Does Marriage Work as a Savings Commitment Device? : Experimental Evidence from Vietnam *

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Abstract

We conducted a time discounting experiment with married couples, and examined how time preferences, particularly time inconsistency, affect intrahousehold financial decision making. Our experimental results suggest people are more patient when they make decisions jointly with their spouses. The analysis of survey data shows time-inconsistent individuals turn over a smaller percentage of their earnings to their spouses. Time-inconsistent husbands are more likely to keep cash within households compared with time-consistent husbands. Time-inconsistent individuals are given smaller amounts of allowances, but they tend to conceal money to compensate. Additionally, time-inconsistent subjects choose not to ask their spouses to keep their experimental earnings and save it for themselves in the experiment. This study shows marriage does not function (or may counteract) as a savings commitment device, especially for time-inconsistent individuals. This implies households need external savings commitment devices such as ROSCAs to protect money from spouses who have hyperbolic preferences.

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1 Introduction

Empirical evidence suggests people do not save as much as they think they should (**??**). A number of studies have identified self-control problems as a major reasons for under-saving (**???**). People find it difficult to save if they do not have access to savings commitment devices such as retirement savings plan (**??**).[1] People who are present-biased place an particularly high value on immediate consumption. These individuals often spend their earnings immediately, and do not save much for the future.[2] Even though there is a strong demand for savings commitment devices in developing countries,[3] people in these countries have limited access to formal financial institutions. This makes it extremely difficult for them to save or resist the temptation of immediate consumption.

While a number of studies have shown savings commitment devices do help people to save money, little attention has been given to the role of traditional institutions such as marriage in facilitating saving. Households are the primary units of consumption and saving decisions in many cultures, and could function as a savings commitment device if patient and less present-biased household members are entrusted with household budgets and make consumption and saving decisions.[4] Several studies examine the conflicts between spouses within households (**?**). However few studies have investigated whether individuals strategically use marriage as a savings commitment devise and get their patient spouses to be in charge of household budgets.

This paper attempts to examine whether marriage work as a savings commitment device by using experimental and survey data we collected in Vietnam. Our experimental results suggest that individuals are less likely to be present-biased when they make decisions jointly with their spouses than when they make decisions individually. It implies that joint decision making within marriage could counteract the present bias. The analysis of survey data, however, shows that present-biased individuals turn over smaller percentages of their earnings to their spouses, withholding larger

[1] **?** review theoretical models and empirical evidence of commitment devices.

[2] **?** show present-biased individuals tend to over spend in the United States.

[3] **?** conducted a field experiment with a bank in the Philippines and observed a high take-up of the commitment saving account among present-biased individuals. **?** offered an interest-free bank account with an withdrawal penalty and found the account had positive impacts on productive investment. **?** and **?** provide evidences that ROSCAs, rotating savings and credit associations, are regarded as savings commitment devices by participants.

[4] The mere observation that patient and less present-biased household members make consumption and saving decisions does not necessarily imply that marriage functions as a savings *commitment device*. If the consumption of the present-biased spouse is restricted against their will, it cannot be called a "commitment device" (**?**). Though potentially important, we do not argue this possibility hereafter because our empirical results, on the contrary, show that present-biased household members tend to control the budget.

amounts of income for themselves. Present-biased husbands and unsophisticated present-biased wives are more likely to keep cash within households. Furthermore, it turns out that individuals turn over larger percentages of their earnings to the spouses if the spouses are present-biased. The similar patterns of decision making are observed in the experiment where the subjects privately decide whether to have their spouses receive their experimental earnings and save it for them, which is designed to control the effect of bargaining. These results hold irrespective of whether their joint decision is present-biased or not, suggesting that marriage not only fails in functioning as a saving commitment device but also gives more resources to present-biased individuals. We also find that although the couples whose joint decision is not present-biased do tend to allocate smaller amount of allowance to present-biased individuals, but these individuals conceal money to counteract it. Our study indicates the importance of savings commitment institutions outside of households such as ROSCAs and saving accounts, and appropriate policy interventions to alleviate self-control problems.

The closest study to ours is **?**, who conducts a field experiment in Kenya and finds when husbands and wives differ in their time preferences, they tend to open individual savings accounts instead of more profitable joint savings accounts. Our study is complement to Schaner's study in the sense that we explore the possibility of marriage, instead of outside formal institution, functioning as a commitment device, and show how present bias affects the intrahousehold resource allocation. Though we do not provide opportunities for opening savings accounts, we find that wives whose husbands are present-biased are more likely to participate in ROSCAs.[5] This finding is consisent with **?** who provide evidences that wives use ROSCAs to protect money from their husbands in Kenya. Our study demonstrates that those wives who use ROSCAs to protect money are the wives who have present-biased husbands.

Another closely related study is **?**. She conducts an experiment with couples in the Philippines and shows that individuals whose spouses control household savings, regardless of wives or husbands, are more likely to hide money if their decisions are not observable to their spouses. Her finding indicates that an additional income would have a different impact on household economy depending on the observability of the income and the allocation of control over household budgets. Our study complements her's by showing how time preferences, more specially present bias, affects the allocation of financial control. We find that the allocation of financial control is not designed

[5]Also note that **?** uses the exponential discounting model while we introduce quasi-hyperbolic discounting. Many experimental and field data show that discount rates tend to decline over time (**????**) and people are often present-biased(**???**).

to alleviate the self-control problem.

The next section presents a model of consumption and saving decisions of present-biased spouses which describes the idea of marriage as a savings commitment device. We derive the condition of marriage as a savings commitment device, that is, the condition that present-biased individuals ask their spouses to be in charge of household budgets. We find that the difference in time preferences and the cost of breaking a commitment plays a crucial role. We infer that the small cost of breaking a commitment in the context of marriage might be a cause of the failure of marriage in functioning as a commitment device. Section 3 discusses the experimental design and procedures. In Section 4, we presents experimental results and estimation results, and Section 5 concludes.

2 A Model

In this section, we present a saving decision model of married partners, player i and player j. For simplicity, we assume the consumption is common across two players.[6] There are three periods, $t = 0, 1, 2$. Period 0 is a commitment period. In period 0, the player who has earnings decides either to keep the earnings and make common consumption decisions for periods 1 and 2 by himself/herself, or to turn over the earnings to his/her spouse and let his/her spouse decide their common consumption levels for period 1 and 2. Because their time preferences may not be the same, there is a potential conflict between husbands and wives on how to allocate the household budgets intertemporally. When player i turns over their earnings to player j and ask player j to make a consumption decision in period 0, we define player i uses player j as *a savings commitment device*. Denote consumption levels in periods 1 and 2 by $c_1 \geq 0$ and $c_2 \geq 0$ such that $c_1 + c_2 = 1$. We assume that the instantaneous utility function $u(c_t)$ is twice differentiable, strictly increasing, strictly concave and $\lim_{c_t \to 0} u'(c_t) = +\infty$.

To explicitly analyze the demand of saving commitment devices, we incorporate present bias represented by quasi-hyperbolic preferences (**??**).[7] We further assume that the players are sophisticated, that is, they are fully aware of their future self-control problems.[8] In contrast to the literature, we consider the possibility of breaking the commitment accessing the spouse's earnings. At the beginning of period 1, a player who is not given the role of making a consumption decision can also gain access to the earnings, as well as a player who is making a consumption decision, by paying a cost $z \geq 0$. The cost z can be interpreted as a psychological or physical cost imposed

[6] **?** also suppose common consumption across individuals and analyze collective decision problems.

[7] **Cite Ashraf-Karlan-Yin and Kaur-Kremer-Mullainathan here, or in the main text?**

[8] **??** extend the quasi-hyperbolic discounting model by introducing partially naive agents.

on a player for trying to gain access to the household budget. If both players gain access to the earnings, consumption in period 1 is determined by the sum of their demands. We focus on pure strategy equilibria and derive the subgame-perfect Nash equilibrium.

Let $\beta^k \in (0,1]$ be the degree of present bias of player $k \in \{i,j\}$ and $\delta^k \in (0,1)$ be the time discount factor of player k. Then, player k's lifetime utility evaluated at $t=0$ is

$$u(c_1) + \delta^k u(c_2).$$

In period 1, however, player k is affected by the present bias and chooses a consumption level according to the following utility function:

$$u(c_1) + \beta^k \delta^k u(c_2).$$

If player k makes a consumption plan alone in period 1, he/she will choose a consumption level of period 1 c_1^{k*} such that

$$u'(c_1^{k*}) - \beta^k \delta^k u'(1 - c_1^{k*}) = 0.$$

It is straightforward that c_1^{k*} is decreasing in β^k and δ^k. Moreover, $c_1^{i*} > c_1^{j*}$ if and only if $\beta^i \delta^i < \beta^j \delta^j$. The more impatient player k is (low β^k and δ^k), the more money he/she will allocate to the consumption in period 1.

If player k could commit to his/her consumption plan in period 0, they would choose a consumption levels $\bar{c}_1^k$ such that

$$u'(\bar{c}_1^k) - \delta^k u'(1 - \bar{c}_1^k) = 0.$$

Notice $\bar{c}_1^k \leq c_1^{k*}$, and an strict inequality holds if $\beta^i < 1$. Because the players correctly expect their future self-control problems, they may use their spouses as a commitment in period 0 to deal with the self-control problems.

We consider the following two cases: I) the cost of conflict z is high, and II) the cost of conflict z is zero or sufficiently low. We will show that marriage works as a commitment device when the cost of conflict is high, whereas it does not serve as a commitment device when the cost of conflict is low. This clearly suggests that the cost of conflict z is an important variable which determines whether marriage can work as a commitment device along with the time preferences of the couples. Although we do not have the direct measure of z in our data, in Section 4 we control some characteristics which seem to be the indirect measure of z, and try to infer whether z is high or low by the empirical analysis. We do not intend, however, to exclude other possibilities: there are a lot of factors ignored in our simple model which may discourage individuals to use their

spouses as a commitment device such as lack of trust and difference in the desirable pattern of intratemporal consumption. We discuss these in Section 4.

2.1 Case I: High Cost of Conflict

We first analyze the case in which the cost of conflict z is very large. Consider the decision making at $t = 0$ in which player i gains earnings. Because players are sophisticated, player i correctly expects in period 0 that if player i keeps their earnings in period 1, they will choose the consumption level c_1^{i*} but not $\bar{c}_1^i$. Player i's expected utility on this consumption plan at the time of period 0 is $u(c_1^{i*}) + \delta^i u(1 - c_1^{i*})$.

On the other hand, if player i turns over his/her earnings to player j in period 0, then player j will choose the consumption level c_1^{j*}, and i's expected utility in period 0 is

$$u(c_1^{j*}) + \delta^i u(1 - c_1^{j*}).$$

Player i also knows he/she would not try to access the earnings in period 1 because the cost of conflict z is very high.

