design elements and personal characteristics.

Figure 1 shows overlaid histograms of the percent of tokens passed in the public and secret spouse games, as well as lines indicating the average percent of tokens given in each game. On average, respondents give 53 percent of tokens in the public game and 45 percent in the secret game, indicating that at least some respondents are taking advantage of asymmetric information by behaving generously in public and selfishly in secret.¹⁷¹⁸

Table 2 shows the difference in average giving across the information condition in a regression framework. The first column shows an OLS regression of the percentage of tokens given on an indicator variable for the secret spouse game.¹⁹ Column 1 again shows that average giving in the public spouse game was 53 percent, and the coefficient on the indicator for the secret game shows that giving in the secret spouse game was statistically significantly lower. The second column controls for game design features, including the order in which the spouse games were played with the stranger games, the stakes of the games,²⁰ and date and enumerator fixed effects,²¹ with heteroskedasticity robust standard errors clustered at the individual level.²² The final column also includes controls for

¹⁷Though giving 100 percent of tokens is the household welfare maximizing and thus efficient decision, average giving is far from efficient and very few choices give all the tokens to the spouse. This result has been found by many others in the experimental literature (e.g. Mani (2011), Kebede et al. (2014), Castilla (2014)). A detailed discussion of efficiency behaviors in this sample and their implications for models of the household can be found in Online Appendix B, available on the author's website.

¹⁸The modal percentage of tokens given is 40 percent in both the public and secret games, and 60 percent is also a focal point. Because of the 1.5 exchange rate, giving 40 percent of tokens results in an even split of money. The 40 percent mode suggests that some spouses are averse to inequity. The 60 percent mass point suggests that others balance individual monetary winnings with inequity aversion. Lastly, the fact that more people choose 40 in the public game than the secret game suggests that people care differently about acting fairly and being seen as acting fairly (Andreoni and Bernheim (2009)). Hoel (2014) explores these ideas in depth.

¹⁹Because only 3.2 percent of observations give 0 percent and 2.6 percent give 100 percent of tokens, censoring is not a major concern. Further, results from Tobit regressions are qualitatively similar and available on request. Though the choice of how many tokens to give does have cardinal meaning, one might be concerned that if a respondent does not fully understand the monetary consequences of their choice their decision may have only ordinal meaning. Results from ordered probit regressions are qualitatively similar and available on request.

individual characteristics.^{23,24} The second and third columns show that after controlling for game design and individual characteristics, the difference between average giving in the public and secret spouse games is large and statistically different from zero. This further indicates that at least some respondents are taking advantage of the asymmetric information offered in the lab.

As has been found in previous studies, these between-subject results indicate that spouses do respond to asymmetric information strategically. However, the analysis presented here and used in previous studies may hide substantial and important heterogeneity. Before concluding that most spouses behave opportunistically, we examine responses to asymmetric information at the individual level.

4.2. Within-subject analysis

While previous results have shown that at least some spouses respond to asymmetric information strategically, we have not previously been able to measure how many. In this study every respondent played both the public and the secret game, thus it is possible to tabulate the response to asymmetric information for every individual, calculate the fraction of people who respond to private information, and categorize respondents distinctly. I classify an individual as responding opportunistically to asymmetric information if she is more generous in public when her spouse will find out about her choices and more selfish in secret when her decision remains hidden. This section counts how many people behave opportunistically and to what extent.

Figure 2 shows a histogram of the linear difference between the percentage of tokens passed in the public and secret games. A positive linear difference indicates that the respondent has behaved opportunistically. While the between-subject analysis showed that the average difference between the public and secret games is positive, this figure makes clear that most people do not change their behavior between the public and secret games. The people who do behave opportunistically give so much more in public that the average difference between treatment conditions is large and statistically significant. Table 3 shows that the 36 percent of observations that give more in public give an average of 30 percentage points more, a 100 percent increase over baseline giving in the secret game. 14 percent of observations give less in the public game and more in secret game, giving an average of 21 percentage points (35 percent) less.

The difference in results for the between- and within-subject analyses is stark: examining differences in average giving across information conditions suggests that asymmetric

²⁰A discussion of the consistency of play across stakes is the subject of Online Appendix D, available on the author's website. Behavior is very consistent across the three stakes offered.

²¹Date fixed effects adjust for the fact that because the experiment was run over several weeks, later respondents may have heard about the experiment before they participated. Date fixed effects are jointly insignificant. Enumerator fixed effects are jointly significant.

