1 II. Theoretical Appendix

Web Appendix

A. Basic Setup

Consider a marriage between two players, a man (Player M), and a woman (player W). I will assume that at the beginning of the marriage W and M contract about financial management in the household, and that the contract takes the following form: M will turn over his income to W and W will allocate it according to the family's needs and give M an allowance for his needs. This contract could have arisen because W has a comparative advantage in budgeting (Gary S. Becker,1981), because M uses W as a commitment device[1], or as a societal default in line with longstanding cultural norms, as in the Philippines(A. Timothy Church, 1986; Jeanne F. Illo, 1989; B.T.C. Medina, 1991; Mina M. Ramirez, 1984). I will take its existence as given in this setting. Let any non-regular income shock which M receives in a given period (such as a bonus, a gift, unusually high number of clients in one day, or earnings received in an experiment) be Y. M has three available strategies: $\{T, H, C\}$, where T is to turn over all the income to W, H is to hide all the income from W and use it for private consumption, and C is to commit the income to a form of private consumption, which has valuation Y.

I am interested in the following type of contract: If M turns the money over to W then she allocates a fraction θ to household consumption and M keeps fraction $1 - \theta$ for private consumption. The parameter θ can be thought of as W's tax rate on any income that M generates. If M plays H, with probability p, W finds this out, performs the allocation as before, and imposes a punishment whose monetary equivalent is P. If M plays C then the probability of being caught is $\widehat{p}$, which is not necessarily equal to p. If he gets caught after playing C, then W imposes punishment P and tries to reallocate the budget to undo his consumption commitment. W may not be able to fully reallocate the budget, which is captured by parameter α, where $0 \leq \alpha \leq 1$. That is, if $\alpha = 1$, the committed consumption can be completely undone, and the household regains Y. The paramater α is essentially a technological constraint, which makes it difficult to immediately undo the spending or to cut equivalent amounts out of future budgets for an extended period of time into the future. When something is spent that was, according to the contract, supposed to be turned over, W will try to undo it as much as possible, by returning the part of the item that hasn't been consumed/used, if possible, or cutting M's allowance from all subsequent budgets to the extent she can. She is limited by how much she can cut out of subsequent budget allocations for him; she cannot, for example, cut his lunch budget and allow him to still work. If the amount is greater than what is spent within a number of months on a particular budget item (for example, clothes), she will have to cut over many months.[2] α represents the degree to which she can undo the committed consumption. The amount of disposable income she can

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[1]In my surveys, the majority of men, when asked why it is that their wife holds the income in the family, respond that they would spend it if they held the money.

[2]If budget cuts have to be made over many months subsequent cuts, they could be heavily discounted over present consumption depending on discount rates and functions. I have not modeled time preference

tax is αY. Thus, if she finds out about the committed consumption, she tries to undo it and takes $\alpha\theta Y$. He thus receives the amount of completed consumption $(1-\alpha)Y$, in addition to the amount left over from the amount that she taxed, $(1-\theta)\alpha Y$, leaving him with $(1-\alpha\theta)Y$. Apart from this budget reallocation, W imposes a punishment whose monetary equivalent is P (but which could well be non-monetary and impose costs on both parties). I take the punishment, P, to be exogenous, but justify the values I assume it takes on below. For simplicity I assume that both M and W are risk-neutral. Under this contract, M's expected utility is as follows:

$$\mathbb{E}\left[U_M\right] = \begin{cases} (1-\theta)Y & \text{T, if turns over income} \\ (1-p)Y + p\left((1-\theta)Y - P\right) & \text{H, if hides income} \\ (1-\widehat{p})Y + \widehat{p}\left((1-\theta\alpha)Y - P\right) & \text{C, if commits income} \end{cases}$$

M's decision about which strategy to play will depend on the parameters.
(1) M prefers strategy H to strategy T if and only if

$$p \le \frac{\theta Y}{\theta Y + P} \tag{1}$$

(2) M prefers strategy C to strategy T if and only if

$$\widehat{p} \le \frac{\theta Y}{\theta\alpha Y + P} \tag{2}$$

(3) M prefers strategy H to strategy C if and only if

$$p \le \frac{\widehat{p}(\theta\alpha Y + P)}{\theta Y + P} \tag{3}$$

Men who face higher tax rates θ, who receive larger income shocks Y, who perceive a lower probability of getting caught, and who get lower punishments P will be more likely to hide money or commit to consumption rather than turning over their money to their wives, since the disutility for getting caught is low if punishment, P, is low, and the benefit from hiding or committing consumption is higher if θ is higher. To further illustrate the role of θ, imagine that there are in the extreme two types, one in which the wife taxes a lot of his income (in the extreme, $\theta = 1$), and one in which she taxes very little of his income (in the extreme, $\theta = 0$). Under the first type, the utility of turning over would be much less than either the utility of hiding or the utility of committing to consumption. Under the second type, the utility of turning over would be much greater, since he would suffer neither the general punishment for defiance, P, nor any constraint on the consumption fungibility, α. Thus, in a population in which there are heterogenous θ, the utility for each choice would differ by couple; the larger the θ, the greater the temptation to defy ("shield" one's extra