Thus, player i chooses to turn over his earnings to player j in period 0 if the following inequality holds:

$$u(c_1^{j*}) + \delta^i u(1 - c_1^{j*}) > u(c_1^{i*}) + \delta^i u(1 - c_1^{i*}). \tag{1}$$

Because $c_1^{i*} \leq c_1^{j*}$ if and only if $\beta^i\delta^i \geq \beta^j\delta^j$, player i does not turn over their earnings to player j if $\beta^i\delta^i \geq \beta^j\delta^j$. Suppose $\beta^i\delta^i < \beta^j\delta^j$, i.e., player i is more impatient than player j in period 1. In this case, player i has an incentive to use their spouse as a savings commitment device. Player i may *not* use their spouse as a commitment, however, if player j is much more patient than player i would want in period 0. That is, player i does not turn over his/her earnings to the spouse if period 1 consumption of the spouse c_1^{j*} is much smaller than what i would want in period 0. Let $\beta_0^i(\beta^j, \delta^i, \delta^j)$ be the cut-off value of Inequality 1 for given β^j, δ^i and δ^j, i.e., $u(c_1^{j*}) + \delta^i u(1 - c_1^{j*}) = u(c_1^{i*}) + \delta^i u(1 - c_1^{i*})$ when $\beta^i = \beta_0^i(\beta^j, \delta^i, \delta^j)$.[9] When $\beta^i\delta^i < \beta^j\delta^j$, Inequality 1 holds if and only if $\beta^i < \beta_0^i(\beta^j, \delta^i, \delta^j)$.

From the above, player i turns over their earnings to player j if and only if $\beta^i < \min\{\beta^j\delta^j/\delta^i, \beta_0^i(\beta^j, \delta^i, \delta^j)\}$. First, consider the case of $\beta^j\delta^j \leq \delta^i$. This leads to $c_1^{j*} \leq \bar{c}_1^i$ and hence $\beta_0^i(\beta^j, \delta^i, \delta^j) > 1$. It means if $\beta^j\delta^j \leq \delta^i$, then player i chooses to turn over his/her earnings to player j if and only if $\beta^i < \beta^j\delta^j/\delta^i$. Second, consider the case of $\beta^j\delta^j > \delta^i$. This leads to $\beta^j\delta^j/\delta^i > 1$ and hence player i chooses to

[9] Note that c_1^{k*} depends on β^k and δ^k.

turn over his/her earnings to player j if and only if $\beta^i < \beta_0^i(\beta^j, \delta^i, \delta^j)$. By the implicit function theorem and substituting the first order condition, we have

$$\frac{\partial \beta_0^i(\beta^j, \delta^i, \delta^j)}{\partial \beta^j} = \frac{(\beta^j \delta^j - \delta^i) u'(c_2^{j*}) \cdot \frac{\partial c_1^{j*}}{\partial \beta^j}}{\{u'(c_1^{i*}) - \delta^i u'(c_2^{j*})\} \cdot \frac{\partial c_1^{i*}}{\partial \beta^i}} < 0,$$

and

$$\frac{\partial \beta_0^i(\beta^j, \delta^i, \delta^j)}{\partial \delta^j} = \frac{(\beta^j \delta^j - \delta^i) u'(c_2^{j*}) \cdot \frac{\partial c_1^{j*}}{\partial \delta^j}}{\{u'(c_1^{i*}) - \delta^i u'(c_2^{j*})\} \cdot \frac{\partial c_1^{i*}}{\partial \beta^i}} < 0.$$

The comparative statics of δ^i on $\beta_0^i(\beta^j, \delta^i, \delta^j)$ is ambiguous.

The following claim summarizes the results.

Claim 1 (High Cost of Conflict.) *Suppose z is very large. Then, in equilibrium player i turns over the earnings to player j if and only if $\beta^i < \min\{\beta^j \delta^j / \delta^i, \beta_0^i(\beta^j, \delta^i, \delta^j)\}$. If $\beta^j \delta^j \leq \delta^i$, player i is more likely to be in charge of consumption decisions as β^i, δ^i increases or β^j, δ^j decreases. If $\beta^j \delta^j > \delta^i$, player i is more likely to be in charge of consumption decisions as $\beta^i, \beta^j, \delta^j$ increases.*

Most importantly, player i is more likely to turn over their earnings to player j as β^i decreases. In other words, people are more likely to entrust their earnings to their spouse as their present bias becomes more severe. It is because players can use their spouses as a savings commitment device to manage their self-control problems, when the cost of conflict is high. Note that a sufficient condition for $\beta^i < \min\{\beta^j \delta^j / \delta^i, \beta_0^i(\beta^j, \delta^i, \delta^j)\}$.

2.2 Case II: Low Cost of Conflict

We next analyze the case in which the cost of conflict z is zero.[10] Because players can access household earnings at no costs, who is in charge of the household budget does not affect the equilibrium consumption levels in this case. Equilibrium consumption in period 1 is determined by the sum of the players' claims. If $c_1^{i*} = c_1^{j*}$, there is no conflict between husbands and wives on how to allocate the household budgets in period 1. Suppose $c_1^{i*} \neq c_1^{j*}$. By examining strategic interaction of the players, we obtain the following lemma:[11]

Lemma 1 *Suppose both players have access to the earnings in period 1. Let $c_1^{k*} > c_1^{l*}$ where $k, l \in \{i, j\}$ and $k \neq l$. Then, player k claims c_1^{k*} and player l claims zero in equilibrium. The equilibrium consumption in period 1 is c_1^{k*}.*

[10] An analysis when z is positive but not equal to zero is provided in Appendix.

[11] The proof is provided in Appendix.

Since $c_1^{k*} > c_1^{l*}$ if and only if $\beta^k\delta^k < \beta^l\delta^l$, a more impatient player would choose a higher consumption level in period 1. A more impatient player in period 1 will try to be in charge of the household budget and determine consumption levels, and the other player cannot prevent the impatient player to access the household budget. These considerations lead to the following claim:

Claim 2 (Zero Cost of Conflict.) *Suppose z is zero. Then, in equilibrium player i becomes in charge of household consumption decisions if and only if $\beta^i\delta^i < \beta^j\delta^j$. Player i is more likely to be in charge of consumption decisions as β^i, δ^i decreases or β^j, δ^j increases.*

The result of Claim 2 for the comparative statics with respect to β^i sharply contrasts with the result of Claim 1: player i is more likely to be in charge of consumption decisions as β^i decreases if if $z = 0$. That is, when the cost of taking over the role of financial management is very low, the players are more likely to decide household consumption decisions as their present bias becomes more severe.

2.3 External Commitment Device

The above analysis show that if z is small, marriage cannot work as a commitment device and a more impatient player becomes in charge of the household budget. In such a situation, a player who wants to protect the household budget from the impatient spouse would have an incentive to use external commitment devices such as ROSCAs. Suppose the cost of conflict z is zero, but in period 0 player i can also choose to put aside his/her earnings into an external commitment institution. If player i uses this external device, they have to pay a cost $r > 0$ and the consumption level is determined in period 0. The cost r can be interpreted as a participation cost or a transaction cost.

If player i uses an external commitment device, then player i chooses the consumption level $\bar{c}_1^i$. In this case, player i expected utility in period 0 is $u(\bar{c}_1^i) + \delta^i u(1 - \bar{c}_1^i) - r$. On the other hand, suppose player i does not use an external commitment device. By Claim 2, the consumption level is $\max\{c_1^{i*}, c_1^{j*}\} \equiv c_1^{max*}$. In this case, i's expected utility in period 0 is $u(c_1^{max*}) + \delta^i u(1 - c_1^{max*})$. Thus, player i takes up the external commitment device in period 0 if and only if

$$u(\bar{c}_1^i) + \delta^i u(1 - \bar{c}_1^i) - r \geq u(c_1^{max*}) + \delta^i u(1 - c_1^{max*}).$$

Note that $c_1^{max*} = c_1^{i*}$ if and only if $\beta^i\delta^i \leq \beta^j\delta^j$. We have the following comparative statics results. In the case of $\beta^i\delta^i < \beta^j\delta^j$, player i is more likely to use the external commitment device as β^i decreases, player i's tendency to use it does not depend on β^j, δ^j, and comparative statics with respect to δ^i is ambiguous. In the case of $\beta^i\delta^i > \beta^j\delta^j$, player i is more likely to use the external

commitment device as δ^i increases or β^j, δ^j decreases, and player i's tendency to use it does not depend on β^i. By summing up, we obtain the following claim:[12]

Claim 3 (External Commitment.) *Suppose z is zero and an external commitment device is available. If $\beta^i\delta^i < \beta^j\delta^j$, player i is more likely to use the external commitment device as β^i decreases. If $\beta^i\delta^i > \beta^j\delta^j$, player i is more likely to use the external commitment device as δ^i increases or β^j, δ^j decreases.*

Claim 3 implies a player is more likely to use external commitment devices when (i) the player is more present-biased, (ii) the spouse is more present-biased and (iii) the spouse is more impatient. When the player is more present-biased, he/she has an incentive to use external commitment devices to alleviate own self-control problem as developed in **?**, **?**, and **?**. When the spouse is more impatient, the player has an incentive to use external savings commitment devices to protect money from the spouse as described in **?**. **?** find a positive correlation between the participation rate of ROSCAs and the degree of present bias.

3 Survey and Experimental Design

3.1 Selection of Research Site

We conducted a survey with economic experiments in one urban commune (called Commune A below) in Can Tho City, Vietnam, in May and June 2010. The commune was previously selected for Vietnam Household Living Standard Survey (VHLSS) 2002, a national representative survey conducted in 2002. VHLSS 2002 shows that the main job categories in Commune A were trade, transportation and services, and that Commune A is relatively wealthy in the region and is densely populated. The mean income is higher than the regional average.

3.2 Selection of Subjects and Experimental Procedure

We chose the parents of first and second graders living in Commune A as our subjects because we expect most of their parents to be economically active. There are 6 communities in Commune A; Area 1 through Area 6 . We asked the head of each Area to contact the parents of first graders and invite both spouses to the survey. There are 205 first graders living in the Commune. We excluded 45 parents who were divorced or separated from the subject pool. Another 45 parents did not want

[12]The proof is provided in Appendix.

to participate in the study. So we conducted the survey with remaining 115 parents, which results in the participation rate among the parents of first graders being 72 percent. After we finished the survey with the parents of first graders in 6 Areas, we started to recruit parents of second graders in Areas 1, 2 and 3 until we were able to collect data from 150 couples (300 parents). Dropping the first 16 couples for which slightly different experimental design was applied, we report the results of 134 couples.[13]

As soon as a couple arrived at the commune office, we conducted a household survey with both spouses together and asked for demographic information of household members, income, properties, and financial management within the household. After the household survey, we conducted the experiment separately for a husband and a wife. We prepared a private room for each husband on the second floor and a private room for each wife on the first floor in the commune office building. After the experiment, we conducted an additional survey with individual subjects (without their spouses) and asked questions such as the ratios of their earnings turned over to other household members, the value of properties inherited from their parents, and ROSCAs participation, and tested each subject's financial literacy.