²²Because behavior is correlated within individual, errors are not i.i.d. across observations within individual.

²³Individual characteristics include gender, age, education, number of children, an indicator that income over the previous week was above median, and an indicator for income from work.

²⁴Results disaggregated by gender are presented in Online Appendix C, available on the author's website. Patterns are largely similar across the genders, aside from one major difference: men give more on average in both the public and secret games, but the difference between giving in the public and secret games is not significantly different across genders.

information affects transfers between spouses, while the individual analysis shows that for most people asymmetric information does not matter. This difference is important to the conclusions drawn about models of the inefficient household: the between-subject analysis suggests that asymmetric information is one of the driving causes of inefficiency in household decisions while the within-subject analysis demonstrates that for most people another explanation is necessary.

4.2.1. Order effects—The major concern about within-subject designs is that the order in which a respondent plays the games may affect his decisions, and that different conclusions would have been drawn had order effects not played a role. We first test for order effects in the between-subject analysis then in the individual analysis. While there is evidence of significant order effects, they do not affect the ultimate conclusions drawn from the data.

To examine order effects in the between-subject analysis, I look for differences in average giving across orders. The second column of table 4 includes indicator variables for whether the respondent played the secret spouse game before the public game (essentially asking whether those who played the public game second gave more in the public game) and an interaction between the indicator for the spouse game and the indicator for playing the secret game first (testing whether those who played the secret game first gave more in the secret game).²⁵ The difference between the public and secret games is significantly smaller when the secret game is played first. However, in the between-subject analysis, the order effects do not change the conclusions drawn from the overall patterns. The difference in giving between the public and secret games is still large (-6.1) and statistically different from zero (t-stat: -5.9).

In the within-subject analysis, we look for differences in the percent of respondents who behave opportunistically or do not respond to asymmetric information across game orders. Table 5 shows the distribution of observations into behavioral categories broken out by the order in which the respondent played the games. When the secret game is played first, 32 percent of observations are opportunistic and 52 percent are non-responsive; when the public game is played first, 40 percent of observations are opportunistic and 47 percent are non-responsive; a Pearson's χ^2 test of equality of distributions is rejected (χ^2 : 19.05). While there are differences across orders, the conclusions drawn from the data are the same: *most* people do not change their behavior across information conditions, regardless of the order in which they played the games.

4.2.2. Mistakes—It is common in the experimental literature to find that some fraction of respondents behave “irrationally,” and either may not have fully understood the games or made a mistake in trying to indicate their true preferences. That some respondents gave more in the secret game than the public game, precisely when their generosity could not be observed, could indicate that some respondents did not understand or made mistakes. However, there are several reasons to believe that the number and extent of mistakes is small and that these mistakes do not affect the overall conclusions drawn from the data. Most importantly, respondents play remarkably consistently across the three stakes of the

²⁵Recall that the base category in this regression is the five token public spouse game.

game. Online Appendix D, available on the author's website, provides a detailed discussion of consistency across stakes. In short, 56 percent of respondents consistently play as an Opportunist, a Non-Responder, or a Secret Benefactor for all three stakes. An additional 30 percent play two stakes as one type, and the third as the proximate type. In total, 94 percent of respondents make choices that are consistent with no more than a one token mistake. All of the results reported in this paper are robust to restricting the sample to those who displayed a consistent type for all three stakes, available on request. Finally, were mistakes common and idiosyncratic, we would expect that correlations between lab and field behavior would be difficult to detect due to attenuation. Results presented in the next section show that there are statistically significant correlations between the types discovered in the lab and behavior in the field, further assuaging concerns about mistakes in game allocations.

The behavior of “Secret Benefactors,” those who give more in secret than in public, is the most potentially concerning. However, there are rational explanations for this behavior. Bénabou and Tirole (2006) suggest that some individuals may give less to a stranger in a public game because they may not gain as much pure altruistic utility when their generosity could be rewarded by their partner. In the household, a respondent could value total household income but also be concerned about embarrassing a proud spouse with excessive generosity or intent on maintaining a tough image for future rounds of negotiation. Such a person would rationally and strategically give a more in the secret game and less in the public game. While further work is needed before too much weight is placed on this finding, the existence of “Secret Benefactors” is certainly intriguing, and would have been missed with a between-subject design.