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explicitly here, but to the extent that the spending has to be undone by cutting future allowances, greater impatience would lead to lower α. For individuals with present-biased time inconsistency, the value of present consumption over future budget cuts would be even more extreme.

income). In terms of the form of defiance or "shielding", hiding is prefererred to committing to consumption if consumption of the good is more observable than storing money away ($\widehat{p} > p$) and the ability to reallocate the budget, parameterized by α, is relatively high. Reformulating Conditions (1) to (3) in terms of cutoff levels of punishment P, we can see that the threshold punishment level P for M to prefer hiding to turning over is increasing in the tax rate θ, the size of the income shock Y, and decreasing in probability of getting caught p.

B. Experimental Treatments

I interpret the experimental treatments as varying two parameters, observability and punishment ($p/\widehat{p}$ and P), since θ is a pre-existing condition in each couple, and α is akin to a technological constraint in the choice of committed consumption which is offered in all conditions. In the Private condition, spouses lack full information about the other spouse's income received, choices made, and outcomes. Thus, in Private the income shock Y was at least partly unobserved such that $p < 1$. Committed consumption comes in the form of a gift certificate for clothing, an outcome which is arguably more observable than hiding money away; we assume that in Private: $\widehat{p} \leq p < 1$. In Negotiation and Public, the income shock Y and all choices (as well as outcomes) are fully observed and hence $p = \widehat{p} = 1$.

In the Negotiation condition spouses were forced to communicate and discuss their preferences throughout the decision-making process. Communication could have many effects.[3] In this framework, we focus on the effect of stating preferences explicitly on expected punishment. The difference between the Public and Negotiation condition captures the difference between explicit defiance and tacit defiance, the former of which might invoke greater punishment because it implies greater guilt. In the Public condition, without full certainty about the spouse's preferences or willingness to punish, the husband could plausibly deny guilt about knowingly breaking the contract.[4] For any given sample of households with a distribution of P (which could be based on prior history and existing characteristics), the imposition of Negotiation acts to shift upwards *the entire distribution*.

The following table summarizes the values for p and P under the three experimental conditions:

Parameters	Private	Public	Negotiation
Punishment: P	$\underline{P}$	$\underline{P}$	$\overline{P} > \underline{P}$
Observability: $p, \widehat{p}$	$\widehat{p} \leq p < 1$	$\widehat{p} = p = 1$	$\widehat{p} = p = 1$

As stated, there is a distribution of the other exogenous variables (θ, α) among the population, but random assignment ensures that the expected distribution of these variables is the

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[3] See McGinn and Croson (2003) for an overview of the role of communication and communication media on enhancing "social awareness" in bargaining situations.

[4] In addition, the punisher may have an aversion to punishing when guilt is not certain: i.e., she is averse to committing a Type II error.

same across treatment conditions. Therefore, the different treatments make conditions 1 to 3 *more or less easy to satisfy*, given the distribution of parameters (θ, α) in the population. I discuss each pair of treatment conditions separately.

Case 1: Private to Public

In the Private condition, where $\widehat{p} \leq p < 1$, hiding can be more attractive than either committing to consumption or turning over. Increasing observability, while holding all other parameters constant, makes both hiding and committing consumption less attractive compared to turning over. Making both choices perfectly observable (ie, $\widehat{p} = p = 1$) as happens in the Public condition, makes hiding a fully dominated choice (since it will be reliquinshed, with punishment P). The decision thus turns between committing to consumption and turning over the income.