Table 1 is the summary statistics of our experimental subjects. On average, our subjects were 37.5 years old and have received 8 years of education. The average monthly salary for husbands and wives are 2.5 million dong (US$120.85) and 1.4 million dong (US$67.68), respectively, and the difference between them is statistically significant at 1% level. Wives tend to be in charge of household budgets. Husbands entrust 71.9 percent of their income to their wives, and wives entrust 13 percent of their income to their husbands. 32.3 percent of husbands are responsible for keeping cash within the households, while that number of wives is 86.6 percent. Husbands and wives receive 648.1 thousand dong and 406.8 thousand dong of monthly allowances, respectively.[14]

3.3 Games

The experiment included ten games. The experimental instruction is provided in the Appendix. One out of ten games was selected for payment at the end of the experiment. Subjects draw a dice with ten numbers to determine which game is used for payment. They received experimental

[13]The analytical results including all 150 couples are similar and available upon request.

[14]As for occupation, 43 and 31 out of 134 male subjects work for private enterprises and other households (including casual work), respectively. 29 of them are self-employed. Regarding female subjects, 34 of them work for other households (including casual work) and 24 of them are not currently working. 23 of them are self-employed. This pattern is consistent with that of VHLSS 2002.

payment for the selected game in addition to 100,000 dong (US$4.83) of a show-up fee. If Game 0 is selected for payment, subjects received 300,000 dong (US$14.50) in addition to the show-up fee. 300,000 dong is equivalent to 12% and 21% of monthly income for husbands and wives, respectively. Subjects were asked in advance if they wanted their spouses to know they had received 300,000 dong as experimental payment if Game 0 was selected for payment. If they answered "Yes," they were then asked if they wanted their spouses to keep 300,000 dong and save the money for them. In order to prevent order effects, subjects with even ID household numbers played game 0 at the beginning of the experiment (before playing Games 1-9) and subjects with odd ID household numbers played game 0 at the end of the experiment (after playing Games 1-9) .

Game 1 is a risk game proposed by **?**. Subjects were asked to choose one risky option out of six options available to them. Game 2 is a time discounting experiment under which subjects choose to receive either 100,000 dong today (Option X) or a larger amount of money in three days (Option Y) for each of ten questions. The amount of delayed payments vary from 100,000 dong to 145,000 dong. We used a notebook that shows two options (Options X and Y) on each page [15]. Similarly, Game 3 consists of ten questions under which subjects choose either 100,000 dong in three weeks (Option X) or a larger amount of money in three weeks and three days (Option Y). The experimental design of Game 2 and 3 are identical except for the number of days to wait. Similar to **?**, subjects in our experiment were given the opportunity to change their decisions three weeks after the experiment.

Games 4 to 6 are similar to Games 1 to 3, except that if these games are selected for experimental payments, either the subject's decision or their spouse's decision is randomly selected for the payment. Games 7 to 9 are similar to Games 1 to 3 except that subjects and their spouses are allowed to talk with each other over the experimenter's phone to make joint decisions. If Games 7 to 9 are selected for experimental payment, the joint decisions made by the couple are used for individual subject's payment. We report the results of the risk experiment and Games 4 to 6 in a separate paper, and focus on the results of the time discounting experiment (Games 2, 3, 8, 9) and Game 0 in this paper.[16]

If the delayed payment was selected for payments, subjects received only the show-up fee of 100,000 dong on the day of the experiment. We asked the commune officer who lives at the commune office to keep the delayed payments for these subjects. We put the money in an envelope, wrote

[15] We started to use the notebooks from the second day of the experiment. Therefore, we exclude the data from 16 subjects on the first day of the experiment in our analysis.

[16] When we include the elicited risk parameters in the following regressions, they never become significant.

down the subject name, and the date the subject should pick it up and sealed it in front of the subject. We prepared a special folder for the commune officer to keep these envelopes. We checked the folder every time we visited the commune office to make sure that experimental payments were securely kept and no envelope were missing from the folder. Commune A is a small commune in the middle of Can Tho City. Subjects usually live within five-minutes form the commune office by motorbike or bicycle. We confirmed all subjects came to the office to pick up delayed payments. We don't think that foot costs affected subjects' decision in the time discounting experiments.

4 Results

4.1 Summary of Experimental Results

Game 2 is used to elicit the time preference between today and three days later. The distribution of the choice is summarized in the upper panel of Appendix Figure 1. The numbers in the horizontal axis indicate the point Y at which the subject switched their choice from option X to option Y.[17] "Never shift" in the rightmost indicates that these subjects always chose to receive 100,000 dong today and didn't switch at all. Game 3 is used to elicit the time preference between receiving 100,000 dong in three weeks and receiving Y in three weeks plus three days. If subjects are time consistent, the choices should be the same in Game 2 and Game 3. However, Wilcoxon signed-rank test rejects this null hypothesis with the p-value less than 0.0001. Appendix Figure 1 indicates that the number of never shifters are smaller in Game 3 than in Game 2, and that more subjects switched to Option Y at relatively smaller values of Y. We define those whose switching points are smaller in Game 3 than in Game 2 as present-biased. It should be noted that 37 percent of the subjects always chose option X and never switched to Option Y both in Game 2 and Game 3. This is partly due to our experimental design in which the variation of range of the Option Y is quite small (100,000 dong to 145,000 dong).[18] In the main analysis, we treat these subjects as non-present-biased individuals, and perform the robustness checks by excluding these never-shifters.

The summary statistics on the elicited time preference parameters are shown in Table 1. 34 percent of the husbands and 40 percent of the wives are present-biased. This difference is not statistically significant ($p = 0.2659$).[19] The cross tabulation of the present bias indicator is shown

[17] A few subjects chose to receive 100,000 dong in three days rather than to receive 100,000 dong today, which is dipicted by the leftmost bin.

[18] We would have observed more subjects switch to option Y if we introduced larger value of Y.

[19] In this paper, we mainly focus on the binomial indicator for present bias. We also calculated the present bias parameter, β, but the elicited value is relatively high compared to other studies (**?**). This might be due to the short

in the upper panel of Table . While 38.8 percent of the couples are both non-present-biased and 12.7 percent are both present-biased, nearly half of the couples consist of a pair of present-biased and non-present-biased individuals. The discount factors elicited from Game 3 are larger for wives than for husbands (0.935 for husbands and 0.943 for wives), but the difference is marginally insignificant ($p = 0.1372$).

The model in section 2 suggests player i will turn over the income to the spouse j if and only if (1) $\beta^i < \min\{\beta^j\delta^j/\delta^i, \beta_0^i(\beta^j, \delta^i, \delta^j)\}$ when z is sufficiently large; and (2) $\beta^i\delta^i > \beta^j\delta^j$ when z is small. The sufficient condition for (1) is $\beta^i\delta^i < \beta^j\delta^j < \delta^i$. Thus the relative sizes of $\beta^i\delta^i$ and $\beta^j\delta^j$ would be one of the important parameters. For brevity, we relabel own time preference parameters as β and δ, and those of the spouse as β^{sp} and δ^{sp}. The lower panel of Appendix Figure depicts the distribution of $\beta\delta - \beta^{sp}\delta^{sp}$. 34.3 percent of the couples have the same $\beta\delta$, 33.6 percent of the husbands have lower $\beta\delta$ than their wives, and 32.1 percent of the husbands have higher $\beta\delta$. The data shows those who satisfy $\beta\delta < \beta^{sp}\delta^{sp} < \delta$ consists 11.6 percent of the all subjects.

Using the results from Games 8 and 9, we measure the joint decision present bias and joint decision discount factor. The fraction of the couples whose joint decision is present-biased is 23.1 percent, which is quite smaller than in the case of individual decision making (36.9 percent). The lower panel of Table 2 shows that, when neither of the couple is individually present-biased, most of them remain non-present-biased in their joint decision. When only one of the couple is present-biased, more than 70 percent of them (35.1/48.5) do not exhibit present bias any more in their joint decision. Even when both of the couples are present-biased, around 41 percent of them (5.2/12.7) are not present-biased in the joint decision making. These result are consistent with **?** who argues that people with other regarding preferences will not exhibit present bias for other's utility and shows using his experimental data in India that group decision making mitigates the present-bias problem.[20] This result implies joint decision-making within marriage could potentially alleviate individual time-inconsistency.

range of Y. The minimum value of β possible in our experimental design is 0.69 when the subject switched to Option Y at the first question in Game 3 but always chooses option X in Game 2. In addition, one grid deviation in the choice causes the change in β by 0.025-0.048. The upper panel of Appendix Figure 2 show the distribution of the elicited β.

[20] **?** model the joint decision making of two self-interested individuals and show that the joint decision would balance the difference in individual temporal motives.

4.2 Intrahousehold Income Transfer

Now we investigate how the time preference parameters affect the actual intrahousehold decision making. In particular, we examine whether the subjects utilize their spouses as a savings commitment device.

First, we look at the share of earnings the subjects turn over to their spouses. This variable is calculated as the amount of earnings the subjects turn over to their spouses divided by the sum of the amount of earnings the subjects keep for themselves and the amount of earnings the subjects turn over to their spouses. We exclude the amount of earnings turned over to other persons such as their parents because this would not be related to the time-inconsistency problems of the couples. Our model implies that, if the cost of taking over the role of financial manager, z, is large, marriage can function as a savings commitment device provided that $\beta < \min\{\beta^j\delta^j/\delta, \beta_0^i(\beta^j, \delta, \delta^j)\}$. On the other hand, if z is small, individuals will turn over their earnings to their spouses if $\beta\delta > \beta^j\delta^j$ because less patient spouses would try to access the household budget. These conditions, however, are the results of the simplication of the model and allowing for other factors such as the difference in utility function and private consumption will require the modification of these conditions. So instead of only using these conditions directly, we also use several specifications to examine the effect of the own and spouse's time preference.

Note that not all subjects have earnings to turn over to their spouses (for example, housewives). This reduces our sample size to 127 husbands and 110 wives (out of 134 each). Appendix Figure 3 shows the histogram of the share of the earnings turned over to their spouses. While over a half of the husbands entrust more than 80% of their earnings to their wives, around eighty percent of wives keep all of their own earnings. The figure also shows the proportion of the individuals who keep all of their earnings is larger in the present-biased samples. However, given the proportion of the present-biased individuals is higher for wives than husbands, we proceed regression analyses to control the effects of other confounding factors.

