<u>Pre-Analysis Plan for "The Impact of Inter-Village Competition and Leadership on Collective Action: Experimental Evidence from Myanmar and Cambodia"</u>

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Section 1: Introduction

This pre-analysis plan describes the hypotheses and specifications that will be used to measure the effects of inter-village competition and village leader's participation on individual behaviors in collective action problems.

This study uses a unique opportunity of collecting information from 150 villages from 9 regions in Myanmar and 60 villages from 3 regions in Cambodia. 100 villages out of 150 in Myanmar and 30 villages out of 60 in Cambodia were selected as treatment villages for rural community-driven development (CDD) projects which Korea International Cooperation Agency (KOICA) introduced in collaboration with the Ministry of Agriculture, Livestock and Irrigation (MOALI) in Myanmar and Ministry of Rural Development (MRD) in Cambodia. Further details of the CDD projects in these two countries are provided in Appendix I.

The CDD projects in these two countries were initially designed after South Korea's rural community-driven development experience, *Saemaul Undong* (SMU). *Saemaul Undong*, literally translated as "new village movement," was a community-based integrated rural development program of South Korea in the 1970s that contributed to seasonal poverty elimination in the rural areas and alleviation of urban-rural disparity through village-level projects.

This study is motivated by the two prominent features of SMU projects compared to other rural CDD projects (Mansuri and Rao, 2004; White et al., 2108). Firstly, the SMU projects have introduced competition among treatment villages in a country and multi-year financial support to villages depends on performances at the level of village. Three key elements of performance were evaluated: (1) improvement of livelihood environment, (2) capacity building of village residents, and (3) income generation. Secondly, the SMU projects have emphasized a role of village leaders in achieving goals of CDD projects.

We introduce within-village randomized controlled trial (RCT) variations of inter-village competition and village leader's participation in lab-in-the-field experiments regarding collective action problems. Specifically, we consider the problem of provision of public goods and the problem of investing in a risky joint project. In the former problem called the village donation game, individual participants are asked to donate for a village joint fund. Villagers are randomly assigned to the competition group where they make a donation decision with inter-village competition and the control group where they do so without inter-village competition. In the latter problem called the joint investment game, participants are asked to choose between a safe option

(keeping an endowment for their personal use) and a risky joint project whose probability of success depends on the number of participants investing in a joint project. Villagers are randomly assigned to three groups: (1) the leadership group where the probability of success depends also on a leader's contribution in sacrifice of his or her material incentives, (2) the competition group where participants join in inter-village competition with their investment decisions, and (3) the control group where participants make a decision on joint investment with neither leader's participation nor inter-village competition.

This plan was written before the endline survey data were collected and before any data were analyzed. The organization of the analysis plan is as follows: In section 2 we describe the study design, sample used in the study, and the data that were and will be collected for this project. In Section 3 we describe the hypotheses to be tested and the specifications that will be performed during data analysis.

Section 2: Study Design

2.1 Village Selection

In Myanmar, 100 villages were selected as the villages where SMU has been introduced (hereafter, SMU villages) and 50 villages neighboring the SMU villages were selected as the comparison group (hereafter, non-SMU villages) across 9 regions/states.[1] Similarly, 30 SMU and 30 non-SMU villages were selected in Cambodia across 3 provinces.[2] In Myanmar, we randomly sampled 8,496 households for the baseline survey and 8,515 households for the first follow-up survey from 150 villages consisting of 100 SMU villages and 50 non-SMU villages. In Cambodia, 1,800 households were randomly sampled from 60 villages consisting of 30 SMU villages and 30 non-SMU villages for the baseline survey. Background of the SMU project is described in Appendix I.

2.2 Sources of Data

The primary data sources are two lab-in-the-field experiments and a series of surveys. In collaboration with local survey agencies, we conducted (i) the baseline surveys in February–March

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[1] These 9 regions/states in Myanmar are as follows: 1) Ayarwaddy, 2) Bago, 3) Mandalay, 4) Mon, 5) NayPyiTaw, 6) Sagaing, 7) Shan, 8) Tanintharyi, and 9) Yangon.
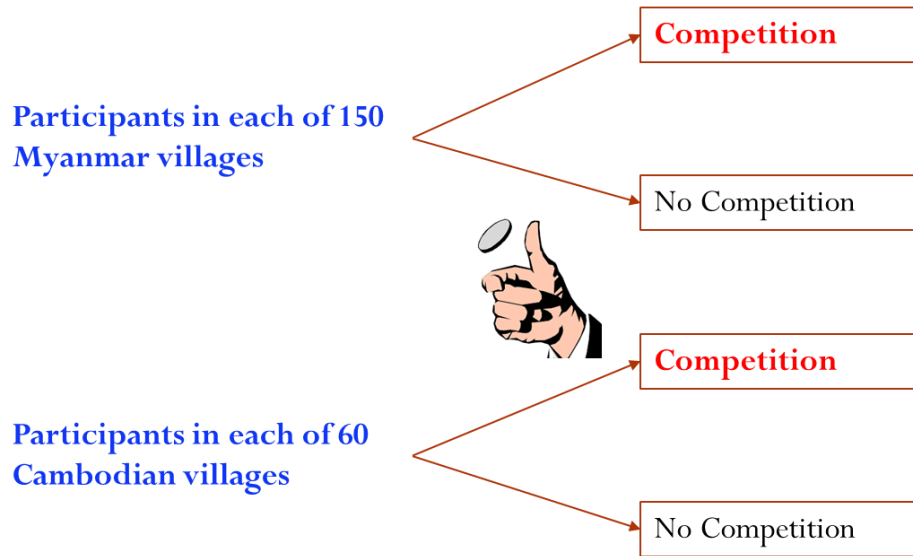[2] These 3 provinces in Cambodia are as follows: 1) Kampong Speu, 2) Takeo, and 3) Tbong Khmum.