4.2.3. Which spouses behave opportunistically?—After recognizing that while some spouses may respond opportunistically to asymmetric information, many or most do not, field experimentalists and policy makers would then like to know which spouses behave opportunistically. If opportunism is highly correlated with an observable characteristic, laboratory games would not be necessary to identify relevant sub-groups and field experimentalists could use the more easily observable characteristic instead. However, easily observed characteristics are not significantly and consistently related to opportunism in this sample, including gender, education,²⁶ number of children, total income,²⁷ and income from work;²⁸ these results are available on request.

While easily observable characteristics are not significant predictors of opportunism in the spouse games, altruism toward strangers is. Column 1 of Table 6 shows linear probability model regressions of an indicator that the respondent gave more in the public than the secret game on giving in the standard dictator game played against a stranger.²⁹ Altruism to

²⁶Women with some university are less likely to behave opportunistically, but the relationship is weak and not robust to the inclusion of other variables.

²⁷Men with income above median are less likely to behave opportunistically, but the relationship is weak and not robust to the inclusion of other variables.

²⁸Men who report earning some income from work are more likely behave opportunistically, but the relationship is weak and not robust to the inclusion of other variables.

²⁹The linear probability model is used for ease of interpretation. Standard errors are robust to heteroskedasticity, and because only 0.66-1.66 percent of predicted values fall outside the unit interval, concerns of bias are low (Horrace and Oaxaca (2006)). Results using a probit specification are qualitatively similar and available on request.

strangers is negatively associated with opportunism toward the spouse. A person at the 75th percentile of the altruism distribution³⁰ is 4.2 percentage points less likely to behave opportunistically towards his spouse than a person at the 25th percentile of the altruism distribution.³¹ This suggests that altruism, an unobservable characteristic, is an important correlate of opportunism.

One of the most important predictors of whether the respondent behaves opportunistically is the behavior of the respondent's spouse. The second column of Table 6 shows that a person who is married to an opportunist is 5.7 percentage points more likely to be an opportunist himself. Perhaps not surprisingly, an individual's behavior in his household is significantly correlated with the behavior types of the other members of his household.³²

4.3. Correlation between laboratory behavior and survey measures of information in the household

In the laboratory information about transfers can be varied experimentally, but at home spouses are able to choose the level of information between them. That is, the perfection or imperfection of information is endogenous to the household decision-making process. We may then expect that better information in the household could be correlated with either better or worse cooperation. For example, suppose a person receives an income stream that she could potentially hide. She may choose to disclose the income to her spouse if she believes the revelation will bring household consumption decisions closer to her preferences, either by increasing her bargaining power or because her and her spouse's preferences are aligned. Castilla (2013 and 2014) writes such a model. Under this idea, better information between spouses may reflect better cooperation, and thus be associated with higher generosity in the games. On the other hand, if a respondent typically hides income and behaves non-cooperatively, the respondent's spouse may choose to monitor her more closely to prevent the income hiding. Chen (2013) writes such a model, including costly monitoring and cooperative and non-cooperative types. In this framework, better information between spouses may be due to more monitoring that reflects less cooperation, and thus be associated with lower giving in the games. Is better information associated with better or worse cooperation between spouses? Which explanation dominates is an empirical question, and importantly, there may be heterogeneity across households in how survey data about information should be interpreted.

To explore these ideas, I compare behavior in the games to survey measures of information in the household. The baseline survey contains detailed income and expenditure modules. To measure income, respondents were asked if they received any money on each of the preceding seven days. In addition to the size of the transfer, the respondent was asked if their spouse knew about the income. With these data, I construct the fraction of income each respondent said their spouse was aware of.³³ 60 percent of people report that their spouses know about every income stream over the previous week.³⁴ A sizable minority reported that

³⁰78 percent of people give 40 percent of tokens or less to the stranger in the traditional dictator game.

³¹31 percent of people give 20 percent of tokens or less in the secret stranger game.

³²Because age at present and length of marriage are highly correlated, it is not possible in these data to determine whether the correlation in spousal types is due to assortative matching on a fixed characteristic or the development of opportunistic responses to spouse's behavior over time.

their spouse was aware of none of their income streams, with 31 percent reporting complete privacy in their income.