The graph below illustrates, when $\widehat{p} = p = 1$, the tradeoff between committing to consumption and turning over. As the equations above describe, the tradeoff is dependent on the relative values of θ, α, P. The graph below fixes θ in order to illuminate the relationship between α and P. In particular, when $\alpha = 1$, turning over is always preferred. For $\alpha < 1$, turning over is preferred so long as the Punishment, P, is greater than the utility M obtains from committing to consumption, even conditional on W finding out and partially undoing it later: $\theta Y - \alpha \theta Y$. When the committed consumption is impossible to undo ($\alpha = 0$), the Punishment has to be very high ($P > \theta Y$) to induce M to turn over the income rather than commit it to consumption. Thus, the relative utility of each choice depends on the ability to undo consumption, the individual tax rate, and the extent of Punishment able to be enacted. The Punishment is constrained at its maximum by both norms and the individual cost to W. [5]
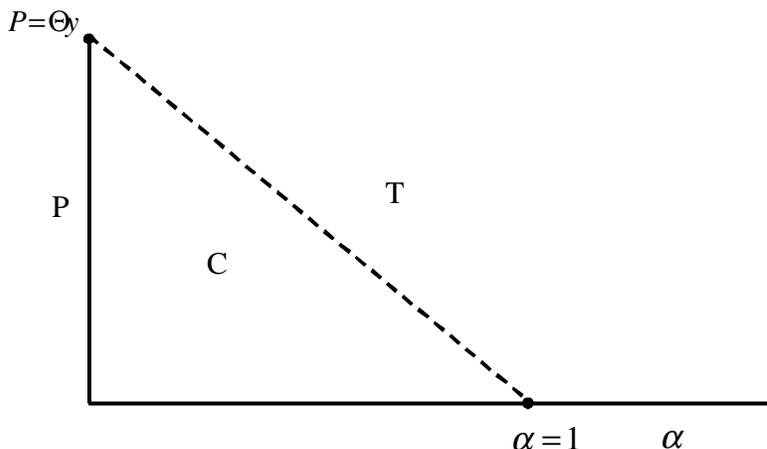
One can see, from the above graph, the regions of α, P in which Committing to Consumption is preferable to Turning Over. Any combination of α, P, θ that satisfies the inequality

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[5] To illustrate the challenge of enacting maximal punishment, one of the subjects, in describing the most punishment for spending all their money that that she once implemented: "I was so mad at him that I refused to do his laundry for 3 whole weeks!".

$P < \theta Y (1 - \alpha)$ would thus lead to choosing Committed Consumption over Turning Over. This includes quite plausible combinations such as: $\alpha = 0.6, \theta = 0.5, P < 120$.

Case 2: Public to Negotiation

The key difference between the Negotiation condition and the Public condition lies in the extent of communication. As described above, we may expect that communication can lead to greater expected punishment if the husband does not comply with turning over his income. Increasing the level of punishment, P, while holding all other parameters constant and with $p=1$, will lead to a larger proportion of men turning over income in the Negotiation condition as compared to the Public condition, rather than committing it to consumption. One can see this easily in the graph above as well. Hiding money was not an option in these two conditions because all income and choices were revealed to the spouses.

Case 3: Private to Negotiation

In the Negotiation condition, both observability $p, \widehat{p}$ and the level of punishment P increases in comparison to the Private condition. W's ability to monitor improves with both parameters and therefore combines the effects discussed in Case 1 and Case 2.

Private
*(Instructions in Private given to wives and husbands separately, once they have gone into
into separate rooms)*

**Financial Decisions:
An Experimental Study**

Oral Consent Form and General Instruction

Welcome!

As a means of thanking you for participating in this study and as a token for the time you spent with us, we are giving you forty pesos (P40.00) for coming. We are also giving you two hundred pesos (P200.00) for the first week, and another two hundred pesos (P200.00) for the third month of your participation in this project. You will have to come to GreenBank for four times during the study period and each time you come, you are given twenty pesos (P20.00). The money that you will be receiving is your own private money, and belongs to you only.

You will have the opportunity to invest this money to make even more money in the future, and also be able to spend the money on certain items. You will be asked to make some decisions (8 decisions) about what you would like to do with this money. At the end of answering these questions about the different options you have to allocate this money, the study facilitator will roll a die and, depending on what number comes up (1-8), one of your decisions will be enacted. Depending on what number on the die is rolled for you, that will be the outcome you will receive—so choose carefully what you would like to do with your money when you are asked, it is likely to come true!!

Within some of these 8 decisions are "sub-decisions" *(show example on board, with die rolls)*; if the die rolls first on one of these, we will roll the die once more and one of the sub-decisions will be enacted.

Now, if in the first die roll, the die rolls on "9", you will receive "luck of the draw" - which could be any outcome! This cup *(show cup with folded slips of paper inside)*

contain all the possibilities and if the die rolls on "9", you will choose randomly from this

cup and whatever it says on the slip of paper will be your outcome.