2016 in Myanmar and in February–April 2017 in Cambodia; (ii) the first follow-up survey in February–April 2018 including a lab-in-the-field experiment (village donation game) in Myanmar; and expect to conduct (iii) the endline surveys including lab-in-the-field experiments (joint investment game in Myanmar and village donation game / joint investment game in Cambodia) in May–August 2019. Regarding survey questionnaires, the sampled households in all villages in Myanmar and Cambodia were (will be) asked about (i) household demographics; (ii) household's group membership and informal networks; (iv) trust and solidarity; (v) collective action and cooperation; (vi) information and communication; (vii) social cohesion and inclusion; and (viii) living conditions including income and assets. Survey questions related to social capital were based on "Measuring Social Capital" of the World Bank (Grootaert et al., 2004), an integrated questionnaire generated to measure different dimensions of social capital.

2.3 Experiment 1: Village Donation Game

We implement a village donation game in order to examine whether the inter-village competition promotes provision of public goods in a village. Participants in a village are randomly assigned into two groups: the **competition** group where participants are asked to make a donation to village joint fund in the presence of inter-village competition and the **control** group where participants are asked to make a donation to village joint fund without inter-village competition. Participants are informed that their donation to the village will be used for their community—for example, improving the road, public schools, or public hospitals. This random assignment of participants in the village donation game is graphically illustrated in Figure 1.

Figure 1. Random assignment of participants in the village donation game

Participants in each of 150 Myanmar villages
→ **Competition**
→ No Competition

Participants in each of 60 Cambodian villages
→ **Competition**
→ No Competition

150 villages in Myanmar / 60 villages in Cambodia compete through the average amount of donation made by participants in the competition group of each village. Specifically, villages in a country are ranked in terms of the average amount of donation made by participants in the competition group. If a village belongs to the group of the top 50 villages in Myanmar / the top 20 villages in Cambodia, it earns a bonus of B. If a village belongs to the group of the next 50 villages in Myanmar / the group of the next 20 villages in Cambodia, it earns a bonus of b. If a village belongs to the group of the bottom 50 villages in Myanmar / the group of the bottom 20 villages in Cambodia, it receives no bonus. The amounts of bonuses are set to be $B > b > 0$. If villages make the same average amount of donation, the tie are randomly broken. The bonuses will be added to the total village donation.

The experimental instructions of the village donation game with and without inter-village competition are presented in Appendix II.


2.4 Experiment 2: Joint Investment Game

We implement a joint investment game to examine (1) whether participation of a village leader who is asked to contribute to the success of a joint project in sacrifice of the leader's material

incentive affects participants' joint investment decisions and (2) whether inter-village competition affects the joint investment decisions of participants in the village.

In this game participants make a decision between a safe option (keeping an endowment for personal use) and a risky joint investment project. The likelihood of a joint project succeeding depends on the number of participants in a village who invest in a joint project (and the amount of contribution made by a village leader in sacrifice of his or her material incentive in case there is a role of a village leader in the success of a joint project). Because the probability of its success is set to be bounded from above, a joint project is risky in its nature. If it fails, those who invest in a joint project will lose an endowment.

Participants in a village are randomly assigned into three groups. Participants in the first group, called the **leadership group**, are asked to decide between a safe option and a risky joint project in the presence of the role of a village leader to the success of a joint project. Those in the second group, called the **competition group**, are asked to decide between the same two options in the presence of inter-village competition. Competition among villages in a country is through the number of participants who invest in a joint project. Bonuses are determined in the same fashion as in the competition group of the village donation game and will be delivered to a village joint fund about two months after the endline survey. Lastly, participants in the third group, called the **control group**, are asked to decide between a safe option and a joint project with none of leadership role and inter-village competition. The random assignment of participants in the joint investment game is graphically depicted in Figure 2. Experimental instructions of the joint investment game are available in Appendix III.

Figure 2. Random assignment of participants in the joint investment game
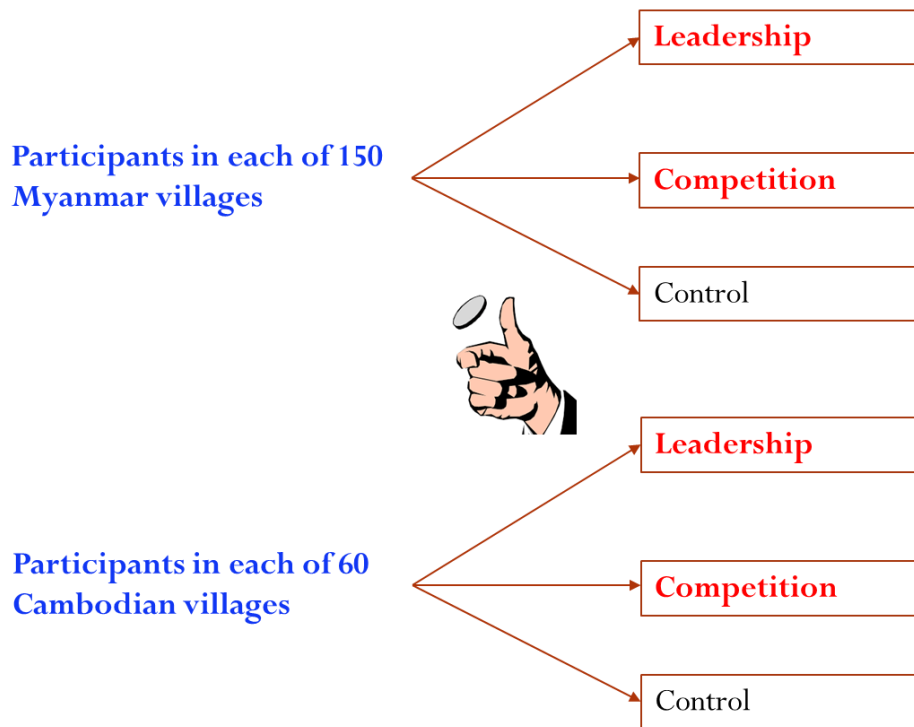
Section 3: Hypotheses and Estimation

