

THE ECONOMICS OF GENDER‡

Is Ignorance Bliss? The Effect of Asymmetric Information between Spouses on Intra-Household Allocations†

By CAROLINA CASTILLA AND THOMAS WALKER*

Fundamental questions about how resources are allocated within the family remain unresolved. Because family decision making is a repeated game and there is caring, it is generally posited that the marriage relationship exploits the high degree of information sharing between spouses. But how valid is this assumption in practice? If spouses choose to exploit their information advantages by concealing resources from each other, the result is a noncooperative equilibrium and a Pareto suboptimal allocation of resources. This question has implications for the design of cash transfer programs. Even if official cash transfers themselves are common knowledge between household members, the transfer may loosen constraints over other income sources less easily monitored. Empirical research has documented inefficient allocations between spouses (Udry 1996) and noncooperative behavior as a result of asymmetric information in migrant households (Chen 2006). However, the implications of asymmetric information between cohabiting spouses are still relatively unexplored (for an exception see Ashraf 2009).

I. Noncooperative Intra-Household Contracts in Ghana

Southern Ghana is an ideal setting for testing noncooperative intra-household resource allocation because, in the regionally predominant Akan culture, men and women maintain separate economies, such that no spouse has control over all of the household's resources, while the marital contract stipulates that husbands should provide a housekeeping allowance (*chop money*) to their wives (see Castilla and Walker 2012, for references). Lundberg and Pollak (1993) show that intra-household allocations can default to a noncooperative equilibrium when the transaction costs associated with cooperation are high. In Castilla and Walker (2012), we show how in a model of intra-household allocation adapted for the Ghanaian context, a noncooperative equilibrium can exist in which chop money transfers continue to be made. Under these conditions, spouses have incentives to hide unobservable resources, and we show how these incentives differ depending on the role each spouse plays within the marital contract.

To illustrate how income concealment can be a dominant strategy within Ghanaian households with gender-differentiated preferences, consider a household with two decision makers, a husband and a wife. Each spouse allocates their disposable income (for husbands, private income net of chop money; for wives, private income inclusive of chop money) among a set of public goods that are easily observable, and several private goods which have varying degrees of observability.¹ We justify the latter assumption on the basis that household public goods, such as assets, food, and

‡*Discussants:* Kevin Lang, Boston University; Catalina Amuedo-Dorantes, San Diego State University; Susan Averett, Lafayette College.

*Castilla: Colgate University, 13 Oak Drive, Hamilton, NY 13346 (e-mail: ccastilla@colgate.edu); Walker: The World Bank, 1818 H Street, NW, Washington, DC 20433 (e-mail: twalker@worldbank.org). The authors would like to thank Chris Barrett, Andrew Agyei-Holmes, Robert Osei, Sarah Pearlman, Joyce Chen, seminar participants at Lafayette College, Binghamton University, and College University for their helpful comments. The survey and experiments were supported by grants from the International Growth Centre [RA-2009-06-010], the National Science Foundation [SES-0851586] and USAID's AMA CRSP Program [P686140].

† To view additional materials, and author disclosure statement(s), visit the article page at <http://dx.doi.org/10.1257/aer.103.3.263>.

¹ For full details on the setup of the model, refer to Castilla and Walker (2012).

and home expenses are typically easy to monitor in households where both spouses live under the same roof. However, private goods may differ in their levels of observability and the costs of monitoring; for instance, while purchases of personal care items may be easily observed, inter-household transfers may not. Now assume that one spouse receives windfall cash income, such as from a public cash transfer scheme. One would expect the couple to bargain over the allocation of this additional income. However, if the windfall was received privately, the recipient could allocate the unobserved resources toward concealable private expenditure.

Why would a spouse conceal income? In the Ghanaian context, the wife's incentive to hide arises because the additional private income could crowd out her chop money allowance; by concealing it from her husband she can increase her command over total household resources. The husband is indifferent between hiding and revealing the private prize since he indirectly determines his household good consumption through the chop money allowance. Nonetheless, if he wishes to avoid renegotiating the chop money allowance with his wife, he may be inclined to hide the windfall as well. Note that these results only hold provided that there is gender specialization within the marital contract and spouses have preferences over different private goods, since otherwise the allocation of income would not affect final household consumption outcomes.