The share of earnings turned over to their spouses ranges from 0 to 1. Bunching at either 0 or 1, as described in Appendix Figure 3, requires us to use the following two-limit Tobit model:

$$
\begin{aligned}
y_i^* &= w_i\theta + x_i\gamma + u_i \qquad u_i|w_i, x_i \sim N(0, \sigma^2) \\
y_i &= \begin{cases} 0 & \text{if } y_i^* \leq 0 \\ y_i^* & \text{if } 0 < y_i^* < 1 \\ 1 & \text{if } y_i^* \geq 1 \end{cases}
\end{aligned}
$$

where y_i is the share of the earnings turned over to their spouses, y_i^* is the latent variable, w_i are

our time preference measures of i, and x_i are a set of other observable controls which would affect the intrahousehold decision making (sex and the differences in age, education, earnings, own assets, own inherited assets, arithmetic score, and financial literacy score). The parameter of interest is θ. Standard errors are clustered at couple level in order to take into account the intra-couple correlations.

The estimation results are presented in Table 3. For brevity, we do not report the estimates of γ excluding gender, which are in most cases not significant. In Column (1), we use the indicator variable for the sufficient condition for Claim 1, $\beta\delta < \beta^{sp}\delta^{sp} \leq \delta$, for w_i.[21] Column (2) instead uses the indicator variable for $\beta\delta > \beta^{sp}\delta^{sp}$ to examine the implication of Claim 2. In both specifications, the coefficients of interest are insignificant and close to zero. When we use the difference between $\beta\delta$ and $\beta^{sp}\delta^{sp}$ instead of the indicator variable for $\beta\delta < \beta^{sp}\delta^{sp} \leq \delta$, the results does not change significantly. As expected from Figure 3, wives ensturst smaller ratios of their earnings to their husbands.

As noted above, these conditions are the result of the simplification of the model and we do not expect that the pattern of the actual decision making alters at the exact thresholds of these conditions. Instead, we include the indicator variables for own present bias, `present bias (PB)`, and for spouse' present bias, `spouse PB (sp PB)`, and the own and spouse's discount factors separately in Column (3). This specification is to investigate the comparative statistics in Claims 2 and 1. Our model implies that present-biased individuals entrust a larger share of the earnings to their spouses when z is large but turn over a smaller share when z is small. It turns out that the result is consistent with the case where z is small. The subjects turn over the larger share of the earnings when they are not present-biased and δ is large, and when their spouses are present-biased and δ^{sp} is small. Adding an indicator variable for being individually present-biased but jointly not present-biased, `PB but joint NPB`, does not change the results (Column (4)), except that the coefficient of the own present bias indicator becomes insignificant. This would be due to the collinearity between `present bias (PB)` and `PB but joint NPB`. The coefficient of `PB but joint NPB` is insignificant and close to zero. This implies that even though joint decision-making within marriage could potentially alleviate individual time-inconsistency as shown in Game 0, it does not help in the decision making of the income transfer.

As shown in the model, what matters is the combination of own and spouse's time preference

[21] We use this sufficient condition instead of the necessary and sufficient condition $\beta^i < \min\{\beta^j\delta^j/\delta^i, \beta_0^i(\beta^j, \delta^i, \delta^j)\}$ because getting the closed form of $\beta_0(\beta^{sp}, \delta, \delta^{sp})$ requires assumptions on the specification of the utility function and levels of the earnings.

parameters. In Column (5), we instead use an indicator variable for a present-biased subject with a non-present-biased spouse, `PB w/ sp NPB`, an indicator variable for a non-present-biased subject with a present-biased spouse, `NPB w/ sp PB`, and an indicator variable for a present-biased subject with a present-biased spouses, `PB w/ sp PB`. The reference category in the regression is thus the couples neither of whom is present-biased. The result is in line with the previous results: a present-biased subject who has a non-present-biased spouse turns over smaller portion of their earnings, and a non-present-biased subject who has a present-biased spouse turns over more of their earnings. The couples both of whom are present-biased behave similarly with the couples neither of whom is present-biased. The coefficients of own and spouse's discount factor remains stable.

These results suggest not only that couples fail in utilizing their spouses as a commitment device, but also that the marriage provides additional resources for the present-biased individuals to consume, even exacerbating the self-control problem. Our model implies that it is the low z which makes marriage unable to work as a commitment device, though it is not clear from our study what are the causes of the low z.[22]

The pattern of decision making may be different between husbands and wives, reflecting the difference in their unobserved preferences, intrahousehold bargaining power and expected roles in the household. So we run the regression separately for the husband subjects, as reported in Columns (6) and (8), and for the wife subjects, in Columns (7) and (9). While the coefficient of the own present bias indicator is insignificant possibly due to the smaller sample size, the coefficient of the spouse's present bias indicator remains significant. The magnitude of the coefficients are much larger for the wife sample, and the indicator for the non-present-biased subject with present-biased spouse, `NPB w/ sp PB`, is only significant in the wife sample. These indicate wives are more likely to suffer from their spouse's time inconsistency problem.

Recall that the Tobit model relies heavily on the assumptions of normality and homoskedasticity. As a rough check of misspecification, `?` suggests to run an alternative Probit estimation and to compare the results by dividing the estimated coefficients by the estimated standard errors in the Tobit model. As we are using the two-limit Tobit model, the counterpart is the ordered Probit model which uses as the dependent variable an ordered categorical variable which takes on 0 if $y = 0$, 1 if $y \in (0, 1)$, and 2 if $y = 1$. The results are reported in Appendix Table 1. The standard

[22]It might be due to affection and acceptance which marriage is based on, which makes it difficult to implement a commitment discipline to the spouses or to prevent the spouse to access the household budget. This may lead to Samaritarian's dilemma: individuals consume more because they know their spouse will help them if they are in need.

errors of the Tobit models of Columns (1) to (9) in Table 3 are 0.707, 0.706, 0.682, 0.681, 0.679, 0.492, 1.470, 0.490, and 1.468, respectively. We find there are no significant change in sings nor in magnitudes, which lend support for the validity of our Tobit model estimation results.

One possible reason marriage does not function as a commitment device is that they are not aware of their time inconsistency problem and thus have no demand for commitment. To examine this possibility, we directly elicit a demand for commitment as in **?**. After Game 3 in which the subjects decided whether to receive 100,000 dong in three weeks or a larger amount of money in three weeks plus three days, they were offered an option to change their decision in three weeks. If they are present-biased but sophisticated, then they know they will be subject to present bias when they change their decision and so they will reject this offer. But if they are not sophisticated, they might accept this offer for the sake of flexibility. We define those who exhibit present bias but reject this offer as sophisticated present-biased, expressed by an indicator variable `sophisticated PB`. Note that because naive individuals do not necessarily accept this option (for example, they may believe they would make the same choice in three weeks and feel cumbersome to make decision again so reject the offer), those who are defined as sophisticated present-biased might include some of naive individuals.[23] By including `sophisticated PB`, the coefficient of own present bias indicator now reflects the effect of the present bias without sophistication. As reported in Table 1, 31.3 percent of the subjects are sophisticated present-biased, which is quite a large number given the ratio of present-biased subjects being 36.9 percent. This is consistent with our assumption that present-biased individuals are sophisticated. However, it should be noted that the following analysis including the sophistication variables requires a caution in interpretation because the results associated with unsophistication depends on the relatively small number of observations who are unsophisticated present-biased, 15 subjects, or 5.6 percent of the total observation.[24]

The estimation results are reported in Table 4 and we do not find any evidence supporting that sophisticated present-biased individuals utilize their spouses as a commitment device. Due to the collinearity between the present bias variables and the sophistication variables, the significance of the present bias goes away, but the linear combination of the present bias indicator and the sophistication variable is still negative through Columns (1) to (6). The coefficient of the indicator for the sophisticated present-biased subjects with non-present-biased spouses, `PB w/ sp NPB`× `soph PB` is large and becomes significant in the wives subjects (Column (6)), but the large neg-

[23] **?** alleviates this problem by lowering the reward from the commitment option compared to the future choice option.

[24] There are also only 7 observations who are non-sophisticated present-biased with non-present-biased spouses.

ative coefficient of `PB w/ sp NPB` makes the linear combination negative and insignificant. This implies that sophisticated present-biased wives do not entrust a larger share of their earnings to their non-present-biased husbands than wives who do not suffer present bias. [25]

Our model predicts the effect of present bias will crucially depend on the value of z, the cost of accessing spouse's money. Unfortunately we do not have a direct measure of z and cannot examine the implication of the model. One possibility is to find proxy variables. Since it is natural to expect that z is correlated with the bargaining power, Appendix Table 2 tries some regressions which include the interaction terms of the present bias variables and some variables which can reflect the bargaining power such as the difference in the value of own asset (Columns (1) to (3)), education (Columns (4) to (6)), and age (Columns (7) to (9)). However, significant coefficients on the interaction term in Columns (1) and (2) suggest that present-biased individuals with more asset (and thus supposedly stronger bargaining power and lower z) turn over a larger portion of their earnings to their spouses, which contradicts with the model's prediction. The positive significant interaction term in Columns (8) also contradicts. This would be because i) the correlation between these variables and z is not highly positive, and ii) these variables correlate with unobservables such as generocity, implying these variables are not valid for proxies. Note that in any specifications, our main results hold: present-biased individuals turn over a smaller percentage of the earnings to their non-present-biased spouses, and non-present-biased wives with present-biased husbands turn over a larger percentage of the earnings to their husbands.

While the lack of a direct measure or good proxies for z prevents us from directly examining the validity of our model, the pattern of the empirical results can rule out some of the plausible alternative explanations. One possible argument is that couples don't use their spouses as a commitment device because of a lack of trust or difference in preference on the intratemporal consumption. But this cannot explain why they turn over more earnings when their spouses are present-biased. The observation that present-biased individuals hold more household resources would reflect that they have more power in the intrahousehold resource allocation. Our model with low z formalizes this idea through the consumption level player k would choose in period 1, c_1^{k*}, because the larger c_1^{k*} is, the more willing player k to pay the cost z to determine the consumption level by himself/herself. One can construct other models in the same spirit where time preference affects the bargaining on the current consumption level given the barganing power parameter fixed. We do not intend to exclude the alternative specifications which describes the causal effect of time preferences on the

[25] We also examined if sophisticated present-biased individuals whose joint decision with their spouses is not present-biased behave differently, but we do not find any significant differences.

result of intrahousehold bargaining. However, we need to exclude the possibility of spurious correlation between time preference and the intrahousehold decision making caused by the correlation between time preference and bargaining power parameters. This issue will be discussed later.

4.3 Financial Manager

Next, we investigate how time preference affects the pattern of the intrahousehold financial management. We asked our subjects in the household survey who keep cash in their households with allowing multiple answers, and identify the individual who keeps cash as a financial manager. We create an indicator variable `keepcash` which takes the value of 1 if the subject keeps cash within the household, and zero otherwise. The numbers in Table 1 suggest that wives are much more likely to be the financial manager, as often observed in other Asian countries.

The upper panel of Table 5 provides the estimation results of the Probit model, where we use the similar specifications to those presented in Table 3 and report the average marginal effects. Since the dependent variable is the indicator variables for keeping cash (not delegating the role of financial manager), we expect the signs of the coefficients to be opposite to those in Table 3 as Table 3 discusses when people turn over their income to their spouses.