3.1 Main Hypotheses

Hypothesis 1: Inter-village competition does not affect collective action within a village.

One of the main research questions in this study is whether inter-village competition can affect collective action in a village. We consider two different types of collective action problems—provision of public goods in a village and an investment in a risky joint project—and test whether inter-village competition affects the behavior of villagers to solve these collective action problems. In the village donation game free-riding incentive is a major source of causing coordination failure and the problem of collective action. In the joint investment game strategic uncertainty of other villagers' behavior is a main source of coordination failure and the problem of collective action.

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Hypothesis 2: A village leader's participation does not affect villagers to invest in a risky joint project.

We investigate the role of a village leader in affecting the investment decision of village members to a risky joint project. In our setting, investment in a joint project is a type of collective action problems because all participants cooperating and investing in a joint project will lead to a socially efficient outcome. If a village leader is self-interested and all villagers believe so, a leader's participation will not affect the investment behavior of villagers. If a leader has other concerns such as other-regarding preferences and villagers know about that, a leader's participation will affect villagers' investment decisions.

3.2 Estimation

3.2.1 Balance Test

We will be conducting mean comparison tests in order to check the balance (i) between the competition group and the non-competition group in the village donation game and (ii) among the three groups in the joint investment game—the leadership group, the competition group, and the control group—in terms of basic household characteristics.

Basic household characteristics include (i) ethnicity of a household head; (ii) female-headed household; (iii) married household head; (iv) Buddhist household head; (v) length of residency over 45 years; (vi) household head with at least high school education; (vii) household head employed; (viii) household head working as a farmer; (ix) household owning land; and (x) asset index.

3.2.2 Effect of Inter-Village Competition (Hypothesis 1)

We estimate the effect of inter-village competition using one specification for average treatment effects and a subsequent set of specifications to analyze heterogeneous treatment effects.

The main outcome variables include (i) the amount of individual donation in the village game and (ii) an individual's decision of investing in a joint project in the joint investment game. We use the following notation of variables common in different regression specifications: an outcome variable is denoted Y_{ijrc} for individual i, village j, region r, and country c. X_{ijrc} is a vector of household control variables. γ_{rc} denotes country-region fixed effects.

Average Treatment Effects. In order to see the average treatment effect of competition on individual behavior in the two different problems of collective action, we use the following specification, where standard errors are clustered at the village level.

$$Y_{ijrc} = \beta_0 + \beta_1 Competition + X_{ijrc} + \gamma_{rc} + \varepsilon_{ijrc} \qquad (1)$$

The coefficient of the dummy of competition, β_1, captures the treatment effect of inter-village competition on each of (i) the amount of individual donation in the village donation game and (ii) an individual's decision of investing in a risky joint project.

Heterogeneous Treatment Effects. Our study has two factors—country (Myanmar/Cambodia) and the status of a village receiving SMU support or not—that lead us naturally to consider the analysis of heterogeneous treatment effects.

In the first analysis of heterogeneous treatment effects, we consider a potential interaction between random assignment of competition and country with the following specification, where $Country$ indicates whether country c is Myanmar or Cambodia:

$$Y_{ijrc} = \beta_0 + \beta_1 Competition + \beta_2 Country + \beta_3 (Competition \times Country) + X_{ijrc} + \gamma_{rc} + \varepsilon_{ijrc} \qquad (2)$$

In the second analysis of heterogeneous treatment effects, we consider a potential interaction between competition and SMU support with the following specification, where SMU indicates whether village j has received SMU support or not:

$$Y_{ijrc} = \beta_0 + \beta_1 Competition + \beta_2 SMU + \beta_3 (Competition \times SMU) + X_{ijrc} + \gamma_{rc} + \varepsilon_{ijrc} \qquad (3)$$

The coefficient of the interaction term between the competition dummy and the country (resp. SMU) dummy β_3, captures an additional treatment effect of competition for a country of

interest (resp. SMU) compared to that for the comparison country (resp. non-SMU). Because β_1 measures the competition effect for the baseline country (resp. non-SMU), the treatment effect of competition for the country of interest (resp. SMU) is captured by $\beta_1 + \beta_3$.

In the third analysis, we consider the full interaction of country and SMU with random assignment of inter-village competition with the following specification:

$$Y_{ijrc} = \beta_0 + \beta_1 Competition + \beta_2 Country + \beta_3 SMU + \beta_4 (Competition \times Country) + \beta_5 (Competition \times SMU) + \beta_6 (Competition \times Country \times SMU) + X_{ijrc} + \gamma_{rc} + \varepsilon_{ijrc} \qquad (4)$$

The treatment effects of competition in this specification can be summarized by the following table:

	SMU	non-SMU
Country of interest	$\beta_1 + \beta_5 + \beta_6$	$\beta_1 + \beta_4$
Baseline country	$\beta_1 + \beta_5$	β_1

3.2.3. Effect of Leader's Participation (Hypothesis 2)

We will follow the same structure of analyzing the effects of a village leader's participation on individual investment in a joint project as for the analysis of competition effects (Section 4.2.2).