Your answers to these questions will be kept completely confidential and private

from your spouse. Because your spouse is not in the room with you, they will not

know what you received, what choices you had, or what you chose for each decision

of what to do. Since the die is rolled, your spouse will not know whether it was your

decision or "luck of the draw".

Any information we obtain from you during the research will be kept strictly confidential

and the information that we will get will solely be used for this study. You and your

spouse's name will not appear in the result of the study. As to the time needed for your

participation during the first week ranges from one to two hours. The following week,

the time needed for your participation is fifteen minutes.

You will not be spending anything when you participate in this study except for the time that

you will be spending with us. There are also no risks involve except on the day to day issues

of making decisions that involve money.

.

Your participation in this research is completely voluntary. You are free to withdraw your

consent and discontinue participation in this study at any time. If you will not complete the

study, you will receive the forty pesos (P40.00) for coming but you will not receive the two

hundred pesos for participating and answering the questions in this study.

Public

(Instructions in Public given to wives and husbands together, when they are seated at separate tables in the same room)

Financial Decisions:
An Experimental Study

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You will have the opportunity to invest this money to make even more money in the future, and also be able to spend the money on certain items. You will be asked to make some decisions (8 decisions) about what you would like to do with this money. At the end of answering these questions about the different options you have to allocate this money, the study facilitator will roll a die and, depending on what number comes up (1-8), one of your decisions will be enacted. Depending on what number on the die is rolled for you, that will be the outcome you will receive—so choose carefully what you would like to do with your money when you are asked, it is likely to come true!!

Within some of these 8 decisions are "sub-decisions" *(show example on board, with die rolls)*; if the die rolls first on one of these, we will roll the die once more and one of the sub-decisions will be enacted.

Now, if in the first die roll, the die rolls on "9", you will receive "luck of the draw" - which could be any outcome! This cup *(show cup with folded slips of paper inside)*

contain all the possibilities and if the die rolls on "9", you will choose randomly from this

cup and whatever it says on the slip of paper will be your outcome.

**Your spouse will be in the room with you while you are making your decision,
although you are sitting at different tables. He/she will not be allowed to speak to
you while you are making the choice for each option and cannot see what you are
doing. However, after the decisions are made, you will be exchanging your forms
with each other and your spouse will see all your decisions. *You are not allowed to
change your answers at that point,* but your spouse will learn about your choices.**

Any information we obtain from you during the research will be kept strictly confidential

and the information that we will get will solely be used for this study. You and your

spouse's name will not appear in the result of the study. As to the time needed for your

participation during the first week ranges from one to two hours. The following week,

the time needed for your participation is fifteen minutes.

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you will be spending with us. There are also no risks involve except on the day to day issues

of making decisions that involve money.

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Negotiation
 (Instructions in Negotiation given to wives and husbands together, when they are seated at the same table in the same room)

**Financial Decisions:
An Experimental Study**

Oral Consent Form and General Instruction

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You will have the opportunity to invest this money to make even more money in the future, and also be able to spend the money on certain items. You will be asked to make some decisions (8 decisions) about what you would like to do with this money. At the end of answering these questions about the different options you have to allocate this money, the study facilitator will roll a die and, depending on what number comes up (1-8), one of your decisions will be enacted. Depending on what number on the die is rolled for you, that will be the outcome you will receive—so choose carefully what you would like to do with your money when you are asked, it is likely to come true!!

 Within some of these 8 decisions are "sub-decisions" *(show example on board, with die rolls)*; if the die rolls first on one of these, we will roll the die once more and one of the sub-decisions will be enacted.

Now, if in the first die roll, the die rolls on "9", you will receive "luck of the draw" - which could be any outcome! This cup *(show cup with folded slips of paper inside)*

contain all the possibilities and if the die rolls on "9", you will choose randomly from this
cup and whatever it says on the slip of paper will be your outcome.

**Your spouse will be in the room with you while you are making your decision and, as
you are now, will be seated at the table with you. Before each decision is made, you and
your spouse will speak to each other/consult with each other for the decision that each
one of you will make. Before each decision, each one says what he/she would like to do,
you discuss the options, and then you each make your own decision, which you mark on
your own sheet.**

Any information we obtain from you during the research will be kept strictly confidential
and the information that we will get will solely be used for this study. You and your
spouse's name will not appear in the result of the study. As to the time needed for your
participation during the first week ranges from one to two hours. The following week,
the time needed for your participation is fifteen minutes.