I construct a similar measure of spousal knowledge of expenditures. For 49 items, the respondent was asked if they purchased the item over the previous week and whether their spouse was aware of the purchase. From these responses, I construct the fraction of the respondent's total expenditures that the respondent says his spouse knows about.³⁵ 53 percent of respondents say their spouse is aware of every expenditure over the past week.³⁶ In contrast to income, very few respondents say their spouse is completely unaware of their purchases.

Because the distribution of knowledge is so lumpy, I collapse the information measures to binary indicator variables to compare means between information types. I code a person as reporting high information if they report their spouse knows about 100 percent of their income streams or expenditures.³⁷

Do people who report better information in their household behave more generously in the games? Table 7 presents OLS regressions of the percentage of tokens passed in the games on survey indicators of perfect information in the household.³⁸ The first two columns show results measuring information at home as information about income; the second two columns measure information at home as information about expenditures. The first column of Table 7 shows a linear regression of giving in the games on an indicator variable indicating that the respondent reported perfect information about their income, with the sample restricted to those who did not respond to asymmetric information.³⁹ For those who do not respond to asymmetric information in the games, reporting perfect information about income in the surveys is positively but insignificantly correlated with more generosity in the games. This behavior is consistent with the idea that more cooperative couples share information, but don't insist on knowing everything. The second column shows results for opportunists. While opportunists who report perfect information about income at home also give more in the public game (the coefficient on "Full information at home" in row 1), they give less in the secret game (the coefficient on "Full information * Secret game" in row 2); rather than behave more cooperatively, opportunists who report better information at home behave more opportunistically. In other words, extreme opportunists, people who give a lot more in the public game than the secret game, are likely to say that their spouse knows about

³³Transfers from the spouse were excluded from the numerator and denominator. Note that respondents who reported zero non-spousal income over the previous week are necessarily excluded. 170 (45 percent of) women and 108 (29 percent of) men are excluded from the income analysis.

³⁴Results are similar for the genders separately. 61 percent of men and 59 percent of women report that their spouses know about every income stream over the previous week.

³⁵Education expenditures were excluded from the calculation because education expenditures are very lumpy, and generated extreme outliers. Note that respondents who reported zero expenditures over the previous week are necessarily excluded. 3 (0.8 percent of) women and 10 (2.7 percent of) men are excluded from the expenditure analysis.

³⁶Results are similar for the genders separately. 56 percent of men and 49 percent of women say their spouse is aware of every expenditure over the past week.

³⁷The results shown here are robust to redefining the indicator variable at a threshold of 50 percent, available on request.

³⁸Results from Tobit regressions to account for possible censoring and ordered probit regression to allow for the possibility that respondents' choices have only ordinal meaning are qualitatively identical and available on request. Results are also robust to limiting the sample to those who consistently played all three token amounts as an Opportunist, Non-Responder, or Secret Benefactor.

³⁹Because these respondents behave the same in the public and secret games, these regressions include observations only for the public spouse game. The sample is also restricted to those who reported positive income over the previous week.

all of their income over the previous week, which is consistent with the idea that their spouse knows they behave non-cooperatively and monitors them accordingly. In contrast, mild opportunists, those who give a bit more in public but not much, are less likely to report that their spouse has perfect information about their income. The behavior of opportunists is consistent with the idea that better information between couples can be explained by more monitoring of non-cooperative spouses. The third and fourth columns show analogous tests for information about expenditures. Here we see broadly similar patterns. Better information about expenditures is mildly positively associated with generosity for those who do not respond to asymmetric information, but only people with extremely opportunistic behavior are likely to report that their spouse has perfect information about their expenditures.⁴⁰

In summary, survey measures of information between spouses are positively correlated with generosity in the games, but the heterogeneity of responses to asymmetric information found in the lab affects the interpretation of the association between information in real life and cooperation in the games. For those who give the same amount in the public and secret games, better information between spouses is positively but insignificantly associated with greater generosity in the games. For those who give more in the public game and less in the secret game, better information is associated with higher levels of opportunism, suggesting that for non-cooperative couples, better information reflects more monitoring. These results highlight the importance of allowing for heterogeneous types and endogenous responses by their spouses, suggest that models of the household should include both asymmetric information and limited contracting, and caution that survey measures of information in the household should be interpreted carefully.