Appendix I: Project Description

The CDD project in Myanmar is a five-year project (2014-2019) where villagers formulate a village-level plan and are granted funding to implement their plan for three project years. 100 villages (treatment villages) in nine regions/states across Myanmar were selected by the Ministry of Agriculture, Livestock and Irrigation (MOALI) for the rural CDD project and equally received USD 20,000 for their village development projects in the first year (2015-2016). After the first project year, MOALI and the Korea International Cooperation Agency (KOICA) evaluated each village's performance in terms of three criteria (capacity building, living environment improvement, and income generation activities) and disbursed USD 40,000 to the top 30 villages, USD 30,000 to the next 40 villages, and USD 20,000 to the bottom 30 villages, respectively, for the second years. The same evaluation was conducted after the second project year (2016-2017) and three different amounts of village development funding were granted for the final third year project (2017-2018). In addition to the 100 treatment villages, 50 villages neighboring the treatment villages were selected as the comparison group. This non-random selection of treatment and comparison villages is one of the main limitations of this study, notwithstanding that the research team tried to select control villages as comparable as possible to the treatment villages.

Similarly, the CDD project in Cambodia is a five-year project (2014-2019), implemented in 30 villages in 3 provinces. The Cambodia CDD project allows villagers to formulate annual village-level plans for four consecutive years and village members are granted funds to implement their plan. Based on their performance evaluation in the previous year, each village receives different amounts of fund in the subsequent year to implement another yearly plan. In the first year (2016), USD 20,000 was equally provided to all 30 SMU villages. In the second year (2017), USD 40,000 was provided to the top 5 villages, USD 30,000 to the next 8 villages, and USD 20,000 was provided to the remaining 17 villages. In the third year (2018), USD 80,000 was provided to the top 5 villages, USD 45,000 was provided to the next 8 villages, and USD 20,000 was provided to the remaining 17 villages. In addition to the 30 treatment villages, additional 30 villages in Cambodia were selected to serve as the comparison group.
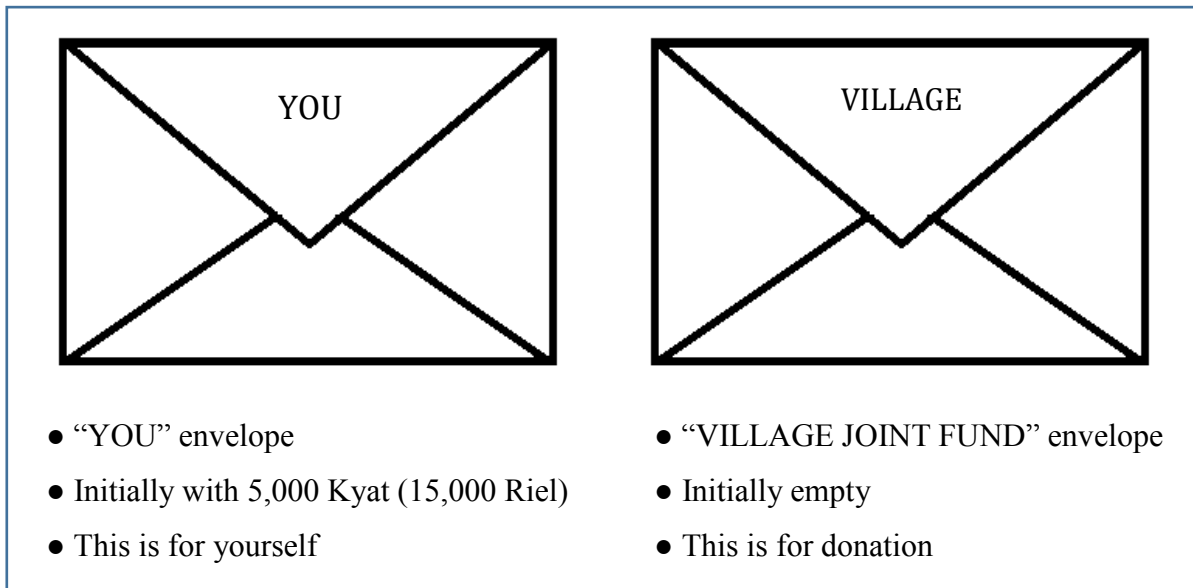
Appendix II: Instructions for Village Donation Game

Below describe the detailed steps for implementing the village donation game:

- Survey participants in each of the treatment and comparison villages are randomly assigned to two groups – Group 1 (Non-Competition Group) and Group 2 (Competition Group). There is an equal number of survey participants in Group 1 and Group 2.

- Each participant is given 5,000 Myanmar Kyat (or 15,000 Riel in Cambodia) at the beginning of the interview. The participant is asked to divide this money between *self* and *the village* (Figure 3 shows the two different types of envelope for making the decision). For example, a participant in Myanmar may allocate 3,800 Kyat to himself/herself and 1,200 Kyat to the village. The money given to *the village* is delivered to the village chief during the village assembly meeting.

- Participants in Group 1 make this contribution decision to the village joint fund *without inter-village competition*, whereas those in Group 2 do so *with inter-village competition*.

- The rules for inter-village competition for Group 2 are as follows. In Myanmar, we have 150 villages covered by the study (100 SMU treatment villages and 50 comparison villages). Each village has the half of survey participants assigned to Group 2. Group 2 from 150 villages joins the competition with the average proportion of contributions. Top 50 villages receive 100,000 MMK and the next 50 villages receive 50,000 MMK as prizes of this competition. The bottom 50 villages do not receive any prize. These prize amounts, in addition to villagers' contributions, are delivered to the village chief during the village assembly meeting after finishing the data collection.

