A Survey of Cambodian Households in Rural Villages: An assessment of Living Standards using *Kakeibo* and its Impact as a Financial Education Tool

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Summary

Kakeibo is the Japanese way of household bookkeeping for saving money efficiently. In the literature of economic studies, the method is also referred to as keeping financial diaries and has been increasingly used for collecting high-frequency data for household cash flows. We introduced the Kakeibo approach into Cambodian rural households from October 2021 to October 2022. The objectives of our study are two-folded: capturing detailed information on income sources, expenses, savings, and borrowing patterns of households over a specific period, and assessing the impacts of keeping the Kakeibo on financial literacy and behavior of rural households. As results of analyses, ceremony expenses, such as expenses for weddings and funeral, constitute a significant portion of total expenses, and those expenses are primarily financed through gift income. In addition, wealthier households tend to rely more on borrowing, while lower-income households often rely on remittances. Furthermore, the diversification of income sources often leads to more stable household income patterns over time. However, it's important to note that many households still face vulnerability, as their income and expenses may temporarily fall below the poverty line at certain periods. Regarding the impact of the Kakeibo, we found that maintaining a record of cash flows has enhanced financial literacy and financial behavior for the households who participated in the Kakeibo program. However, the positive effects were predominantly observed among households with higher levels of education or income. This study provides crucial evidence for gaining insights into the economic realities of rural communities in Cambodia and can be used to develop effective policies and interventions aimed at improving their well-being and financial resilience.

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Contents

1 Introduction and Background

In developing countries, access to a formal financial system for households and small- and medium-sized enterprises is typically low. A financial system is an essential infrastructure for starting a business, improving social protection, and creating secured assets. However, the lack of financial access is preventing people from escaping the poverty trap (Demirguc-Kunt, Klapper, and Singer 2017). Thus, in developing countries the concept of financial inclusion is considered as a key to reduce extreme poverty and boost prosperity, as financial inclusion has been identified as an enabler for 7 of the 17 Sustainable Development Goals.

Cambodia, predominantly an agrarian society, has a significant rural population facing numerous challenges related to poverty, limited access to basic services, and vulnerability to economic shocks. However, access to formal financial services remains limited in rural Cambodia, with the majority of households relying on informal mechanisms for savings, credit, and insurance. This lack of access to formal financial services hampers rural households' ability to manage financial risks, invest in income-generating activities, and improve their overall living standards. Understanding the financial behaviors and needs of rural households is essential for designing targeted interventions to enhance financial inclusion and promote sustainable livelihoods. Although there are increasing accumulation of studies on rural households in Cambodia, there is a gap in understanding the detailed financial lives and living standards of rural households.

In our study we fill this gap by employing *Kakeibo*[1] (also referred to as a financial diary in the economic research literature) as a data collection tool for collecting high-frequency information on the cash flows of rural Cambodian households. This data collection methodology was first introduced by Collins et al. (2009) and involves regular tracking of individual or household financial transactions over time. This has several advantages,

[1] *Kakeibo* is a Japanese concept that refers to the methods and tools of keeping a record of daily cash flows in order to reduce waste of money and improve household budget planning. In the literature the method of keeping a financial record for households is usually referred to as "financial diaries," and Kakeibo is often used as an interchangeable word with financial diary. However, usually the term "financial diaries" does not encompass the concept of "improving household budget planning". In this paper, we use the term "Kakeibo" to encompass both the concepts of keeping a financial record and improving household budget planning and distinguish the words with "financial diaries."

including capturing detailed data on income and expenditure patterns, identifying seasonality in financial activities, and exploring informal financial practices. This methodology has been successfully used in various countries to study household finances, as it includes income volatility, consumption patterns, and financial coping mechanisms.