It turns out that none of the time preference variables appear significant for the whole sample. Adding an indicator variable for being individually present-biased but jointly not present-biased, `PB but joint NPB`, does not change the results and the indicator variable itself is also insignificant. The coefficient of `sex` is always positive and significant. When we divide the sample into husbands and wives, however, we find that present-biased husbands (or present-biased husbands whose wives are not present-biased) are more likely to keep cash while present bias is not correlated with whether a wife keep cash or not. The coefficients of the indicator for $\beta\delta < \beta^j\delta^j \leq \delta$ or $\beta\delta > \beta^j\delta^j$ are not significant even when we split the sample (not reported). The results in Columns (5) and (7) suggest the probability that husbands keep cash is almost 20 percent higher for the present-biased husbands.

The lower panel of Table 5 presents the estimation when the interaction term with the sophistication variable is included. Unlike in the analysis of the share of the earnings turned over to the spouse, the interaction term and own present bias variable become significant. While naive present-biased individuals are more likely to keep cash than non-present-biased individuals, there are no significant differences in being the financial manager between sophisticated present-biased individuals and non-present-biased individuals. This pattern is observed both in the husband subjects

and wife subjects, as reported in Columns (3) to (6). These results suggest that couples with naive present-biased individuals suffer from the time-inconsistency problem by allowing present-biased individuals more likely to keep cash. Even sophisticated individuals do not actively utilize marriage as a commitment device because the linear combination of the interaction term and own present bias variable is close to zero and insignificant. We also run the regression including the interaction term with bargaining power measures, but these do not appear significant (not reported).

To sum, the results here are consistent with the ones we obtained above in Section 4.2. We do not find any evidence that marriage functions as a commitment device. Rather, unsophisticated present-biased individuals are more likely to be a financial manager, making the household budget vulnerable to the existence of present-biased individuals.

4.4 Decision in Game 0

So far we have shown how the time preference parameters affect the intrahousehold financial decision. While our analysis consistently shows that marriages do not work as a commitment device, there could be some omitting variables which would generate the spurious correlation between the intrahousehold financial decision and time preference variables. For example, bargaining power could be highly correlated with present bias and it was the bargaining power which causes the correlation, though time preference itself does not affect the intrahousehold financial decision. In the above analysis, we did control the variables reflecting the bargaining power such as difference in the asset values, age, education, numeracy and financial literacy, but here we use the decision made in Game 0 to confirm that the results obtained so far are driven by the time preference parameters and not by the bargaining power.

The subjects were asked if they wanted their spouses to know of the 300,000 dong bonus in the experiment's reward should Game 0 be selected as the payout game. The subjects were also asked if they wanted their spouses to receive the reward on their behalf. Note that the subjects were informed their spouses' decision only when Game 0 was selected as the payout game for their spouses (with probability of 1/10) and the spouses chose to have them know of the 300,000 dong bonus. Thus even when they chose not to have their spouses know, they would think that their spouses would think that Game 0 was not selected as the payout game. So it is plausible to assume that subjects' decisions in Game 0 were little affected by bargaining power.

On the other hand, because the payment is made on the same day as the experiment, subjects' decisions are likely to be influenced by the present bias. Thus this game corresponds to the case

where commitment is not available, or z is low. The results above suggest the actual z is low, if the decision pattern in this game is similar to the previous two analysis, we are more confident in arguing that the results we have obtained is not caused by the omitted bargaining power.[26]

Table 1 shows in total, 51.5 percent of the subjects chose to have their spouses receive their experimental reward of 300,000 dong if Game 0 was chosen as the payout game. In line with the previous two outcome variables, husbands were more likely to choose this option compared with wives (75.4 percent vs. 27.6 percent). The data also show that present-biased subjects are less likely to ask their spouses to keep the experimental payment and save it for them (42.4 percent vs. 56.8 percent with two-sided p-value being 0.0230).

The results of the probit model are presented in Table 6. The results are consistent with those of earnings turned over to spouses presented in Table 3: present-biased subjects are less likely to ask their spouses to keep experimental payments. Now the coefficient of the indicator for $\beta\delta < \beta^{sp}\delta^{sp} \leq \delta$ also becomes negative and significant, suggesting more impatient subjects are less likely to ask the spouses to receive the payments. The result also shows subjects are more likely to ask their spouses to receive the rewards when $\beta\delta > \beta^{sp}\delta^{sp}$ or their spouses are present-biased. This is puzzling because there should be no bargaining effect in this game and the subject's decision would not be affected by the pressure from the present-biased spouses. The result in Column (3) is in the same line. One possible explanation is that the actual intrahousehold decision forms a norm among the couples, which in turn affects the decision in Game 0. A framing effect may also work: those who usually turn over their earnings to their spouses would choose to ask their spouses to receive experimental payments in this particular game. If we instead use the variables indicating whether each of the subject and the spouse is present-biased, the result in Columns (4) shows only `PB w/ sp NPB` becomes significant, while the coefficients of `NPB w/ sp PB` and `PB w/ sp PB` are small and not significantly different from zero. Thus the positive coefficient of the spouse's present bias in Columns (3) seems to be driven by the couples in which both individuals are present-biased and who are more likely to ask their spouse to receive experimental payments than couples in which only one of them is present-biased. The result that present-biased individuals are less likely to ask their spouses to keep experimental payments is common to both husbands and wives (Columns (5) to (8)). The joint decision present bias does not affect the decision in Game 0 (not reported), which supports the results in the analysis of the earnings turned over to the spouse. This result

[26] A better experimental design would be to make payment a number of days later so that the decision in Game 0 is not influenced by the present bias. This would allow us to directly test whether the present-biased individuals are more likely to use their time-consistent spouses as a commitment device. We leave this for future research.

would be more reasonable in this setting in that subjects make decisions individually.

Because the results are similar to our two previous analyses (on the proportion of earnings turned over to spouses and keeping cash in the households), it is plausible to consider that the finding of couple's failure in using their spouses as a commitment device and succumbing to present bias is not driven by the omitted variables such as bargaining power.

4.5 Pocket Money

Next, we investigate how couples utilize their joint funds. More specifically, we examine how much money couples allocate to each other as a monthly allowance. Although present-biased individuals turn over smaller portion of their earnings to their spouses, it's still possible for couples to manage the present bias problem by giving a smaller amount of allowance to present-biased individuals. Compared to the decisions on the amount of earnings turned over to spouses, the amount of allowance allocated to each spouse would be better based on the decision made by the financial manager or the couple's joint decision making. This may enable joint-decision time-consistent couples to alleviate the time-inconsistency problems of the individual present-biased spouses by reducing the amounts of monthly allowances to them. To explore this possibility, we asked couples how much money they each received as an allowance in the previous month. As reported in Table 1, the amount of allowance is larger for husbands than for wives and the difference is statistically significant.

The upper panel of Table 7 reports the regression results on monthly allowance. Allowances are expected to be smaller for present-biased individuals irrespective of their spouses' present bias. We report the results using the indicator variables for the subject's present bias and for the spouse's present bias. We control the level of household income along with a set of the control variables in order to control the size of the household income. The result in Column (1) suggests a present-biased individual actually receives a smaller amount of allowance. In Column (2), we include the indicator variable for those who are individually present-biased but not jointly present-biased. The result suggests that the negative coefficient of the own present bias in Column (1) is driven by these individuals. Couples whose joint decision is not present-biased allocate less amount of allowance to present-biased individuals, while couples whose joint decisions are present-biased fail in reducing monthly allowances to present-biased individuals.

When we separate the sample into husbands and wives, we find more subtle results. The results in Columns (3) and (4) suggest when husbands are present-biased, *both* of husband's and wife's

monthly allowances are reduced by more than 250,000 dong, which is more than fifty percent of the average amount of allowances for the wives. Whether wives are present-biased or not does not affect the amounts of allowances allocated to each. The results in Columns (5) and (6) suggest, while joint-decision present-bias does not affect the husband sample and the monthly allowances are smaller for present-biased husbands, it does affect allowances for wives. When the couples are jointly not present-biased, then the monthly allowances for wives will be smaller for present-biased wives by 228,000 dong. Further, if their husbands are present-biased, the monthly allowance given to wives is further reduced by nearly 300,000 dong.

For present-biased husbands, how much allowances for both husbands and wives are reduced might be due to the omitted variables such as the structure of intrahousehold decision making. One could also argue the negative effect of present bias on allowances may be caused by a natural recursive nature. A present-biased individuals turns over a smaller amount of earnings to their spouses and thus their monthly allowances is smaller. However, when we include the percentage of earnings turned over to spouses as a regressor, the magnitude of the coefficients on present bias variables slightly increases. Thus our finding that a present-biased individual receives a smaller allowance is not driven by the omitted variables related to intrahousehold decision making or by the negative correlation between present bias and the proportion of income turned over to spouses.[27]

Even though we find some evidence that couples try to alleviate present bias problems by allocating smaller amount of money to present-biased individuals, it is still possible for these present-biased individuals to hide some parts of their income to maintain a desired level of discretionary income. To examine this possibility, we asked subjects individually (not in the presence of their spouses) the amount of money they could spend without their spouse's agreement. From this data we calculate the amount of hidden disposable money by taking the difference between the monthly allowance which is elicited from the household survey and the amount of money the subject could spend without their spouse's agreement. The lower panel of Table 7 reports the regression results. Column (1) shows that the coefficient of own present bias is significantly positive and its magnitude is comparable to that of Column (1) in the upper panel of Table 7. This suggests even though households allocate smaller amounts of allowances to present-biased individuals, they hide the same amount of money behind their spouses so that they have enough money to spend without their spouse's agreement. When we include the indicator variable for those who are individually present-biased but not jointly present-biased in Column (2), the coefficients of the own present bias and this indicator are positive with the magnitudes comparable to those of Column (2) in the

[27]The results are available upon request.

upper panel. These results are confirmed by the regression results when we regress the amount of money the subject could spend without his/her spouse's agreement on the same set of the control variables, where the coefficients of own present bias indicator turn out to be insignificant. Although the households try to alleviate the present bias problem by allocating less money to present-biased individuals, these individuals undo this by hiding their income.

However, when we split the sample into the husbands and wives, we get a more subtle picture. While husbands does not seem to change the amount of hidden disposable money, wives does, though the coefficients are insignificant. This pattern still holds even when we include the percentage of earnings turned over to spouses and the financial manager variable as a regressor to control the potential omitted variables. The result reported in Column (6) suggests that when the reduction of the amount of allowance is caused by the own present bias with the joint decision non-present bias, wives tend to increase the amount of hidden money. On the other hand, when the reduction of the amount of allowance is caused by the husband's present bias, then wives do not (or possibly cannot) increase the amount of hidden money.