- In Cambodia, we have 60 villages covered by the study (30 SMU treatment villages and 30 comparison villages). Each village has the half of survey participants assigned to Group 2. Group 2 from 60 villages will join the competition with the average proportion of contributions. Top 20 villages will receive 300,000 Riel and the next 20 villages will receive 150,000 Riel as prizes of this competition. The bottom 20 villages will not receive any prize. These prize amounts, in addition to villagers' contributions, will be delivered to the village chief during the village assembly meeting after finishing the data collection.

- Every participant in Group 2 is informed of joining the inter-village competition and competition prizes for his/her village.

- In Group 1 where there is no rule of inter-village competition, (i) 50 randomly selected villages in Myanmar (20 villages in Cambodia) will receive 100,000 MMK (or 300,000 Riel in Cambodia), (ii) another 50 randomly selected villages in Myanmar (20 villages in Cambodia) will receive 50,000 MMK (or 150,000 Riel in Cambodia) and (iii) the other 50 villages in Myanmar (20 villages in Cambodia) will earn no extra bonus. Each village has an equal chance of belonging to any of the three groups.

- Every participant in Group 1 will be informed about their village's random chance of earning extra bonus.

Figure 3: Making Donation to Village

YOU	VILLAGE
● "YOU" envelope	● "VILLAGE JOINT FUND" envelope
● Initially with 5,000 Kyat (15,000 Riel)	● Initially empty
● This is for yourself	● This is for donation

Sample Instructions for Group without Inter-Village Competition in Cambodia

We invite you to one brief exercise before this survey starts. This exercise involves real money reward.

We will give you two envelopes. One envelope printed with "YOU" contains 15,000 Riel (15 bills of 1,000 Riel), and the other one printed with "VILLAGE" is empty. You will be asked to make a donation out of the 15,000 Riel to your village. Your donation to the village will be used for your community - for example improving the road, public schools, or public hospitals. Note that your decision will be kept strictly private and confidential.

Once you decide on the amount of money to donate to your village, please go to an isolated area and reallocate the amount from the "YOU" envelope to the "VILLAGE" envelope. Please remember that you can choose not to donate any amount to the village. The remaining amount in the "YOU" envelope becomes your money reward. After you keep the "YOU" envelope in a safe place, please bring back the "VILLAGE" envelope to the enumerator and enter the **"amount of your donation"** in the tablet. Please make sure the amount in the "VILLAGE" envelope matches the amount entered in the tablet.

The other survey participants of your village will make similar decisions. At the end of the survey, we will calculate the total amount of donation made by the participants of your village.

In addition to the total amount of donation, your village will have an opportunity of earning extra money. Out of 60 villages that participate in this survey, we will randomly select 20 villages to earn extra amount of 300,000 Riel (group A), another 20 villages to earn extra amount of 150,000 Riel (group B), and the other 20 villages will earn no extra bonus (group C). Your village has an equal chance of belonging to any of the three groups.

Two months after completing the survey, the village assembly meeting will be organized. At that time we will revisit your village and deliver your village chief the total amount of donation made by the participants of your village *plus* any extra money your village earns. Again, no one in your

village will know how much you keep for yourself or donate to the village.

Sample Instructions for Group with Inter-Village Competition in Cambodia

We invite you to one brief exercise before the survey starts. This exercise involves real money reward.

We will give you two envelopes. One envelope printed with "YOU" contains 15,000 Riel (15 bills of 1,000 Riel), and the other one printed with "VILLAGE" is empty. You will be asked to make a donation out of the 15,000 Riel to your village. Your donation to the village will be used for your community - for example improving the road, public schools, or public hospitals. Note that your decision will be kept strictly private and confidential.

Once you decide on the amount of money to donate to your village, please go to an isolated area and reallocate the amount from the "YOU" envelope to the "VILLAGE" envelope. Please remember that you can choose not to donate any amount to the village. The remaining amount in the "YOU" envelope becomes your money reward. After you keep the "YOU" envelope in a safe place, please bring back the "VILLAGE" envelope to the enumerator and enter the **"amount of your donation"** in the tablet. Please make sure the amount in the "VILLAGE" envelope matches the amount entered in the tablet.

The other survey participants of your village will make similar decisions. At the end of the survey, we will calculate the total amount of donation made by the participants of your village.

In addition to the total amount of donation, your village will have an opportunity of earning extra money. 60 villages in Cambodia including your village will join a competition through the amount of donation. We will rank 60 villages in terms of the average amount of donation made by participants. If your village belongs to the group of the top 20 villages (ranked between 1st and 20th), your village will earn 300,000 Riel. If your village belongs to the group of the next 20 villages (ranked between 21st and 40th), your village will earn 150,000 Riel. If your village belongs to the group of the bottom 20 villages (ranked between 41st and 60th), your village will

receive no extra bonus. If your village and other villages made same average amount of donation, we will randomly decide the ranking of your village and other villages. These extra money rewards will be added to the total village donation.

Two months after completing the survey, the village assembly meeting will be organized. At that time we will revisit your village and deliver your village chief the total amount of donation made by the participants of your village *plus* any extra money your village earns. Again, no one in your village will know how much you keep for yourself or donate for the village.