You will not be spending anything when you participate in this study except for the time that
you will be spending with us. There are also no risks involve except on the day to day issues
of making decisions that involve money.
.

Your participation in this research is completely voluntary. You are free to withdraw your
consent and discontinue participation in this study at any time. If you will not complete the
study, you will receive the forty pesos (P40.00) for coming but you will not receive the two
hundred pesos for participating and answering the questions in this study.

Experimental Choice Form

Today, as part of your compensation, you will receive 200 pesos. The following choices ask you to compare gift certificates to each other, to see which one you prefer. They are all of the same value—200 pesos.

The Special Men's/Women's Good refers to a good just for yourself. If you are a man, it is a gift certificate to Gaisano for Men's Clothing or Shoes. If you are a woman, it is a gift certificate for Gaisano for Women's Clothing or Shoes. It expires within 2 weeks and can only be used by you alone (you can only redeem it with your identification).

The gift certificate for food can be redeemed for food at a number of stores. It also expires within 2 weeks and can only be used by you alone (you can only redeem it with your identification).

If you choose savings you can choose to deposit the money into your own savings account or, if you don't have a savings account here, we can create one and deposit directly into it. If you want to deposit the account to the account of your spouse or into a joint account, then, we will do so.

Would you prefer:

1. [   ] **200** gift certificate for **special good for self**
          (**200** gift certificate **para sa imong kaugalingon)**
               OR
  [   ] **200** gift certificate **for food (200** gift certificate
          para sa pagkaon)

Would you prefer:
2. [   ] **200** gift certificate **for special good for self (200** gift certificate **para sa gamit
          sa kaugalingon)**
          OR
  [   ] **200** gift certificate **for own savings account at
          Green Bank (200** gift certificate **para sa imong savings account** sa
          Green Bank**)**
          (Choose one:)
          [   ] deposit the gift certificate in your existing account
          [   ]deposit the gift certificate in a newly opened account in your name
          [   ] deposit to the account of your spouse
          [   ] deposit to existing joint account or newly opened joint account

Would you prefer:
3. [   ] **200** gift certificate **for food** (**200** gift certificate
          para sa pagkaon)
             OR
  [   ] **200** gift certificate **for own savings account at
          Green Bank (200 gift certificate para sa
          kaugalingon nga account sa Green Bank)**
        (Choose one:)
        [   ] deposit the gift certificate in your existing account
        [   ] deposit the gift certificate in a newly opened account in your
          name
        [   ] deposit to the account of your spouse
        [   ] deposit to existing joint account or newly opened joint account

Cash versus Direct Deposit Experiment Form

Today, as part of your compensation, you will receive 200 pesos. In this decision you will get the opportunity to decide about whether you would like to receive the 200 pesos as cash or if you would like to receive a gift certificate instead for deposit into a savings account here at Green Bank. Each question asks you about getting 200 cash, but the amount of the gift certificate for savings varies. Please answer *each* question.

You can choose to deposit the money into your own savings account or, if you don't have a savings account here, we can create one and deposit directly into it. If you want to deposit the account to the account of your spouse or into a joint account, then, we will do so.

Would you prefer:
1. [   ] **200** cash
OR
  [   ] **225** gift certificate for your savings account at
        Green Bank (**225 balor** nga gift certificate **para sa imong savings
        account o bank account** sa Green Bank)

Would you prefer:
2.   [   ] **200** cash
        OR
  [   ] **200** gift certificate for your savings account at
        Green Bank (**200 balor** nga gift certificate **para sa imong savings
        account o bank account** sa Green Bank)

Would you prefer:
3. [   ] **200** cash   OR
  [   ] **175** gift certificate for your savings account
     at Green Bank (**175 balor** nga gift certificate **para sa imong savings account o
     bank account** sa Green Bank)

Would you prefer:
4.   [   ] **200** cash
       OR
  [   ] **150** gift certificate for your savings account at Green Bank (**150 balor** nga gift
       certificate **para sa imong savings account o bank account** sa Green
       Bank)

Would you prefer:
5.   [   ] **200** cash
       OR
  [   ] **125** gift certificate for your savings account at Green Bank (**125 balor** nga gift
       certificate **para sa imong savings account o bank account** sa Green
       Bank)

If you choose a gift certificate for your savings at Green Bank in any of the line above, please check if you want (Choose one):
[   ] deposit the gift certificate in your existing account
[   ] deposit the gift certificate in a newly opened account in your
    name
[   ] deposit to the account of your spouse
[   ] deposit to existing joint account or newly opened joint account