Previous studies of rural households in Cambodia have focused on poverty assessments, livelihood strategies, and coping strategies for external shocks (Dattasharma, Kamath, and Ramanathan 2016; Kamath and Dattasharma 2017; Rönkkö, Rutherford, and Sen 2021). However, there is a dearth of research specifically examining the living standards and financial behaviors of rural households using financial diaries to obtain a granular understanding of their economic lives. Our study seeks to address this gap by exploring the following research questions using the Kakeibo approach: what are the income sources and expenditure patterns of rural households over a specific period? How do households cope with financial shocks and manage their day-to-day expenses? What are the saving and borrowing behaviors of rural households, including their engagement with formal and informal financial services? And how do financial behaviors and living standards vary across different demographic and socio-economic groups within rural communities?

Furthermore, our study also examines the effect of Kakeibo as a financial education. In the social science literature, the financial diary methodology has been increasingly used as a collection tool for the high frequency data generated by households. However, the educational aspect of this methodology has been paid less attention, and only a few studies have examined its impact in different context (Smits and Günther 2018; Islam et al. 2022). In Japan, Kakeibo has been often adopted in government community development programs to improve household well-being and financial literacy (Sato 2014). Thus, the financial diary methodology can also be used to improve financial literacy, and this could positively affect the financial behavior of households (Islam et al. 2022; Frisancho, Herrera, and Prina 2023). In the rural areas of developing countries, many people are not only poor, but they also have little knowledge and little capacity to manage their household finances (Cull, Demirguc-Kunt, and Morduch 2012). Thus, the participation in a Kakeibo program is considered as likely to be effective for rural households in Cambodia. In our study, we therefore further examine the impact of keeping Kakeibo on the financial literacy and financial behavior of households by collecting a control group of households to compare the impact of the households who participated in the program with those that did not.

Our analysis of income and expenditure patterns reveals that weddings, which constitute

a significant portion of total expenses, are primarily financed through gift income. We note that education and medical expenses pose a relatively significant burden for lower-income households and also observe that wealthier households tend to rely more on borrowing, while lower-income households often rely on remittances. Nevertheless, the combination of multiple income sources results in stable patterns of household income over time despite the many households that have income and expenses that place them below the poverty line.

Furthermore, households that report being indirectly and directly affected by the COVID-19 pandemic exhibited low initial levels of income and expenditure during the Kakeibo program. However, as the Cambodian economy gradually recovered, their income and expenses increased. We also discovered that the flow of expenditure is strongly correlated with the flow of income among low-income households compared to high-income households. This finding suggests that low-income households are more vulnerable to income shocks. Their expenditure is highly sensitive to changes in income, likely due to limited access to informal risk-sharing networks and formal financial markets.

Based on our analysis of the impact of the Kakeibo program we discovered that maintaining a record of cash flows does enhance financial literacy and financial behavior. Specifically, households that participated in the program demonstrated improvement in their understanding of fundamental financial concepts and exhibited a reduction in food expenses, while increasing their expenditure on education. However, the positive effects were predominantly observed among households with higher levels of education or income. The program exhibited comparatively less effectiveness in enhancing financial literacy and behavior among households characterized by both low-income and low-education levels.

Our study contributes to the existing knowledge on the living standards of rural households in Cambodia by employing this financial diary approach, and also by providing evidence of the impact of the method as an education tool with respect to financial literacy and financial behavior. Improving the living standards of rural households is a critical component of poverty alleviation and sustainable development strategies in Cambodia. By examining the income sources, expenditure patterns, and financial practices of 149 rural households, our study aims to contribute to the knowledge base necessary for designing evidence-based policies and interventions. The findings from this study provide valuable insights for policymakers, development practitioners, and financial service providers to

design targeted interventions that can enhance the financial resilience and well-being of rural households in Cambodia.

The rest of the paper is organized as follows. In Section 2, we introduce the concept and key features of Kakeibo. In Section 3, we describe the design of our study. We present the results of our analysis of the data in daily transaction records in Section 4, and we present the results of our analysis on impact of this program on financial literacy and behavior in Section 5. We conclude the discussion in Section 6.