Appendix III: Instructions for Joint Investment Game

<u>Sample Instructions for Group A (with Leader's Role) in Myanmar</u>

We invite you to one brief task before the survey starts. Each task involves real money reward. In this task you are given 2,000 Myanmar Kyat. Please check whether you have 2,000 Kyat. This is your money and you can use it for your personal use. Please put this envelope in your personal closet in your room and come back here to participate in the survey.

You will be asked to decide how to use this money between two options. You can either keep this money for your personal use or invest this money to a joint project in which the other participants of your village can join. The total number of participants who make this decision in your group is 14. If you decide to keep this money for your personal use, your earnings in this task is simply 2,000 Kyat.

If you decide to keep this money for your personal use, your earnings in this task is simply 2,000 Kyat.

If you decide to invest this money to a joint project, your earnings in this task will depend on whether a joint project succeeds or fails. If the project succeeds, you will earn two times of 2,000 Kyat (that is, 4,000 Kyat). If it fails, you will earn nothing (that is, 2,000 Kyat that you invested will be lost).

The chance of the project succeeding will depend on how many participants out of 14 participants invest their money to the project AND how many envelopes of 6,000 Kyat the SMU chairman (in the treatment villages) or the village chief (in the control villages) contributes to the project. Note that the SMU chairman or the village chief will be given 12,000 Kyat (two envelopes – each envelope containing 6,000 Kyat) and will be asked whether to keep this money for his or her personal use or contribute to the joint project. The SMU chairman or the village chief has three options – (i) keeping the two envelopes (or 12,000 Kyat) for his/her own use; (ii) donating one envelope (or 6,000 Kyat) and keeping one envelope (or 6,000 Kyat) for his own use; (iii) donating two envelopes (12,000 Kyat) to increase the success probability of this joint investment game. The

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SMU chairman or village chief will receive no financial reward from the success of the project, regardless of the amount of his or her contributions. In other words, the earnings of the SMU chairman or village chief will be 12,000 Kyat minus the amount of money that he or she contributes to the joint project.

Specifically, the chance of the project succeeding will be as follows.

1) If the leader doesn't contribute (this means that the leader keeps the two envelopes for his/her personal use), then the chance of success is given by:

$$\frac{\text{(Number of participants who invested)}}{25}$$

2) If the leader contributes one envelope of 6,000 Kyat to the joint investment project, then the chance of success is given by:

$$\frac{\text{(Number of participants who invested + 3)}}{25}$$

3) If the leader contributes two envelopes (12,000 Kyat) to the joint investment project, then the chance of success is given by:

$$\frac{\text{(Number of participants who invested + 6)}}{25}$$

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[Explanation of Probability Concept with Beans]

Please prepare 14 white beans, 25 black beans, and a plastic bag. Please explain first that the participant can think of the white beans as "participants in his/her group that invest their money," and the total number of beans should equal to 25 in any case.

If higher number of participants invest their money, winning probability increases. If there are higher number of white beans in the bag, the probability of picking a white bean increases.

1.   Put one white bean and 24 black beans in the bag (this case means that you are the only investor in your group and all of the others do not invest). Then, shuffle the beans without looking inside the bag. Ask a survey participant how likely it is to select the white bean out of 25 beans?

① Very unlikely

② Unlikely

③ Equal chance

④ Likely

⑤ Very Likely

Answer should be (1) Very unlikely or (2) Unlikely

2.　　Put 5 white beans and 20 black beans in the bag (This case means that five participants including you in your group invest and nine other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we only have one white bean in the bag, do you think the probability of picking a white bean increased or decreased?"

① Increased

② Stay the same

③ Decreased

Answer should be (1) Increased

3.　　Put 10 white beans and 15 black beans in the bag (This case means that ten participants including you in your group invest and four other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have five white beans, do you think the probability of picking a white bean increased or decreased?"

① Increased

② Stay the same

③ Decreased

Answer should be (1) Increased

4.　　Put 7 white beans and 18 black beans in the bag (This case means that seven participants including you in your group invest and seven other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant:

"Compared to the previous case where we have 10 white beans, do you think the probability of picking a white bean increased or decreased?"

① Increased

② Stay the same

③ Decreased

Answer should be (3) Decreased

5. Put 14 white beans and 11 black beans in the bag (This case means that all participants including you in your group invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have 7 white beans, do you think the probability of picking a white bean increased or decreased?"

① Increased

② Stay the same

③ Decreased

Answer should be (1) Increased

If the participant incorrectly answered more than 3 out of 5 questions, please repeat 1-5 above.

After this process, we can explain how the above scenarios change depending on their leader's contribution:

1.   Put 7 white beans and 18 black beans in the plastic bag. Explain that this means there are 7 participants (out of the total 14 participants) in their group that decide to invest their money.

   (i)   If your leader decides not to contribute (leader takes 12,000 kyat for his/her own use), the winning probability stays the same.

   (ii)   If your leader decides to contribute 1 out of 2 envelopes (leader decides to donate 6,000 kyat for the joint investment game and takes 6,000 kyat for his/her own use), this means there are 3 additional white beans and 3 less black beans (and the total number of beans should still equal to 30) and there are 10 white beans and 15 black beans in the bag. Since the probability of picking a white bean is higher than before, this means that if their leader decides to contribute their endowment, the probability of winning the game

increases.

(iii) If your leader decides to contribute all two envelopes (leader decides to donate 12,000 kyat for the joint investment game and takes none for his/her own use – even if your village wins the joint investment game, the leader does not receive any reward), this means there are 6 additional white beans and 6 less black bean and thus 13 white beans and 12 black beans in the bag.

Please ask if the participant understands the probability concept. If yes, please explain the following point and practice with the respondent:

- If more participants decide to invest during the joint investment game, this case is similar to increasing the number of white beans in the bag.