5. Conclusion

Asymmetric information has been suggested as a cause of inefficiency in household decision-making, but most tests of the effect of private information have examined only the average difference in behavior between one group of spouses that have perfect information and another that does not. In this study, I use within-subject dictator games between spouses in Kenya to detail the full distribution of responses to private information, and find that heterogeneity matters: while on average people are more generous to their spouses in the public information treatment, most respondents do not change their behavior between the public and secret games. A minority of subjects behave so differently that the average treatment effect is large and statistically different from zero, while for most respondents, behavior in the public and secret games is the same. These two results lead to different conclusions about the appropriate model of the household: examining only average differences would suggest that asymmetric information is a likely cause of inefficiency between spouses, while within-subject analysis shows that for most people, another explanation for inefficiency is needed.

To confirm that the types identified in the games are meaningful outside the lab, I examine survey measures of spousal knowledge of income and expenditures at home, and find that

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⁴⁰Results for Secret Benefactors, those who give more in the secret game than public game, are not shown here because the sample size is too small to detect meaningful differences; these results are available on request.

better information at home indicates different things for different respondents. For those who do not respond to asymmetric information in the lab, better information at home is positively but insignificantly associated with more generosity in the lab, indicating trust and cooperation. For those who behave opportunistically in the lab, greater knowledge at home is associated with greater opportunistic behavior in the lab, suggesting that the information at home is not due to trust, but rather the close monitoring of a suspicious spouse. This result highlights that cross-section survey data about information between spouses should be interpreted carefully because while for some couples high levels of information may reveal cooperation, for others better information indicates an endogenous response to non-cooperative behavior.

Most importantly, the paper highlights the existence of heterogeneous types of households in their responses to asymmetric information, and suggests a method of identifying them to examine heterogeneous treatment effects in field tests of new programs. Field experimentalists who think that household information dynamics may affect the uptake or efficacy of a new program should consider using laboratory games to identify those for whom we think information matters most.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Appendix A

Appendix A Game materials

Note: The games were implemented in Dholuo in an individual interview with a trained enumerator following a script. The enumerators were all native Dholuo speakers. The scripts were written in English with input from the field assistants, then forward and back-translated twice into Dholuo. The scripts shown here are in English. Dholuo translations are available on request.

Introduction to Games

Thank you for your participation in the survey. Now I would like to invite you to participate in some games. First, I will give you some instructions for the game. You should feel free to

ask me to repeat something if you don't catch it at first. After the instructions, I will ask you a few questions to check your understanding. It's ok if you don't answer the questions correctly at first; I will just repeat the instructions of the game.

General Game Instructions

1. In these games you will have a chance to win real money. Jessica, the leader of this project, has arranged for the money. The money you win has come from Jessica's school so that she can complete this project.
2. These games you will play with a partner. In some games your partner will be your husband/wife. But in some of the games your partner will be a stranger.
3. You will make two types of decisions [hold up two fingers]; 1) secret decisions and 2) public decisions. For the secret decision, I will not tell anyone about your choices except Jessica, the leader of this project. For the public decision you make I will tell only your partner and Jessica, but no one else in your village.
4. Today we will play several different games over different amounts of money. One of these games will come true.
5. We will enter all of your games into the computer in the office. The computer will randomly decide which game comes true. We will then combine your choices with the choices of your partners, and together they will determine how much money you win.
6. You will receive your money next week when we come back for a follow up interview.

Now I would like to ask you a few questions to check your understanding of the instructions. If you don't understand some part, I will just repeat the instruction and that will be fine.

Questions about General Game Instructions

FO Instructions: If the respondent answers correctly, say "Yes, that's right" then repeat the correct answer. If the respondent answers incorrectly, follow the instructions given on the line.

1. Where did the money come from? [Jessica's School; if wrong, repeat #1.]
2. Who will be your partner in these games? [My spouse or a stranger; if wrong, repeat #2.]
3. When your decision is secret, who will I tell about your choice? [No one except the leader of this project; if wrong, repeat #3.]
4. When your decision is public who will I tell about your choices? [My partner and the leader of this project only; if wrong, repeat #3.]
5. Will I ever tell your village elder about your choices? [No. If wrong, say "I will sometimes tell your partner, but I will never tell anyone else in your village about your choices."]

6. Of the many games we play today, how many of your choices will come true? [One; if wrong, repeat #4.]
7. How will we pick which of your games come true? [The computer will pick randomly; if wrong, repeat #5.]
8. When will you receive your money from the game that comes true? [Next week; if wrong, repeat #6]

Great! Now that you understand the general rules of the games, let's talk about one game in specific.