II. Data Collection and Empirical Specification

To test the model, we use data from a field experiment conducted in 2009 in conjunction with a year-long panel household survey in four communities in Akwapim South district of Ghana's Eastern Region. The survey included detailed information on spousal relationships, expenditure, and social networks. The sample consisted of 70 married monogamous and polygamous households from each of the four communities.² Spouses were interviewed separately every two months between February and November 2009.³

² We only include the monogamous couples as bargaining in polygamous households is very different. This amounts to dropping 16 households out of the 280 total.

³ For further details on the survey and experiments, refer to Walker (2011).

The field experiment took place over four rounds, one week before each survey round (except for round one). Windfalls of cash and goods in kind were generated by distributing lottery prizes to randomly selected survey respondents. Husbands and wives had an equal and independent probability of winning a prize in each round. The experiment was a two-by-two design, with half of the prizes raffled in public, half in private, ten of each in cash, and ten as livestock (chickens and goats). The private prizes were drawn and given to the winner in a closed room, so that the winner's identity was unknown even to their spouse.⁴ We treat the privately-won livestock prizes as public, since it is unlikely that they could be concealed. Over the four lotteries, 42 percent of individuals and 62 percent of households won at least one prize. The prizes were of a substantial size and their values varied between GH¢10 and GH¢70.⁵

The lotteries and lucky dips took place one week before the commencement of the survey interviews. Great care was taken to make clear to participants that the allocation of prizes was random, and that each respondent had an equal chance of winning in each round. A village meeting was held in the community, and all respondents were invited to attend. The team explained that respondents had a chance to win one of 20 prizes that day, framing the lottery tickets as a gratuity for participation in the survey. Winners for the ten public prizes were then drawn (without replacement) from a bucket containing the names of the survey respondents. Each winner was announced, and asked to come forward to receive their prize.

After the lottery prizes were distributed, the lucky dip began. Respondents were asked to identify themselves to an enumerator, who took their thumbprint or signature and issued them an identification number. The respondents then entered a closed classroom, one at a time, where another enumerator invited them to draw a bottle cap without replacement from a bag. There was one bottle cap for each of the respondents in the sample, ten of which were of different colors corresponding to the prizes. Those who drew winning tokens were informed of their prize and, for cash prize winners, given the money on

⁴ The winner had the choice to disclose his/her windfall; this design provided them the *opportunity* to conceal it.

⁵ For comparison, mean monthly per capita consumption in the four survey communities during 2009 was GH¢65.

TABLE 1—BALANCE OF TREATMENT FOR KEY EXPENDITURES AT BASELINE (Round 1)

Expenditure	Non winners	Private cash	Public cash	Livestock prize
<i>Household public goods</i>				
Home expenses	24.78 (1.87)	17.65 (3.51)	16.78 (3.16)	19.38 (2.25)
Assets	14.43 (2.22)	8.11 (2.99)	13.6 (4.97)	6.97* (1.57)
<i>Husband private expenditure</i>				
Public transportation	8.93 (0.78)	9.02 (2.26)	8.40* (6.25)	14.8 (4.14)
Personal care	4.53 (0.50)	3.89 (0.65)	3.06 (1.75)	2.41 (0.71)
Cash gifts	13.40 (3.25)	24.47 (14.9)	1.875 (0.93)	19.68 (4.02)
In-kind gifts	7.67 (2.57)	6.71 (2.16)	-39.0 (5.62)	13.9 (3.64)
<i>Wife private expenditure</i>				
Public transportation	8.42 (1.56)	6.4 (1.49)	7.07 (2.95)	13.3 (7.65)
Personal care	8.00 (0.40)	7.71 (1.12)	3.55* (1.47)	1.89 (1.35)
Cash gifts	2.83 (0.77)	0.43 (0.25)	4.33 (1.50)	4.77 (1.59)
In-kind gifts	3.07 (0.67)	1.73 (1.48)	73.5 (13.0)	1.77 (0.71)

Note: Standard errors in parentheses.
 ***Significant at the 1 percent level.
 **Significant at the 5 percent level.
 *Significant at the 10 percent level.

the spot. They were told that they did not have to tell anyone else that they had won. The survey team made clear that they would not divulge the identities of the lucky dip prize winners.⁶

Identification of noncooperative behavior in the form of income hiding requires data on expenditure and income with varying degrees of observability. The field experiment lotteries provide an exogenous shock to spouse’s private income and random variation on the ease of observability by the other spouse (as well as the entire village). Husbands and wives had the same probability of winning a prize, which allows us to compare spouses’ responses to prize winning by gender. Further, using baseline

⁶ Respondents who were absent at the time of drawing were called to pick up their prize in person, if possible. Livestock prizes were delivered two days later to the winner in person, or to another household member if absent.

data collected before the experiments were conducted, and follow-up data collected afterwards, we can test the effect of asymmetric information on actual household expenditure.