- The respondent should randomly select a bean from a non-transparent plastic bag with one white bean and 24 black beans five times with replacement (This case means that you are the only investor in your group and all of the others do not invest. Also, your leader donates none). After the five-time practice, tell the participant that it is very unlikely to succeed the joint investment project in this case.

- The respondent should randomly select a bean from a non-transparent plastic bag with 17 white bean and 8 black beans five times with replacement (This case means that all participants including you in your group invest and your leader donates one envelope of 6,000 Kyat). After the five-time practice, tell the participant that it is still possible that you lose your investment even if all 14 participants decide to invest.

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Therefore, before making your decision, you may need to think about how many participants would invest their money to a joint project as well as how many envelopes of 6,000 Kyat (out of 12,000 Kyat) the SMU chairman or the village chief would contribute to a project. Note that your decision will be kept strictly private and confidential.

The other survey participants in your group will make the same kind of decisions. If the decisions of all participants (including that of the village chief) are made, we will calculate the chance of the

project succeeding. In case you invested, your earnings will be determined according to this chance.

Once you complete the survey, you are going to receive 1,000 Kyat as a token of appreciation. At the end of the survey in your village, we will revisit your house and deliver this amount of 1,000 Kyat and the amount of money you earned in case you invested and the project succeeded. Again, no one in your village will know about your decision.

Sample Instructions for Group B (competition group) in Myanmar

We invite you to one brief task before the survey starts. Each task involves real money reward.
In this task you are given 2,000 Myanmar Kyat. Please check whether you have 2,000 Kyat. This is your money and you can use it for your personal use. Please put this envelope in your personal closet in your room and come back here to participate in the survey.

You will be asked to decide how to use this money between two options. You can either keep this money for your personal use or invest this money to a joint project in which the other participants of your village can join. The total number of participants who make this decision in your group is 14. If you decide to keep this money for your personal use, your earnings in this task is simply 2,000 Kyat. If you decide to invest this money to a joint project, your earnings in this task will depend on whether a joint project succeeds or fails. If the project succeeds, you will earn two times of 2,000 Kyat (that is, 4,000 Kyat). If it fails, you will earn nothing (that is, 2,000 Kyat that you invested will be lost).

The chance of the project succeeding will depend on how many participants out of 14 participants invest their money to the project. Specifically, the chance of the project succeeding will be equal to the ratio of the number of investors to 25:

$$\frac{(\text{Number of participants who invested})}{25}$$

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[Explanation of Probability Concept with Beans]
Please prepare 14 white beans, 25 black beans, and a plastic bag. Please explain first that the participant can think of the white beans as "participants in his/her village that invest their money,"

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and the total number of beans should equal to 25 in any case.

If higher number of participants invest their money, winning probability increases. If there are higher number of white beans in the bag, the probability of picking a white bean increases.

1.   Put one white bean and 24 black beans in the bag (this case means that you are the only investor in your group and all of the others do not invest). Then, shuffle the beans without looking inside the bag. Ask a survey participant how likely it is to select the white bean out of 25 beans?

  (1) Very unlikely

  (2) Unlikely

  (3) Equal chance

  (4) Likely

  (5) Very Likely

Answer should be (1) Very unlikely or (2) Unlikely

2.   Put 5 white beans and 20 black beans in the bag (This case means that five participants including you in your group invest and nine other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we only have one white bean in the bag, do you think the probability of picking a white bean increased or decreased?"

  (1) Increased

  (2) Stay the same

  (3) Decreased

Answer should be (1) Increased

3.   Put 10 white beans and 15 black beans in the bag (This case means that ten participants including you in your group invest and four other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have five white beans, do you think the probability of picking a white bean increased or decreased?"

  (1) Increased

  (2) Stay the same

  (3) Decreased

Answer should be (1) Increased

4.   Put 7 white beans and 18 black beans in the bag (This case means that seven participants including you in your group invest and seven other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have 10 white beans, do you think the probability of picking a white bean increased or decreased?"

(1) Increased
(2) Stay the same
(3) Decreased

Answer should be (3) Decreased

5. Put 14 white beans and 11 black beans in the bag (This case means that all participants including you in your group invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have 7 white beans, do you think the probability of picking a white bean increased or decreased?"

(1) Increased
(2) Stay the same
(3) Decreased

Answer should be (1) Increased

If the participant incorrectly answered more than 3 out of 5 questions, please repeat 1-5 above.

Please ask if the participant understands the probability concept. If yes, please explain the following point and practice with the respondent:

- If more participants decide to invest during the joint investment game, this case is similar to increasing the number of white beans in the bag.
- The respondent should randomly select a bean from a non-transparent plastic bag with one white bean and 24 black beans five times with replacement (This case means that you are the only investor in your group and all of the others do not invest. Also, your leader donates

none). After the five-time practice, tell the participant that it is very unlikely to succeed the joint investment project in this case.

- The respondent should randomly select a bean from a non-transparent plastic bag with 14 white bean and 11 black beans five times with replacement (This case means that all participants including you in your group invest). After the five-time practice, tell the participant that it is still possible that you lose your investment even if all 14 participants decide to invest.

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In addition to your earnings, your village will have an opportunity of earning money. 150 villages in Myanmar including your village will join a competition through the amount of joint investment. We will rank 150 villages in terms of the total amount of joint investment made by 14 participants in each of the 150 villages. If your village belongs to the group of the top 50 villages (ranked between 1st and 50th), your village will earn 100,000 Myanmar Kyat. If your village belongs to the group of the next 50 villages (ranked between 51st and 100th), your village will earn 50,000 Myanmar Kyat. If your village belongs to the group of the bottom 50 villages (ranked between 101st and 150th), your village will receive no money. If your village and other villages made same average amount of joint investment, we will randomly decide the ranking of your village and other villages.