Secret Spouse Decider Game

(If the first:) Now let's play the first game. This game is called the secret spouse Decider Game.

(If not the first:) Now let's play a different game. This game is called the secret spouse Decider Game. The rules are a bit the same and a bit different from the last game.

Game Rules

1. Your partner in this game is your spouse.
2. Your choices in this game will be secret. I will not tell your spouse how you have played. I will also not tell anyone else in the village how you have played.
3. In this game I will give you bottle caps that represent real money.
4. You can keep all these bottle caps and money for yourself or you can give some or all to your spouse.
5. The bottle caps you keep are worth ksh20 for yourself. But if you give them to your spouse, they are worth ksh30 to your spouse. For example, if you keep 2 bottle caps, they are worth 40 shillings to you. If you give 2 bottle caps, they are worth 60 shillings to your spouse. You can use this sheet to help you understand the value of the bottle caps. This column shows how much the caps are worth if you keep them and this column shows how much the caps are worth if you give them.
6. Here are two labeled tins. This one is labeled SELF and this one is labeled SPOUSE. Drop the bottle caps you would like to keep in the tin labeled SELF and the bottle caps you would like to give in the tin labeled SPOUSE.
7. Because this game is secret, your spouse will not know that the money comes from you. They will not know if you give them money, and they will also not know if you do not give them money.

Again I would like to ask you a few questions to check your understanding of the rules of the secret spouse Decider Game.

Questions for secret spouse Game

FO Instructions: If the respondent answers correctly, say “Yes, that's right” then repeat the correct answer. If the respondent answers incorrectly, follow the instructions given on the line.

1. Here are 7 bottle caps. If you keep them by putting them in the SELF tin (FO: Demonstrate), how much are they worth to you? [140ksh; if wrong, repeat #5]
2. If you give the 7 bottle caps by putting them in the SPOUSE tin (FO: Demonstrate), how much are they worth to your spouse? [210ksh; if wrong, repeat #5]
3. Who is your partner for this game? [Spouse; if wrong, repeat #1]
4. Will I tell your spouse what you decided? [No; if wrong, repeat #2]
5. Will I tell your village elder what you decided? [No; if wrong, repeat #2]
6. Will your spouse know how much you gave to them in this game? [No; if wrong, repeat #7]

Ok! Now lets play the game! Here are 5 bottle caps. You can make your choice as you wish.

Ok. You have chosen to keep X bottle caps worth X to you and give X bottle caps worth X to your spouse. Is that correct?

If no, “Ok, here are the 5 bottle caps again. You can make your choice as you wish.”

If yes, “Ok, let's continue. Here are 10 bottle caps. You can make your choice as you wish.”

FO: Repeat for other values as needed.

Public Spouse Decider Game

(If the first:) Now let's play the first game. This game is called the public spouse Decider Game.

(If not the first:) Now let's play a different game. This game is called the public spouse Decider Game. The rules are a bit the same and a bit different from the last game.

Game Rules

1. Your partner in this game is your spouse.
2. Your choices in this game will be public. I will tell your spouse how you have played. But, I will not tell anyone else in the village how you have played.
3. In this game I will give you bottle caps that represent real money.
4. You can keep all these bottle caps and money for yourself or you can give some or all to your spouse.
5. The bottle caps you keep are worth ksh20 for yourself. But if you give them to your partner, they are worth ksh30 to your spouse. For example, if you keep 10 bottle caps, they are worth 200 shillings to you. If you give 10 bottle caps, they are worth

300 shillings to your spouse. You can use this sheet to help you understand the value of the bottle caps. This column shows how much the caps are worth if you keep them and this column shows how much the caps are worth if you give them.

6. Here are two labeled tins. This one is labeled SELF and this one is labeled SPOUSE. Drop the bottle caps you would like to keep in the tin labeled SELF and the bottle caps you would like to give in the tin labeled SPOUSE.

Again I would like to ask you a few questions to check your understanding of the rules of the public spouse Decider Game.

Questions for public spouse Game

FO Instructions: If the respondent answers correctly, say “Yes, that’s right” then repeat the correct answer. If the respondent answers incorrectly, follow the instructions given on the line.