We estimate reduced-form demand equations for expenditure separately for husbands and wives. We consider household public goods such as home expenses (includes household items, utilities, and rent) and asset purchases which should be observable to both spouses. For both the husband and the wife’s private expenditure, personal care and public transportation expenses as well as gifts are considered. Personal care expenses and public transportation are easily observed. The gifts to each social network are much harder to monitor because the money effectively leaves the household, and the recipients have an incentive to keep the gifts private as otherwise, the giver would have to negotiate with his/her spouse over how the money is allocated.

In Table 1 we present tests on mean expenditure across treatment groups and control (non-winners). There are no significant differences between winners and non-winners, except for husbands’ average expenditure on public transportation and wives’ personal care expenses, significant at the 10 percent level.

Because the possibility exists of zero spending at any particular round on a given item, an unobserved random effects Tobit model is used.⁷ For spouse i , in household h , village v , and round r , the demand for good $x_{i,h,v,r}^g$ can be expressed as

$$\begin{aligned}
 x_{i,h,v,r}^g = & \sum_{j=0}^1 [\delta_{1j} PuC_{i,v,r-j} + \delta_{2j} PrC_{i,v,r-j} + \delta_{3j} L_{i,v,r-j}] \\
 & + \theta_2 \ln A_{h,v,1}^{liq} + \theta_3 \ln A_{h,v,1}^{ill} \\
 & + \sum_{v=2}^4 \alpha_v + \sum_{r=3}^5 \sigma_r + \varepsilon_{i,h,v,r},
 \end{aligned}$$

where $PuC_{i,v,r}$, $PrC_{i,v,r}$ and $L_{i,v,r}$ are the values of the public and private cash prizes, and livestock prizes, respectively, won by spouse i ; $\sum_{h=2}^4 \alpha_v$ are village fixed-effects; $\sum_{r=3}^5 \sigma_r$ are

⁷ Results are robust if we use an inverse sign hyperbolic transformation, $\ln x_i = \ln[x_i + (x_i^2 + 1)^{\frac{1}{2}}]$, as well as $\ln x_i = \ln[x_i + 1]$, and fit is slightly better.

TABLE 2—TREATMENT EFFECTS ON OBSERVABLE EXPENDITURE

	Household goods		Observable private expenditure			
	Home expenses	Assets	Husband		Wife	
			Public transportation	Personal care	Public transportation	Personal care
<i>Husband</i>						
Public cash prize	0.232** (0.105)	0.555** (0.237)	0.060 (0.054)	−0.009 (0.014)	−0.008 (0.124)	0.020 (0.023)
Private cash prize	−0.033 (0.109)	−0.545 (0.345)	0.125** (0.054)	0.012 (0.014)	−0.121 (0.130)	0.027 (0.023)
Livestock	0.035 (0.067)	−0.065 (0.176)	−0.040 (0.038)	−0.018* (0.010)	−0.058 (0.077)	−0.008 (0.014)
Public cash prize (lag)	0.196 (0.130)	0.350 (0.313)	0.026 (0.072)	−0.013 (0.018)	−0.157 (0.164)	−0.027 (0.030)
Private cash prize (lag)	0.172 (0.135)	0.047 (0.327)	0.103 (0.067)	−0.009 (0.017)	0.026 (0.155)	0.013 (0.029)
Livestock (lag)	0.107 (0.080)	0.214 (0.181)	−0.009 (0.046)	−0.010 (0.012)	−0.078 (0.092)	−0.005 (0.017)
<i>Wife</i>						
Public cash prize	0.199** (0.092)	−0.038 (0.250)	−0.011 (0.049)	0.004 (0.012)	0.069 (0.100)	0.036* (0.019)
Private cash prize	0.098 (0.108)	0.052 (0.253)	0.104* (0.056)	−0.009 (0.015)	−0.017 (0.118)	0.019 (0.022)
Livestock	0.010 (0.067)	−0.180 (0.181)	0.053 (0.036)	−0.011 (0.009)	0.003 (0.078)	−0.010 (0.014)
Public cash prize (lag)	−0.013 (0.094)	−0.065 (0.242)	0.001 (0.049)	−0.002 (0.013)	0.071 (0.102)	0.052** (0.019)
Private cash prize (lag)	0.034 (0.119)	0.182 (0.270)	−0.012 (0.064)	−0.004 (0.016)	−0.033 (0.131)	−0.013 (0.024)
Livestock (lag)	−0.018 (0.073)	0.277 (0.169)	−0.035 (0.040)	−0.015 (0.010)	−0.045 (0.085)	−0.010 (0.016)
Uncensored observations	826	342	830	839	845	1,009
Observations	1,070	1,070	1,027	1,027	1,070	1,070