Note that the amount of hidden disposable money is the difference between the amounts of money the subject could spend without his/her spouse's agreement and their monthly allowance. If the amount of money the subject could spend without their spouse's agreement is constant across individuals, then any variables positively correlating with the monthly allowance would correlate negatively with the amount of hidden disposable money by construction. Figure 4 indicates this might not be the case. The amount of money the subject could spend without their spouse's agreement distribute as sparsely as the monthly allowance. Further, the correlation coefficient of these two variables is a positive value of 0.52, which also supports the argument that the negative coefficients in the regression of the hidden disposal money do not just reflect the positive coefficients in the regression of the monthly allowance.

4.6 ROSCAs

Previous literature shows that ROSCAs function as a commitment mechanism to protect money from own present bias, spouse's pressure to use money, and neighbor's pressure to share income or lend money. In this subsection, we examine whether the participation in ROSCAs is correlated with the own and spouse's present bias. Note that only 28 out of 268 subjects report participating in ROSCAs and twelve subjects were in the same households (i.e. six couples). In these instances, it is not clear whether both husbands and wives have access to money in ROSCAs or only one

of them join ROSCAs but both of them report they use ROSCAs. These imply the identification of the coefficient would rely on a rather small number of observations and we need a caution for interpreting the results.

Table 8 reports the estimated average marginal effects of the probit models, where the control variables are the same as the last subsection. When we include the indicators for own present bias and spouse's present bias, we do not find any statistically significant results. Including the joint-decision time-preference do not change the results. Instead when we include the indicator for the present-biased subject with non-present-biased spouse, `PB w/ sp NPB`, the indicator for the non-present-biased subject with present-biased subject, `NPB w/ sp PB`, and the indicator for the couples both of whom are present-biased, `PB w/ sp PB`, then we find that couples with one present-biased spouses are more likely to use ROSCAs. Including the interaction terms with joint decision non-present bias only little changes of the coefficients and eliminates the significance due to the multicollinearity. Columns (5) and (6) report the regression results using the husband sample and wife sample separately. For the husband sample, there are no observations whose value of `PB w/ sp PB` equals one and who joined ROSCAs, so these observations are dropped from the estimation leaving us 117 observations. The coefficients of `PB w/ sp NPB` and `NPB w/ sp PB` are positive for both husbands and wives, and statistically significant results are obtained only for the coefficient of `NPB w/ sp PB` for the wife sample. Notice that in the previous analysis of earnings turned over to the spouse shows women who are time consistent but whose husbands are present-biased turn over substantially larger ratio of their earnings to their present-biased husbands. The result in Column (6) in Table 8 shows exactly these wives are the ones who are more likely to utilize ROSCAs, probably in order to protect the income from the husbands.

4.7 Robustness

In the time discounting game, 37% of the subjects always choose to receive 100,000 dong sooner and never choose to receive a larger amount of money later. In the above analyses, we assumed these subjects are time-consistent. Table 3 report results when we drop these observations. Most of the estimated coefficients remain stable, though the estimates become less precise because of the smaller sample size. The first three columns in the upper panel of Appendix Table 3 report the estimation results of the percentage of earnings turned over to spouses, where Column (1) reports the estimation result using both the husband and wife samples, Column (2) the result using only the husband sample, and Column (3) the result using only the wife sample. Our main finding

is that present-biased subjects turn over a smaller portion of their earnings to their non-present-biased spouses and non-present-biased subjects turn over a larger percent of their earnings to their present-biased spouses is unchanged. When we split the sample into husbands and wives, the significance goes away but the coefficients are still stable and the coefficients for wife samples are much higher than those for husband sample as we found the analysis above.

Column (4) and (5) report the estimation results on the role of financial manager. Similar to the main analysis, we again find that estimated coefficients relating present bias are insignificant, but when we include the interaction term with the sophistication variable, both the interaction term and `PB w/ sp NPB` becomes significant: while unsophisticated present-biased individuals are more likely to keep cash than non-present-biased individuals, sophisticated present-biased individuals do not behave differently from non-present-biased individuals. Couples with unsophisticated present-biased individuals seem to suffer from the present bias problem by allowing present-biased individuals to keep cash, and even sophisticated individuals does not actively delegate the role of financial management to their non-present-biased spouses. Column (6) reports the estimation results on choices made in Game 0 and the results we obtained in the previous analysis still holds.

In the lower panel of Appendix Table 3, Columns (1) and (2) report the estimation results on monthly allowances and Columns (3) and (4) the hidden disposal money. The regression results are again similar to the main analyses. For the monthly allowance, the present-biased individuals receive smaller amount of allowances driven by those present-biased individuals whose joint decision with their spouses does not exhibit present bias. On the other hand, these individuals hide the corresponding amount of money so that they can have enough money to spend without their spouse's agreement. Although the households try to alleviate the present bias problems by allocating less money to present-biased individuals, these individuals undo this by hiding their income.

Columns (5) reports the estimation results on ROSCA participation using both husband and wife sample, and Column (6) using only wife sample. The magnitudes of the coefficients are similar to Table 8, though the significance of `NPB w/ sp PB` for the wife sample goes away due to smaller sample size.

4.8 Impact on savings and asset accumulation

Finally, we investigate whether present bias affects the actual savings and asset accumulation of the couple. Columns (1) to (4) in Appendix Table 4 present the regression results on the indicator for the household which have any savings, and Columns (5) to (8) report on the asset holdings. The

results show the preference parameters of the husbands and wives do not predict these variables. Given the large standard deviation of the asset holdings, it will be difficult to detect any impact with a small sample size (134 for each of husbands and wives), we did not find any evidence that present bias affects the actual household savings and the value of the household assets.

5 Conclusion

We examine whether marriage work as a savings commitment device. While our experimental results suggest that people choose more patient decisions when they make decisions jointly with their spouses, the actual household resource allocation does not seem to be designed to alleviate the self-control problem. Our results show that time-inconsistent individuals turn over smaller percentages of their earnings to their spouses. Rather, individuals turn over more of their earnings to their time-inconsistent spouses and this effect is substantially larger for wives. We also find that present-biased husbands and unsophisticated present-biased wives are more likely to keep cash within households. These patterns hold irrespective of whether their joint decision is present-biased or not. Our results suggest that marriage not only fails in functioning as a saving commitment device but also gives more resources to present-biased individuals.

One concern is that these results are driven by the bargaining power which is correlated with time preferences and time preferences themselves do not play an effective role. To exclude this possiblity, we utilize the information on the subject's decision in an additional experiment where the subjects are asked whether they want their spouses to keep their experimental earnings and save it for them. The result of this experiment confirms intrahousehold financial arrangements are affected by time preferences. Time-inconsistent subjects are less likely to ask their spouses to keep their experimental earnings.

Whether the couple's joint decision is present-biased or not do affect the allocation of monthly allowance. Our finding indicates that the couples whose joint decision is not present-biased do tend to allocate smaller amount of allowance to present-biased individuals. However, this reduction of allowance is undone by these individuals concealing money.

In the context of Vietnam, one of the commitment device outside of households is ROSCAs. We find that time-consistent wives who have present-biased husband are more likely to use ROSCAs. This group turns over a substantially higher percentage of their earnings to their spouse, so we can interpret that they use ROSCAs to protect money from time-inconsistent spouses.

Our study indicates the importance of savings commitment institutions outside of households

and appropriate policy interventions to alleviate self-control problems. Empowering the time-consistent spouses could save the households from the time-inconsistent insiders.

Table 1: Summary statistics

	Male	Female	Total
Age	38.56	36.40	37.48
	(6.530)	(6.782)	(6.733)
Education	8.104	7.910	8.007
	(3.419)	(3.626)	(3.519)
Own monthly income: million VND	2.528	1.442	1.985
	(1.819)	(1.515)	(1.757)
Value of own asset: million VND	280.0	222.8	251.4
	(495.6)	(602.8)	(551.5)
Value of own inherited asset: million VND	128.5	97.48	113.0
	(380.6)	(245.5)	(320.0)
Number of correct answers in the arithmetic problems	4.888	4.657	4.772
	(2.524)	(2.567)	(2.543)
Number of correct answers in the financial literacy questions	1.821	1.455	1.638
	(1.032)	(0.993)	(1.028)
The percent of salary the subject gives to his/her spouse	0.719	0.130	0.446
	(0.318)	(0.297)	(0.426)
Keep cash in the household (yes=1, no=0)	0.321	0.866	0.593
	(0.469)	(0.342)	(0.492)
Prefer spouse receiving my reward in Game 0	0.754	0.276	0.515
	(0.432)	(0.449)	(0.501)
Amount of allowance per month: thousand VND	648.1	406.8	527.5
	(553.2)	(411.1)	(501.2)
Any savings (yes=1, no=0)	0.612	0.612	0.612
	(0.489)	(0.489)	(0.488)
β	0.965	0.940	0.953
	(0.160)	(0.119)	(0.141)
present bias (PB)	0.336	0.403	0.369
	(0.474)	(0.492)	(0.484)
δ	0.935	0.943	0.939
	(0.0478)	(0.0461)	(0.0470)
present bias (joint decision)			0.231
			(0.423)
δ (joint decision)			0.935
			(0.0474)
sophisticated PB	0.291	0.336	0.313
	(0.456)	(0.474)	(0.465)

Note: The mean values are reporpted with standard errors in the parenthesis. The differences between husband and wife in age, own monthly income, number of correct answers in the financial literacy questions, the percent of salary the subject gives to his/her spouse, whether to keep cash in the household, amount of monthly allowance are significant at 1% level. The differences in other variables are not statistically significant even at 10% level.