Therefore, before making your decision, you may need to think about how many participants would invest their money to a joint project. Note that your decision will be kept strictly private and confidential.

The other survey participants in your group will make the same kind of decisions. If the decisions of all participants are made, we will calculate the chance of the project succeeding. In case you invested, your earnings will be determined according to this chance.

Once you complete the survey, you are going to receive 1,000 Kyat as a token of appreciation. At the end of the survey in your village, we will revisit your house and deliver this amount of 1,000 Kyat and the amount of money you earned in case you invested and the project succeeded. Again, no one in your village will know about your decision.

Two months after completing the entire survey in 150 villages, we will revisit your village and

deliver your SMU Chairman (in the treatment villages) or the village chief (in the control villages) the total amount of bonus money in case your village earned.

Sample Instructions for Group C (control group) in Myanmar

We invite you to one brief task before the survey starts. Each task involves real money reward. In this task you are given 2,000 Myanmar Kyat. Please check whether you have 2,000 Kyat. This is your money and you can use it for your personal use. Please put this envelope in your personal closet in your room and come back here to participate in the survey.

You will be asked to decide how to use this money between two options. You can either keep this money for your personal use or invest this money to a joint project in which the other participants of your village can join. The total number of participants who make this decision in your group is 14. If you decide to keep this money for your personal use, your earnings in this task is simply 2,000 Kyat. If you decide to keep this money for your personal use, your earnings in this task is simply 2,000 Myanmar Kyat. If you decide to invest this money to a joint project, your earnings in this task will depend on whether a joint project succeeds or fails. If the project succeeds, you will earn two times of 2,000 Kyat (that is, 4,000 Kyat in Myanmar). If it fails, you will earn nothing (that is, 2,000 Myanmar Kyat that you invested will be lost).

The chance of the project succeeding will depend on how many participants out of 14 participants invest their money to the project. Specifically, the chance of the project succeeding will be equal to the ratio of the number of investors to the number of participants:

$$\frac{\text{(Number of participants who invested)}}{25}$$

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[Explanation of Probability Concept with Beans]

Please prepare 14 white beans, 25 black beans, and a plastic bag. Please explain first that the participant can think of the white beans as "participants in his/her village that invest their money," and the total number of beans should equal to 25 in any case.

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If higher number of participants invest their money, winning probability increases. If there are higher number of white beans in the bag, the probability of picking a white bean increases.

1.   Put one white bean and 24 black beans in the bag (this case means that you are the only investor in your group and all of the others do not invest). Then, shuffle the beans without looking inside the bag. Ask a survey participant how likely it is to select the white bean out of 25 beans?

    (1) Very unlikely

    (2) Unlikely

    (3) Equal chance

    (4) Likely

    (5) Very Likely

Answer should be (1) Very unlikely or (2) Unlikely

2.   Put 5 white beans and 20 black beans in the bag (This case means that five participants including you in your group invest and nine other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we only have one white bean in the bag, do you think the probability of picking a white bean increased or decreased?"

    (1) Increased

    (2) Stay the same

    (3) Decreased

Answer should be (1) Increased

3.   Put 10 white beans and 15 black beans in the bag (This case means that ten participants including you in your group invest and four other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have five white beans, do you think the probability of picking a white bean increased or decreased?"

    (1) Increased

    (2) Stay the same

    (3) Decreased

Answer should be (1) Increased

4. Put 7 white beans and 18 black beans in the bag (This case means that seven participants including you in your group invest and seven other participants do not invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have 10 white beans, do you think the probability of picking a white bean increased or decreased?"

    (1) Increased

    (2) Stay the same

    (3) Decreased

Answer should be (3) Decreased

5. Put 14 white beans and 11 black beans in the bag (This case means that all participants including you in your group invest). Then, shuffle the beans without looking inside the bag. Ask the following question to the survey participant: "Compared to the previous case where we have 7 white beans, do you think the probability of picking a white bean increased or decreased?"

    (1) Increased

    (2) Stay the same

    (3) Decreased

Answer should be (1) Increased

If the participant incorrectly answered more than 3 out of 5 questions, please repeat 1-5 above. Please ask if the participant understands the probability concept. If yes, please explain the following point and practice with the respondent:

- If more participants decide to invest during the joint investment game, this case is similar to increasing the number of white beans in the bag.

- The respondent should randomly select a bean from a non-transparent plastic bag with one white bean and 24 black beans five times with replacement (This case means that you are the only investor in your group and all of the others do not invest. Also, your leader donates none). After the five-time practice, tell the participant that it is very unlikely to succeed the joint investment project in this case.

- The respondent should randomly select a bean from a non-transparent plastic bag with 14 white bean and 11 black beans five times with replacement (This case means that all participants including you in your group invest). After the five-time practice, tell the participant that it is still possible that you lose your investment even if all 14 participants decide to invest.

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Therefore, before making your decision, you may need to think about how many participants would invest their money to a joint project. Note that your decision will be kept strictly private and confidential. The other survey participants in your group will make the same kind of decisions. If the decisions of all participants are made, we will calculate the chance of the project's success. In case you invested, your earnings will be determined according to this chance.

Once you complete the survey, you are going to receive 1,000 Kyat as a token of appreciation. At the end of the survey in your village, we will revisit your house and deliver this amount of 1,000 Kyat and the amount of money you earned in case you invested and the project succeeded. Again, no one in your village will know about your decision.

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