Box 1. Supplementary Information of the Survey

In 2019, the Japan International Cooperation Agency (JICA) signed an investment agreement worth JPY 1.0 billion with Gojo & Company, Inc. (hereinafter, Gojo).[2] Gojo's business is to extend financial inclusion by helping socially impacting financial service providers succeed through the acquisition or establishment of financial service providers. The Gojo Group now consists of the holding company and eight group companies in five countries - Cambodia, Sri Lanka, Myanmar, India and Tajikistan - that provide various financial services, such as microcredit and micro-savings.

Maxima Microfinance Plc (hereafter referred to as "Maxima") is an MFI that is majority-owned by Gojo and based in Cambodia with around 6,000 active clients and 14 branches in 8 provinces as of 2019. MAXIMA's mission is to provide inclusive financial solutions to low-income households and SMEs for improving their socio-economic situation in a sustainable way. MAXIMA provides loans for agriculture, home improvement, business and education. They provide a wide range of loan sizes starting from $50, and offer an innovative small, fast digital loan product, which uses a network of community agents and is disbursed and repaid through a mobile money service.

This study project was jointly conducted by JICA and Gojo in order to assess and boost the impact of JICA's investment for financial inclusion. The survey is also aimed at finding better marketing strategies and governmental policy measures to achieve financial inclusion.

[2] For the detail, see JICA's homepage, https://www.jica.go.jp/Resource/english/news/press/2019/20190822_10_en.html

2 The *Kakeibo* ("Financial Diaries") Program

2.1. Kakeibo as a Data Collection Tool

Kakeibo is the Japanese way of household bookkeeping for saving money efficiently by keeping records of income and expenditure on a transaction basis, a daily basis or a weekly basis. The concept was originally developed in 1904 by Hani Motoko, who is often referred to as Japan's first female journalist. She designed this system as a way to make a budget for households. Using the Kakeibo, we collect the data of rural Cambodian household's daily financial transactions to investigate their lifestyles and use of formal and informal financial systems. In the economic studies literature, the method of collecting daily transaction data is often referred to as the "financial diaries" approach, an innovative research methodology enabling the collection of detailed and granular data on the financial transactions and behaviors of individuals or complete households over a specific period. Collins et al. (2009) is the seminar paper behind the introduction of this approach for data collection in the poor households of the developing world. Nowadays, this approach is used in various contexts, including financial inclusion studies (Dattasharma, Kamath, and Ramanathan 2016; Kamath and Dattasharma 2017; Biosca et

Table 1. Example of the format in the Kakeibo program

Date	Items	Payee/Payer	Amount	Currency	Code
	Income				
15-Oct	Income from husbund's salary	Company	180	USD	E20101 (Wage: Regular wage employment)
20-Oct	Sell cooked food and goods	Villagers and passengers	90000	KHR	R20301 (Self-owned business: Nonagriculture like vending store)
21-Oct	Sell cooked food and goods	Villagers and passengers	85000	KHR	R20301 (Self-owned business: Nonagriculture like vending store)
22-Oct	Sell cooked food and goods	Villagers and passengers	67000	KHR	R20301 (Self-owned business: Nonagriculture like vending store)
	Expenditure				
15-Oct	Buy bread	Market	5000	KHR	E10105 (Foods: Food market basket)
15-Oct	Give husbund for lunch at work	At workplace	20000	KHR	E11801(Unknown Expense: for income generating member)
15-Oct	Buy Gasolines	Store	5500	KHR	E10904 (Transportation: Gasolines)
16-Oct	Buy goods for sales	Martket	56000	KHR	E11501 (Business: Stock for resale)
16-Oct	Pay for Children's extra class	Private School	35000	KHR	E10401 (Education: School Fees)
17-Oct	ROSCA	Village Chief	10000	KHR	E11104 (ROSCA)
17-Oct	Pay for the bank loan	Bank	185	USD	E11103 (Debt Payment: Both principle and interest)

Source: The data is from our survey. We randomly picked up income and expenditure items from Kakeibo data of 149 participants. Thus, this table does not show the record of a certain household. Codes for items are recorded by enumerators by asking households about details of income and expenditure on phone or face-to-face interviews. The detail of codes are available in the appendix section of this report.

al. 2020), poverty assessments and intra-household analysis (Kamath and Dattasharma 2017), and public health expenditure (Kiyingi et al. 2023).