1. Here are 9 bottle caps. If you keep them by putting them in the SELF tin (FO: Demonstrate), how much are they worth to you? [180ksh; if wrong, repeat #5]
2. If you give the 9 bottle caps by putting them in the SPOUSE tin (FO: Demonstrate), how much are they worth to your spouse? [270ksh; if wrong, repeat #5]
3. Who is your partner for this game? [Spouse; if wrong, repeat #1]
4. Will I tell your spouse what you decided? [Yes; if wrong, repeat #2]
5. Will I tell your village elder what you decided? [No; if wrong, repeat #2]

Ok! Now lets play the game! Here are 5 bottle caps. You can make your choice as you wish.

Ok. You have chosen to keep X bottle caps worth X to you and give X bottle caps worth X to your spouse. Is that correct?

If no, “Ok, here are the 5 bottle caps again. You can make your choice as you wish.”

If yes, “Ok, let’s continue. Here are 10 bottle caps. You can make your choice as you wish.”

FO: Repeat for other values as needed.

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Highlights (for review)

Within-subject dictator games identify which spouses respond to private information.

Most spouses give the same in the public and secret game.

A minority of spouses give more in public.

Types revealed in the lab also show different behaviors in field.

Figure 1. Histograms of transfers in spouse games

Notes: Figure shows overlapping histograms of the percentage of tokens given in the public and secret spouse games, along with lines indicating the mean percentage of tokens given in each game. The figure includes observations for both men and women for all three token amounts (stakes), but restricts to the first spouse game the respondent played.

Figure 2. Linear difference between public and secret games

Notes: The figure shows a histogram of the linear difference between the percent of tokens given in the public and secret spouse games.

KEEP	Tokens	GIVE
0 ksh	0	0 ksh
20 ksh	1	30 ksh
40 ksh	2	60 ksh
60 ksh	3	90 ksh
80 ksh	4	120 ksh
100 ksh	5	150 ksh
120 ksh	6	180 ksh
140 ksh	7	210 ksh
160 ksh	8	240 ksh
180 ksh	9	270 ksh
200 ksh	10	300 ksh
220 ksh	11	330 ksh
240 ksh	12	360 ksh
260 ksh	13	390 ksh
280 ksh	14	420 ksh
300 ksh	15	450 ksh
320 ksh	16	480 ksh
340 ksh	17	510 ksh
360 ksh	18	540 ksh
380 ksh	19	570 ksh
400 ksh	20	600 ksh
420 ksh	21	630 ksh
440 ksh	22	660 ksh
460 ksh	23	690 ksh
480 ksh	24	720 ksh
500 ksh	25	750 ksh

Figure 3. Token Value Sheet

Table 1
Demographic and financial characteristics

Variable	Men	Women
Age	45.99 (16.1)	36.62 (13.93)
No education?	0.07 (0.25)	0.15 (0.35)
Some primary school?	0.36 (0.48)	0.41 (0.49)
Finished primary school?	0.22 (0.41)	0.26 (0.44)
Some secondary school?	0.11 (0.31)	0.09 (0.29)
Finished secondary school?	0.19 (0.39)	0.08 (0.27)
Some university?	0.04 (0.19)	0 (0.05)
Finished university?	0.02 (0.13)	0.01 (0.07)
Number of Children	3.88 (2.6)	3.77 (2.39)
Total Income	1555 (4829)	676 (2343)
Income from Work?	0.52 (0.5)	0.33 (0.47)
N	376	376

Notes: Table shows means and standard deviations, in parentheses, of demographic and financial characteristics.

Table 2
Between-subject analysis

	Percent of tokens given		
	(1)	(2)	(3)
Secret spouse game	-8.446*** (0.811)	-7.729*** (1.216)	-7.396*** (1.200)
Ten token stakes		-0.547 (0.591)	-0.547 (0.593)
Twenty five token stakes		-0.773 (0.633)	-0.773 (0.635)
Enumerator fixed effects		x	x
Date fixed effects		x	x
Errors clustered at individual level		x	x
Personal characteristics			x
Constant	53.22*** (0.508)	42.20*** (4.178)	35.69*** (5.809)
Observations	2,256	2,250	2,250
R-squared	0.047	0.130	0.165

Notes:

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

These OLS regressions include observations only for the spouse game the respondent played first. The base category in the first column is giving in the public spouse game. In the second column, the base category is the five token public spouse game. Standard errors are robust to heteroskedasticity in all regressions. In addition to the variables shown in the table, the second column includes controls for enumerator, date, and order with the stranger games fixed effects. The third column additionally includes controls for gender, age, education, number of living children, an indicator that income in the previous week was above median, and an indicator for income from work.