Table 2: Elicited preference parameters

	Wife		
Husband	non present-biased	present-biased	Total
non present-biased	38.8	27.6	66.4
present-biased	20.9	12.7	33.6
Total	59.7	40.3	100.0

	Joint decision		
Individual decision	non present-biased	present-biased	Total
neither are present-biased	36.6	2.2	38.8
One person is present-biased	35.1	13.4	48.5
Both are present-biased	5.2	7.5	12.7
Total	76.9	23.1	100.0
Observations	134		

Table 3: The percent of salary turned over to spouses: Tobit

	(1) All	(2) All	(3) All	(4) All	(5) All	(6) Husband	(7) Wife	(8) Husband	(9) Wife
$\beta\delta < \beta^{sp}\delta^{sp} \leq \delta$	0.053								
	(0.215)								
$\beta\delta > \beta^{sp}\delta^{sp}$		0.025							
		(0.121)							
present bias(PB)			-0.251*	-0.235		-0.172	-0.578		
			(0.142)	(0.165)		(0.126)	(0.482)		
spouse PB(sp PB)			0.442***	0.438***		0.279**	1.353***		
			(0.144)	(0.150)		(0.136)	(0.512)		
PB but joint NPB				-0.027					
				(0.181)					
PB w/ sp NPB					-0.331**			-0.240	-0.686
					(0.165)			(0.163)	(0.613)
NPB w/ sp PB					0.372**			0.222	1.259**
					(0.163)			(0.157)	(0.627)
PB w/ sp PB					0.235			0.143	0.822
					(0.183)			(0.173)	(0.722)
δ			3.416**	3.400**	3.485**	2.578*	8.154	2.668*	8.145
			(1.570)	(1.583)	(1.569)	(1.395)	(5.735)	(1.393)	(5.739)
δ^{sp}			-3.744**	-3.737**	-3.687**	-3.411**	-6.882	-3.359**	-6.802
			(1.566)	(1.567)	(1.567)	(1.455)	(5.137)	(1.447)	(5.245)
Sex	-1.390***	-1.391***	-1.390***	-1.389***	-1.392***				
	(0.165)	(0.165)	(0.162)	(0.161)	(0.162)				
Observations	237	237	237	237	237	127	110	127	110

Standard errors in parentheses

Other control variables such as the differences in income, asset, age, education, arithmetic score, and financial literacy are not reported but always included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Including sophistication variable

	(1) All	(2) All	(3) husband	(4) wife	(5) husband	(6) wife
present bias(PB)	-0.212		-0.093	-0.256		
	(0.273)		(0.224)	(0.967)		
spouse PB(sp PB)	0.443***		0.280**	1.335**		
	(0.144)		(0.136)	(0.519)		
sophisticated PB	-0.045		-0.088	-0.372		
	(0.252)		(0.225)	(0.988)		
PB w/ sp NPB		-0.392			-0.156	-8.277***
		(0.317)			(0.306)	(0.185)
NPB w/ sp PB		0.371**			0.224	1.277***
		(0.162)			(0.158)	(0.097)
PB w/ sp PB		0.233			0.146	0.834***
		(0.183)			(0.173)	(0.090)
PB w/ sp NPB× soph PB		0.067			-0.092	7.678***
		(0.308)			(0.304)	(0.185)
Observations	237	237	127	110	127	110

Standard errors in parentheses

Other control variables such as the differences in income, asset, age, education, arithmetic score, and financial literacy are not reported but always included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Whether subjects keep cash in their households

	(1) All	(2) All	(3) All	(4) All	(5) All	(6) Husband	(7) Wife	(8) Husband	(9) Wife
$\beta\delta < \beta^{sp}\delta^{sp} \leq \delta$	0.069								
	(0.089)								
$\beta\delta > \beta^{sp}\delta^{sp}$		-0.026							
		(0.057)							
present bias(PB)			0.085	0.017		0.222**	-0.020		
			(0.056)	(0.068)		(0.108)	(0.060)		
spouse PB(sp PB)			-0.039	-0.026		-0.070	-0.021		
			(0.063)	(0.063)		(0.097)	(0.083)		
PB but joint NPB				0.107					
				(0.080)					
PB w/ sp NPB					0.075			0.248*	-0.056
					(0.065)			(0.129)	(0.073)
NPB w/ sp PB					-0.049			-0.045	-0.063
					(0.065)			(0.111)	(0.095)
PB w/ sp PB					0.054			0.137	-0.017
					(0.067)			(0.146)	(0.107)
δ			-0.666	-0.623	-0.661	-1.335	-0.645	-1.350	-0.606
			(0.646)	(0.643)	(0.646)	(1.131)	(0.704)	(1.130)	(0.710)
δ^{sp}			0.356	0.379	0.364	0.558	0.190	0.535	0.200
			(0.763)	(0.755)	(0.760)	(1.085)	(0.854)	(1.081)	(0.831)
Sex	0.532***	0.532***	0.532***	0.527***	0.532***				
	(0.056)	(0.056)	(0.053)	(0.054)	(0.053)				
Observations	268	268	268	268	268	134	134	134	134

	(1) All	(2) All	(3) husband	(4) wife	(5) husband	(6) wife
present bias(PB)	0.299**		0.378*	0.846***		
	(0.123)		(0.195)	(0.166)		
spouse PB(sp PB)	-0.037		-0.066	-0.026		
	(0.061)		(0.097)	(0.080)		
sophisticated PB	-0.235*		-0.171	-0.881***		
	(0.125)		(0.187)	(0.169)		
PB w/ sp NPB		0.379**			0.488*	0.830***
		(0.178)			(0.256)	(0.157)
NPB w/ sp PB		-0.039			-0.034	-0.061
		(0.064)			(0.111)	(0.093)
PB w/ sp PB		0.065			0.149	-0.011
		(0.066)			(0.147)	(0.104)
PB w/ sp NPB× soph PB		-0.327*			-0.264	-0.898***
		(0.184)			(0.253)	(0.163)
Observations	268	268	134	134	134	134

Standard errors in parentheses

Other control variables such as the differences in income, asset, age, education, arithmetic score, and financial literacy are not reported but always included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Probit estimation: Whether subjects want to ask their spouses to keep the experimental rewards

	(1) All	(2) All	(3) All	(4) All	(5) Husband	(6) Wife	(7) Husband	(8) Wife
$\beta\delta < \beta^{sp}\delta^{sp} \leq \delta$	-0.193**							
	(0.088)							
$\beta\delta > \beta^{sp}\delta^{sp}$		0.102*						
		(0.061)						
present bias(PB)			-0.196***		-0.228**	-0.200**		
			(0.068)		(0.093)	(0.092)		
spouse PB(sp PB)			0.125*		0.105	0.170		
			(0.071)		(0.090)	(0.112)		
PB w/ sp NPB				-0.237***			-0.291***	-0.206*
				(0.083)			(0.111)	(0.110)
NPB w/ sp PB				0.084			0.048	0.164
				(0.085)			(0.104)	(0.131)
PB w/ sp PB				-0.043			-0.084	-0.025
				(0.084)			(0.139)	(0.149)
δ			1.433**	1.459**	2.393**	0.828	2.449**	0.833
			(0.697)	(0.694)	(0.973)	(1.042)	(0.983)	(1.044)
δ^{sp}			-1.109	-1.068	-0.638	-1.767	-0.583	-1.759
			(0.710)	(0.703)	(1.004)	(1.164)	(0.996)	(1.168)
Sex	-0.442***	-0.450***	-0.439***	-0.439***				
	(0.065)	(0.064)	(0.064)	(0.063)				
Observations	268	268	268	268	134	134	134	134

Table 7: Amount of monthly allowance and hidden disposal money

Monthly allowance:

	(1) All	(2) All	(3) husband	(4) wife	(5) husband	(6) wife
present bias(PB)	-165.919**	-45.630	-272.213**	-59.716	-257.467*	101.223
	(67.737)	(80.612)	(129.921)	(71.776)	(147.488)	(113.384)
spouse PB(sp PB)	-99.806	-122.531	12.313	-254.999**	9.630	-289.104**
	(73.845)	(75.426)	(80.542)	(125.206)	(84.139)	(126.565)
PB but joint NPB		-183.590**			-25.473	-228.470**
		(81.569)			(129.239)	(112.315)
Observations	268	268	134	134	134	134

Hidden disposal money:

	(1) All	(2) All	(3) husband	(4) wife	(5) husband	(6) wife
present bias(PB)	179.308*	64.206	91.785	213.593	41.959	42.925
	(100.521)	(104.894)	(99.895)	(150.287)	(137.496)	(158.091)
spouse PB(sp PB)	-112.376	-90.630	-32.043	-192.785	-22.980	-156.618
	(105.777)	(100.118)	(66.533)	(244.995)	(71.030)	(234.381)
PB but joint NPB		175.674			86.073	242.281
		(125.835)			(150.167)	(207.633)
Observations	268	268	134	134	134	134

Standard errors in parentheses

Other control variables such as the differences in income, asset, age, education, arithmetic score, and financial literacy are not reported but always included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Participation in ROSCAs

	(1) All	(2) All	(3) All	(4) All	(5) husband	(6) wife
present bias(PB)	0.029	-0.018				
	(0.046)	(0.066)				
spouse PB(sp PB)	0.038	0.046				
	(0.054)	(0.054)				
PB but joint NPB		0.068				
		(0.066)				
PB w/ sp NPB			0.114*	0.127	0.118	0.101
			(0.060)	(0.079)	(0.089)	(0.080)
NPB w/ sp PB			0.124*	0.111	0.111	0.159*
			(0.069)	(0.088)	(0.088)	(0.095)
PB w/ sp PB			-0.018	-0.018		0.024
			(0.097)	(0.097)		(0.124)
PB w/ NPB sp*joint NPB				-0.015		
				(0.066)		
NPB w/ PB sp*joint NPB				0.016		
				(0.068)		
Observations	268	268	268	268	117	134

Standard errors in parentheses

Other control variables such as the differences in income, asset, age, education, arithmetic score, and financial literacy are not reported but always included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A Appendix Figures and Tables

Appendix Figure 1: Choice distribution of Games 2 and Game 3

Appendix Figure 2: Elicited β and the difference in $\beta\delta$

Appendix Figure 3: The percent of salary the subject turns over to his/her spouse

Appendix Figure 4: Kernel density estimates of the monthly allowance and monthly disposal money without spouse's agreement

Appendix Table 1: The percentage of salary turned over to spouses: Ordered Probit

	(1) All	(2) All	(3) All	(4) All	(5) All	(6) Husband	(7) Wife	(8) Husband	(9) Wife
pct_givesal3									
$\beta\delta < \beta^{sp}\delta^{sp} \leq \delta$	0.193								
	(0.307)								
$\beta\delta > \beta^{sp}\delta^{sp}$		-0.001							
		(0.178)							
present bias(PB)			-0.352	-0.314		-0.318	-0.392		
			(0.215)	(0.262)		(0.283)	(0.332)		
spouse PB(sp PB)			0.669***	0.661***		0.606**	0.927***		
			(0.215)	(0.222)		(0.287)	(0.302)		
PB but joint NPB				-0.063					
				(0.276)					
PB w/ sp NPB					-0.456*			-0.441	-0.451
					(0.252)			(0.356)	(0.423)
NPB w/ sp PB					0.579**			0.505	0.877**
					(0.252)			(0.342)	(0.401)
PB w/ sp PB					0.375			0.358	0.560
					(0.280)			(0.390)	(0.463)
δ			5.180**	5.149**	5.284**	5.263*	5.565	5.446*	5.569
			(2.313)	(2.339)	(2.320)	(3.045)	(3.794)	(3.045)	(3.807)
δ^{sp}			-5.246**	-5.234**	-5.185**	-6.402**	-4.718	-6.329**	-4.681
			(2.418)	(2.422)	(2.427)	(3.120)	(3.538)	(3.120)	(3.605)
Sex	-1.897***	-1.892***	-1.965***	-1.962***	-1.973***				
	(0.273)	(0.274)	(0.279)	(0.278)	(0.279)				
Observations	237	237	237	237	237	127	110	127	110

Standard errors in parentheses

Other control variables such as the differences in income, asset, age, education, arithmetic score, and financial literacy are not reported but always included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix Table 2: Interaction with bargaining power