Table 1 presents a sample of the data that households are encouraged to track in the Kakeibo program. Participants are required to record every income and expenditure transaction. This includes details of the payee for expenses, the source of income, the purpose of each payment, and the payer for incomes. Considering the context of developing countries, where transactions may involve multiple currencies, households are also instructed to note the currency used in each transaction. To maximize effectiveness in financial management, the Kakeibo's format is designed to be adaptable to each household's unique lifestyle. While our program mandates the recording of basic information for analyzing household financial behaviors, we also recommend including a section in the Kakeibo for scrutinizing each expense. This practice aims to identify and potentially reduce unnecessary expenditures. In addition, from the perspective of economic research, keeping record of working hours may allow researchers to analyze labor conditions.

Kakeibo involves tracking and documenting all income, expenses, savings, and borrowing activities in a systematic and comprehensive manner. Thus, the approach's strengths lie in its ability to capture the intricacies of financial behavior and provide valuable insights for policy and program design that can promote financial well-being and improve the lives of individuals and households. The key features and characteristics of our program can be described as follows.

a) *Longitudinal Data Collection*: the program covers collecting data over an extended period, often ranging from several weeks to a year. This longitudinal approach captures the day-to-day financial activities and fluctuations in income and expenditure, allowing for a more comprehensive understanding of individuals' or households' financial lives.

b) *Real-time Tracking*: Participants in the program record their financial transactions as they occur, ensuring accurate and timely data capture. This real-time tracking reduces reliance on memory recall and enhances the accuracy and reliability of the collected data.

c) *Transaction-Level Detail*: The program requires participants to record each financial transaction individually, providing transaction-level detail. This includes information such as the date, amount, purpose, and source of income or expenditure. This level of

granularity enables researchers to analyze patterns, trends, and relationships between different financial activities.

d) *Mixed Methods Approach*: The program employs a mixed methods approach, combining qualitative and quantitative data collection techniques. While quantitative data capture the numerical aspects of financial transactions, qualitative data may be collected through interviews or participant narratives to capture the context, motivations, and decision-making processes behind financial behaviors. In addition to financial transactions, the program may also collect contextual information about participants, such as demographic characteristics, socioeconomic status, household composition, and other relevant factors. This contextual information provides a richer understanding of the participants' financial lives and helps interpret the data in a broader context.

The collection of data by keeping household daily transactions provide has several advantages over other methodologies. First, it provides detailed insights into individuals' or households' financial behavior, income volatility, expenditure patterns, financial challenges, and coping mechanisms. This level of detail helps researchers and policymakers develop a nuanced understanding of financial realities and design targeted interventions as required. Second, by tracking financial activities over time, we can capture seasonality and variability in income and expenditure patterns. This information is valuable for understanding the impact of seasonal fluctuations on financial well-being and designing appropriate financial tools and strategies. Third, the high-frequency data of household daily transactions prioritize the perspectives and experiences of participants, allowing for a client-centric understanding of financial lives. This approach ensures that research findings reflect the lived experiences and realities of individuals or households, which is crucial for designing effective financial services and interventions. Lastly, a survey based on these considerations aims to capture all aspects of financial behavior, including both formal and informal financial activities. This holistic view helps uncover the full range of financial strategies, risks, and opportunities available to individuals or households, enabling a comprehensive analysis of their financial lives.

2.2. Kakeibo as a Financial Education Tool

In the literature of economics the method of financial diaries has been mainly used as a data collection tool. In the meantime, the educational aspects of introducing the method to rural households have been paid less attention. However, Kakeibo can also be used to encourages individuals to track and record their daily expenses and income manually. By

doing so, it raises awareness about their spending habits and financial situations. It also encourages individuals to consider the value and necessity of each expense before making a purchase. This heightened consciousness leads to a better understanding of where money is being spent and the potential areas for improvement. Furthermore, users can more easily allocate their income into different categories such as savings, necessities, and discretionary spending. By setting clear objectives and allocating money accordingly, households gain better control over their finances and can work towards achieving their financial goals.