Notes: Results include controls for initial assets, village, and round fixed effects. Standard errors in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

round fixed-effects; and $A_{h,v,1}^{liq}$ and $A_{h,v,1}^{ill}$ are household liquid and illiquid assets in round one, respectively. We use assets rather than income (as in the usual Engel specification) because the income data proved too noisy to reliably capture households' living standards.

III. Empirical Results and Findings

The counterfactual to identify noncooperative behavior in the form of hiding is the set of allocations that would be chosen by the household,

under asymmetric information, if spouses were cooperative. In the absence of hiding, there should be no differences between spouses in the treatment effect of public and private cash prizes. Any wind-fall, public or private, would increase allocations to items preferred by the beneficiary as a result of her increased bargaining power (due to the change in her resources relative to her spouse). If the prize is private and the recipient wishes to shift her bargaining power it would have to be revealed. A possible alternative counterfactual is the set of allocations that would result under a gender-based

marital contract (as described above) in the absence of hiding. Both public and private lottery prizes would have no differential effect and would only influence allocations in the winning spouse's realm of responsibilities.

The empirical results on observable and concealable goods are presented in Tables 2 and 3, respectively. The results indicate that there is no shift in bargaining power as a result of winning a prize. The effect of lottery prizes on assets, utilities, household items, and rent depends on the gender of the recipient. When husbands win a public prize, expenditure in home goods and assets increases, but there is no effect on public transportation or personal care expenses. If the wife wins a public prize, her expenditure on personal items increases in following rounds, but other expenses are unaffected by lottery prizes won by the wife (public or private). It is possible that the prizes were not large enough to shift bargaining power. However the cooperative contract can be rejected as there are differences in the effect of public versus private cash prizes on assets, home expenses, husbands' public transportation and wives' personal care items. While winning a private prize has no effect on public good expenses, it increases husbands' expenditure on public transportation.

Lottery winnings by the wife have no effect on husbands' expenditure, and vice versa for the husband. These results support the hypothesis that spouses maintain separate economies and, at least with respect to public and observable private expenditure, provide further evidence in support of the noncooperative contract.

Livestock and private cash winnings by husbands significantly increase their in-kind gifts and there are no lagged effects. Also, when the husband wins a livestock prize, wives' in-kind gifts decrease by a similar amount as the increase observed in husbands' gifts. Livestock prizes were awarded in front of the entire village, thus the resulting gifts may be driven by social pressure. However, cash prizes are only known by others if the recipient chooses to share, suggesting that inter-household transfers are driven by alternative motives.

Wives' private prizes increase cash gifts in the immediate round, though only significantly at the 13 percent level.⁸ Recall that follow-up

⁸ This result is significant at the 5 percent level when using logarithmic specifications.