	(1) All	(2) Husb	(3) wife	(4) All	(5) Husb	(6) wife	(7) All	(8) Husb	(9) wife
PB w/ sp NPB	-0.319**	-0.243	-0.629	-0.340*	-0.262	-0.620	-0.343**	-0.307*	-0.604
	(0.163)	(0.164)	(0.611)	(0.174)	(0.162)	(0.615)	(0.169)	(0.184)	(0.667)
NPB w/ sp PB	0.386**	0.246	1.493**	0.375**	0.207	1.157*	0.350**	0.113	1.439*
	(0.159)	(0.155)	(0.643)	(0.168)	(0.158)	(0.631)	(0.163)	(0.161)	(0.779)
PB w/ sp NPB× dif_asset	0.283**	0.233***	0.313						
	(0.113)	(0.090)	(0.608)						
NPB w/ sp PB× dif_asset	-0.046	-0.094	0.603						
	(0.124)	(0.144)	(0.423)						
PB w/ sp NPB× dif_edu				0.047	0.136	-1.021			
				(0.166)	(0.135)	(0.822)			
NPB w/ sp PB× dif_edu				0.020	-0.001	0.050			
				(0.172)	(0.111)	(0.564)			
PB w/ sp NPB× dif_age							0.077	0.094	0.093
							(0.151)	(0.160)	(0.500)
NPB w/ sp PB× dif_age							0.120	0.202*	0.343
							(0.141)	(0.117)	(0.766)
Observations	237	127	110	237	127	110	237	127	110

Appendix Table 3: Robustness: drop observations who never shift

	(1) salary	(2) salary:husb	(3) salary:wife	(4) keepcash	(5) keepcash	(6) pass
PB w/ sp NPB	-0.371**	-0.254	-0.902	0.018	0.314*	-0.246***
	(0.181)	(0.181)	(0.667)	(0.074)	(0.165)	(0.082)
NPB w/ sp PB	0.419*	0.239	1.069	-0.114	-0.098	0.110
	(0.241)	(0.194)	(0.957)	(0.083)	(0.081)	(0.110)
PB w/ sp PB	0.250	0.126	0.742	0.041	0.054	-0.021
	(0.211)	(0.186)	(0.800)	(0.075)	(0.073)	(0.085)
PB w/ sp NPB× soph PB					-0.319*	
					(0.171)	
Observations	150	76	74	169	169	169

	(1) allowance	(2) allowance	(3) hidden money	(4) hidden money	(5) rosca	(6) rosca:wife
present bias(PB)	-166.816**	-81.959	220.406**	55.095		
	(63.966)	(89.790)	(97.439)	(99.121)		
spouse PB(sp PB)	27.387	0.305	-116.965	-64.205		
	(72.986)	(76.233)	(139.894)	(128.769)		
PB but joint NPB		-130.788		254.790**		
		(86.703)		(120.255)		
PB w/ sp NPB					0.129*	0.053
					(0.069)	(0.084)
NPB w/ sp PB					0.179**	0.173
					(0.079)	(0.112)
PB w/ sp PB					0.023	0.034
					(0.100)	(0.127)
Observations	169	169	169	169	169	88

Standard errors in parentheses

Other control variables such as the differences in income, asset, age, education, arithmetic score, and financial literacy are not reported but always included.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix Table 4: Savings and assets

	(1) saving	(2) saving	(3) saving	(4) asset	(5) asset	(6) asset
present bias(PB)	0.076		0.124	205.794		325.094
	(0.160)		(0.167)	(323.018)		(325.379)
spouse PB(sp PB)	-0.032		0.053	75.265		43.959
	(0.112)		(0.150)	(118.382)		(165.466)
PB but joint NPB	-0.095	-0.087	-0.093	-556.502	-553.641	-551.925
	(0.157)	(0.161)	(0.163)	(388.345)	(410.061)	(385.465)
PB w/ sp NPB		0.045			193.444	
		(0.195)			(442.309)	
NPB w/ sp PB		-0.052			67.216	
		(0.132)			(118.210)	
PB w/ sp PB		0.053			284.384	
		(0.183)			(296.413)	
Observations	134	134	81	134	134	81

B Theoretical Appendix

B.1 Proof of Lemma 1

Notice that each player never wants to claim beyond his/her optimal consumption in period 1. Thus, without loss of generality we focus the analysis on claims $c_1^k \in [0, c_1^{k*}]$ and $c_1^l \in [0, c_1^{l*}]$ where $c_1^{k*} > c_1^{l*}$.

Suppose player l claims a positive amount in equilibrium: $c_1^l > 0$. The best response of player k is $c_1^k = c_1^{k*} - c_1^l > 0$. Then, the consumption in period 1 becomes c_1^{k*}. Player l, however, has an incentive to decrease own claim because $c_1^{k*} > c_1^{l*}$, a contradiction. Therefore, in any equilibrium player l chooses $c_1^l = 0$. Given this, player k chooses $c_1^k = c_1^{k*}$. □

B.2 Proof of Claim 3

First, suppose $\beta^i\delta^i < \beta^j\delta^j$. It leads to $c_1^{max*} = c_1^{i*}$. Then, player i takes up the external commitment device in period 0 if and only if

$$u(\bar{c}_1^i) + \delta^i u(1 - \bar{c}_1^i) - r \geq u(c_1^{i*}) + \delta^i u(1 - c_1^{i*}). \tag{2}$$

Note that the left hand side of Inequality 2 does not depend on β^i, whereas the right hand side of Inequality 2 is increasing in β^i. Thus, if $\beta^i\delta^i < \beta^j\delta^j$, then player i is more likely to use the external commitment device as β^i decreases.

Second, suppose $\beta^i\delta^i > \beta^j\delta^j$. It leads to $c_1^{max*} = c_1^{j*} > \bar{c}_1^i$. Then, player i takes up the external commitment device in period 0 if and only if

Let $\Delta u_r^i \equiv u(\bar{c}_1^i) + \delta^i u(1 - \bar{c}_1^i) - r - \{u(c_1^{j*}) + \delta^i u(1 - c_1^{j*})\}$. Then,

$$\begin{aligned}\frac{\partial \Delta u_r^i}{\partial \delta^i} &= \{u'(\bar{c}_1^i) - \delta^i u'(1 - \bar{c}_1^i)\} \cdot \frac{\partial \bar{c}_1^i}{\partial \delta^i} + u(1 - \bar{c}_1^i) - u(1 - c_1^{j*}) \\ &= u(1 - \bar{c}_1^i) - u(1 - c_1^{j*}) > 0.\end{aligned}$$

Thus, if $\beta^i\delta^i > \beta^j\delta^j$, then player i is more likely to use the external commitment device as δ^i increases.

Also, note that the left hand side of Inequality 2 does not depend on β^j and δ^j, whereas the right hand side of Inequality 2 is increasing in β^j and δ^j. Thus, if $\beta^i\delta^i > \beta^j\delta^j$, then player i is more likely to use the external commitment device as β^j and δ^j decreases. □

B.3 A Model of General Cost of Conflict

We analyze the case in which the cost of conflict $z > 0$ is positive but some player possibly pays z. Note that once both players choose to access the earnings, the equilibrium consumption is

determined by $\max\{c_1^{i*}, c_1^{j*}\}$ by Lemma 1.

First, suppose $\beta^i\delta^i > \beta^j\delta^j$. It leads to $\max\{c_1^{i*}, c_1^{j*}\} = c_1^{j*}$. If player i keeps the earnings in period 0, player i is actually in charge of household consumption decisions in period 1 if player j does not pay cost z and make the decisions:

$$u(c_1^{i*}) + \beta^j\delta^j u(1 - c_1^{i*}) > u(c_1^{j*}) + \beta^j\delta^j u(1 - c_1^{j*}) - z. \tag{3}$$

Let $\beta_{1j}^i(\beta^j, \delta^i, \delta^j, z)$ be the cut-off value of Inequality 3 for given β^j, δ^i and δ^j, i.e., $u(c_1^{i*}) + \beta^j\delta^j u(1 - c_1^{i*}) = u(c_1^{j*}) + \beta^j\delta^j u(1 - c_1^{j*}) - z$ when $\beta^i = \beta_{1j}^i(\beta^j, \delta^i, \delta^j, z)$.[28] Given $\beta^i\delta^i > \beta^j\delta^j$, Inequality 3 holds if and only if $\beta^i < \beta_{1j}^i(\beta^j, \delta^i, \delta^j, z)$.

Second, suppose $\beta^i\delta^i < \beta^j\delta^j$. It leads to $\max\{c_1^{i*}, c_1^{j*}\} = c_1^{i*}$. Then, player i turns over the earnings and player j is in charge of household consumption decisions if both Inequality 1 and

$$u(c_1^{j*}) + \beta^i\delta^i u(1 - c_1^{j*}) > u(c_1^{i*}) + \beta^i\delta^i u(1 - c_1^{i*}) - z \tag{4}$$

hold. Let $\beta_{1i}^i(\beta^j, \delta^i, \delta^j, z)$ be the cut-off value of Inequality 4 for given β^j, δ^i and δ^j, i.e., i.e., $u(c_1^{j*}) + \beta^i\delta^i u(1 - c_1^{j*}) = u(c_1^{i*}) + \beta^i\delta^i u(1 - c_1^{i*}) - z$ when $\beta^i = \beta_{1i}^i(\beta^j, \delta^i, \delta^j, z)$. Given $\beta^i\delta^i < \beta^j\delta^j$, Inequality 4 holds if and only if $\beta^i > \beta_{1j}^i(\beta^j, \delta^i, \delta^j, z)$.

By combining them, we obtain the following results:

Claim 4 *(i) Suppose $\beta^i\delta^i > \beta^j\delta^j$. Then, player i becomes in charge of household consumption decisions if and only if $\beta^i < \beta_{1j}^i(\beta^j, \delta^i, \delta^j, z)$. (ii) Suppose $\beta^i\delta^i < \beta^j\delta^j$. Then, player i becomes in charge of household consumption decisions if and only if $\beta^i \in (0, \beta_{1j}^i(\beta^j, \delta^i, \delta^j, z)] \cup [\beta_0^i(\beta^j, \delta^i, \delta^j), 1]$.*

Thus, under general cost of conflict, it is ambiguous that how player i is likely to be in charge of consumption decisions as his/her present bias varies. Note, however, both $\beta_{1j}^i(\beta^j, \delta^i, \delta^j, z)$ and $\beta_{1i}^i(\beta^j, \delta^i, \delta^j, z)$ approach to $\beta^j\delta^j/\delta^i$ as z goes to zero. It implies that if the cost of conflict $z > 0$ is sufficiently small and if the distribution of β^i is not concentrated around $\beta^j\delta^j/\delta^i$, then player i is more likely to be in charge of consumption decisions as β^i decreases.

[28] Note that c_1^{k*} depends on β^k and δ^k.