Table 3

Within-subject analysis

	Percent of observations	Giving in public - secret
Opportunist: More in public spouse game	36	29.97
Non-Responder: Same in public and secret	49	
Secret Benefactor: Less in public spouse game	14	-20.54

Notes: The first column shows the percent of observations in which respondents give more, the same, or less in the public spouse game than in the secret spouse game. The second column shows the average linear difference between giving in the public and secret spouse games, split by behavior type.

Table 4
Order effects in the between-subject analysis

	Percent of tokens given		
	(1)	(2)	(3)
Secret spouse game	-8.012 *** (0.569)	-9.740 *** (0.987)	-9.740 *** (0.988)
Ten token stakes		-0.327 (0.442)	-0.327 (0.443)
Twenty five token stakes		-0.712 (0.488)	-0.712 (0.488)
Secret game played first		-1.832 (1.173)	-1.617 (1.147)
Secret game played first * Secret game		3.699 ** (1.450)	3.699 ** (1.452)
Enumerator fixed effects		x	x
Date fixed effects		x	x
Errors clustered at individual level		x	x
Personal characteristics			x
Constant	52.13 *** (0.402)	43.78 *** (3.316)	36.08 *** (4.311)
Observations	4,512	4,500	4,500
R-squared	0.042	0.111	0.143

Notes:

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

These OLS regressions include observations for all spouse games. The base category in the first column is giving in the public spouse game. In the second column, the base category is the five token public spouse game. Standard errors are robust to heteroskedasticity in all regressions. In addition to the variables shown in the table, the second column includes controls for enumerator, date, and order with the stranger games fixed effects. The third column additionally includes controls for gender, age, education, number of living children, an indicator that income in the previous week was above median, and an indicator for income from work.

Table 5

Order effects in the within-subject analysis

Panel A : Secret game first	Percent of observations	Giving in public - secret
Opportunist: More in public spouse game	32	29.27
Non-Responder: Same in public and secret	52	
Secret Benefactor: Less in public spouse game	16	-21.46
Panel B: Public game first	Percent of observations	Giving in public - secret
Opportunist: More in public spouse game	40	30.44
Non-Responder: Same in public and secret	47	
Secret Benefactor: Less in public spouse game	13	-19.59

Notes: The first column shows the percent of observations in which respondents give more, the same, or less in the public spouse game than in the secret spouse game for those who played the secret game first. The second column shows the average linear difference between giving in the public and secret spouse games for those who played the secret game first, split by behavior type. The third and fourth column show analogous statistics for those who played the public game first.

Table 6
Who is an opportunist?

	Opportunist	
Percent given in stranger game	-0.00209** (0.000922)	
Spouse is Opportunist?		0.0569** (0.0241)
Constant	0.631*** (0.132)	0.169 0.109)
Observations	1,439	2,250
R-squared	0.197	0.181

Notes:

***
Significant at the 1 percent level.

**
Significant at the 5 percent level.

*
Significant at the 10 percent level.

These OLS regressions include controls for token amount, order of play, and date and enumerator fixed effects, with heteroskedasticity robust standard errors clustered at the individual level.

Table 7
Link between laboratory type and survey data regarding information about finances

	Percent of tokens passed			
	Information about Income		Information about Expenditures	
	Non-Responders	Opportunists	Non-Responders	Opportunists
Full information at home	1.912 (1.603)	5.305** (2.093)	2.140 (1.646)	3.719** (1.755)
Full information * Secret game		-8.217*** (2.399)		-8.148*** (2.128)
Secret game		-24.44*** (1.588)		-25.10*** (1.490)
Constant	32.66*** (6.680)	17.78* (9.120)	31.64*** (5.660)	25.97*** (8.035)
Public game included	X	X	X	X
Secret game included		X		X
N	671	1,100	1,085	1,624
R-squared	0.299	0.552	0.198	0.521

Notes:

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Standard errors in these OLS regressions are robust to heteroskedasticity and clustered at the individual level. The Income sample is restricted to those who reported positive income over the previous week, while the Expenditure sample is restricted to those with positive expenditures. All regressions include controls for gender, age, education, number of children, an indicator that income over the previous week is above median, an indicator for income from work, and date, enumerator, token amount, and game order fixed effects.