TABLE 3—TREATMENT EFFECTS ON CONCEALABLE EXPENDITURE

	Concealable private expenditure			
	Husband		Wife	
	Cash gifts	Inkind gifts	Cash gifts	Inkind gifts
<i>Husband</i>				
Public cash prize	-0.142 (0.301)	-0.290 (0.185)	-0.109 (0.237)	-0.058 (0.083)
Private cash prize	0.049 (0.276)	0.153** (0.067)	0.128 (0.196)	-0.029 (0.092)
Livestock	-0.066 (0.195)	0.117** (0.048)	-0.051 (0.132)	-0.192** (0.072)
Public cash prize (lag)	-0.400 (0.501)	-0.078 (0.136)	0.170 (0.236)	-0.029 (0.112)
Private cash prize (lag)	-0.016 (0.376)	-0.005 (0.104)	-0.361 (0.389)	-0.227 (0.181)
Livestock (lag)	-0.028 (0.237)	-0.021 (0.069)	0.039 (0.149)	-0.079 (0.076)
<i>Wife</i>				
Public cash prize	-0.127 (0.219)	-0.042 (0.068)	-0.018 (0.149)	0.078 (0.060)
Private cash prize	0.017 (0.274)	0.012 (0.075)	0.232 ^a (0.152)	0.037 (0.075)
Livestock	-0.070 (0.187)	0.062 (0.048)	-0.205 (0.141)	0.096** (0.048)
Public cash prize (lag)	-0.112 (0.239)	-0.017 (0.074)	0.392** (0.136)	0.118* (0.064)
Private cash prize (lag)	0.046 (0.310)	0.020 (0.090)	0.056 (0.215)	-0.281 (0.185)
Livestock (lag)	-0.192 (0.216)	0.052 (0.054)	0.062 (0.129)	-0.046 (0.063)
Uncensored observations	335	270	182	292
Observations	1,048	1,048	1,100	1,100

Notes: Results include controls for initial assets, village, and round fixed effects. Standard errors in parentheses.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

^a p-value < 0.13

surveys were conducted a week after the lotteries, suggesting the wife commits the prize toward an allocation that is both difficult to monitor and cannot be easily recovered if the husband were to find out she won. Public prizes won by wives significantly increase both cash and in-kind gifts in following rounds.

The differences in the timing of committing the private prizes toward cash gifts, and

lagged public prizes toward both kinds of gifts is consistent with differing motives. The wife commits the private prize to cash gifts immediately. On the other hand, she shares (probably what is left from) public prizes from previous rounds. The effect on cash gifts is larger than the effect on in-kind gifts, further strengthening the argument of an intention to conceal from her husband, as in-kind gifts are easier to monitor. In the Ghanaian context, inter-household transfers are usually reciprocated at a later date based on need, thus this result may indicate that women use gifts as a means of safeguarding their winnings for unexpected emergencies in the future. The use of “money guards” by women in this way has been noted in other country contexts as well (Collins et al. 2009).

IV. Conclusions

In this paper we used data from a field experiment in Southern Ghana to test the effect of windfalls on intra-household allocation. The results from the experiment indicate that spouses behave according to a noncooperative marital allocation contract with differences in spending patterns by gender. Furthermore, asymmetric information over windfalls has a differential effect on observable and concealable expenses, consistent with hiding. Public windfalls received by husbands lead to increased investment in assets and social capital, while there is no such effect when wives win. Private windfalls of both spouses are committed to cash (wives) or in-kind gifts (husband) which are either difficult to monitor or to reverse if discovered by the other

spouse (consistent with Ashraf 2009). As hiding in this context occurs in the form of gifts, it is not clear whether hiding is inefficient without observing reciprocity effects of risk sharing among these households. In Castilla and Walker (2012) we examine this issue in more detail.

REFERENCES

- Ashraf, Nava.** 2009. “Spousal Control and Intra-household Decision Making: An Experimental Study in the Philippines.” *American Economic Review* 99 (4): 1245–77.
- Castilla, Carolina, and Thomas Walker.** 2012. “Gender Roles and Intra-Household Allocation.” Unpublished.
- Chen, Joyce J.** 2006. “Migration and Imperfect Monitoring: Implications for Intra-household Allocation.” *American Economic Review* 96 (2): 227–31.
- Collins, Daryl, Jonathan Morduch, Stuart Rutherford, and Orlanda Ruthven.** 2009. *Portfolios of the Poor: How the World’s Poor Live on \$2 a Day*. Princeton: Princeton University Press.
- Lundberg, Shelly, and Robert A. Pollak.** 1993. “Separate Spheres Bargaining and the Marriage Market.” *Journal of Political Economy* 101 (6): 988–1010.
- Udry, Christopher.** 1996. “Gender, Agricultural Production, and the Theory of the Household.” *Journal of Political Economy* 104 (5): 1010–46.
- Walker, Thomas.** 2011. “Risk Coping, Social Networks and Investment in Rural Ghana.” Unpublished PhD diss., Cornell University.