In addition, through the practice of Kakeibo, individuals can identify potential areas for saving money. By reviewing their expense records, they can spot unnecessary expenses, reduce wasteful spending, and find ways to economize. This process helps households optimize their spending and increase their saving capacity. In Cambodia, keeping a financial record is not common, and a proper noun for describing keeping a financial record for household does not even exist. Furthermore, regular practice cultivates disciplined financial habits. By consistently recording expenses, reviewing financial progress, and reflecting on spending patterns, individuals develop a long-term habit of financial management. This habit can extend beyond the immediate use of this technique, leading to sustained improvements in financial literacy and behavior.

Apart from its efficacy in improving household/personal financial management, introduction of the program may also facilitate financial discussions and communication within households (Amano 2001). When family members participate in tracking expenses and setting financial goals together, it promotes transparency and encourages open conversations about money matters. This shared responsibility can lead to better financial decision-making and a stronger financial foundation for the entire household.

Finally, the technique may possibly work as a self-assessment tool of financial conditions. In our program, we provide summary reports of the expenditure and income patterns of average households by household categories, such as numbers of household members, income levels of households and areas of household locations., on a monthly basis. The summary report is expected to allow households to compare their own financial condition with other households which are similar to theirs. Such information sharing may make them aware of whether their financial management is efficient, and then help them understand what the problem is if it is not.

In Japan, Kakeibo has been often adopted in government community development programs to improve household well-beings and financial literacy (Sato 2014). The approach is also used in the community develop programs of other countries. For example, in the cash transfer program in Hondulace, one of the JICA technical cooperation projects, it was integrated into the local program to educate local people to save and not to waste money after receiving cash transfers.[3]

While this approach has been widely embraced in Japan and other countries as a tool for improving financial literacy and behavior, there is still limited academic research specifically focusing on studying its effectiveness. In the recent literature on financial education, two research groups have examined the impact of keeping a financial record on financial literacy and behavior. Islam et al. (2022) conducted a randomized controlled trial (RCT) among women in rural Bangladesh to compare the efficacy of teaching a standard financial curriculum with maintaining household bookkeeping. Maintaining household bookkeeping potentially represents a less intensive and simplified alternative to financial education in improving female financial wellbeing. They found that using household bookkeeping to track spending is generally as effective as financial education in improving financial test scores and downstream financial behavior. Frisancho, Herrera, and Prina (2023) also conducted a Randomized Control Trial (RCT) on the introduction of a mobile app to record daily financial transactions with students in Peru, and examined its impacts on financial literacy and financial behavior. They found evidence that introduction of the budget-recording app led to a positive and statistically significant effect on financial literacy scores and greater awareness of market prices.

[3] For the detail of the project, see JICA's homepage, https://www.jica.go.jp/Resource/project/honduras/005/activities/index.html

3 Design of the Research Project

The objectives of our study project are two-fold. First, we investigate household living standards in detail and more precisely use the Kakeibo approach to reveal the market needs and potential for new services to further promote financial inclusion. Second, we examine the impact of this approach on the financial literacy and financial behavior of rural households. For those purposes, we designed the questionnaire survey around the following considerations.

The Kakeibo program was implemented for one year. It started on October 12, 2021, and ended on October 15, 2022. Before the program, participating households were educated about the concept and how to keep data. During the program, we asked participants to record all cash flows, and then report to us on a regular basis. For keeping cash-flow records correctly, enumerators were hired to instruct households on how to keep diaries, and to make a phone call on a daily basis to ask for exact cash flows before they are forgotten.

We adopted a Randomized Control Trials (RCT) design for examining the impact of the program as a financial education tool. Before we started the program with households, we conducted a baseline survey to collect the information from the 422 Households (HHs) in the program area in August 2021. Figure 1 illustrates the timeline of the entire survey project. After the baseline survey, we invited 134 HHs from the sample households of the baseline survey to participate in the program. However, 15 households dropped out of the program by March 2022. To counteract this, we invited new 15 participants from the

Figure 1. Timeline of the Research Project

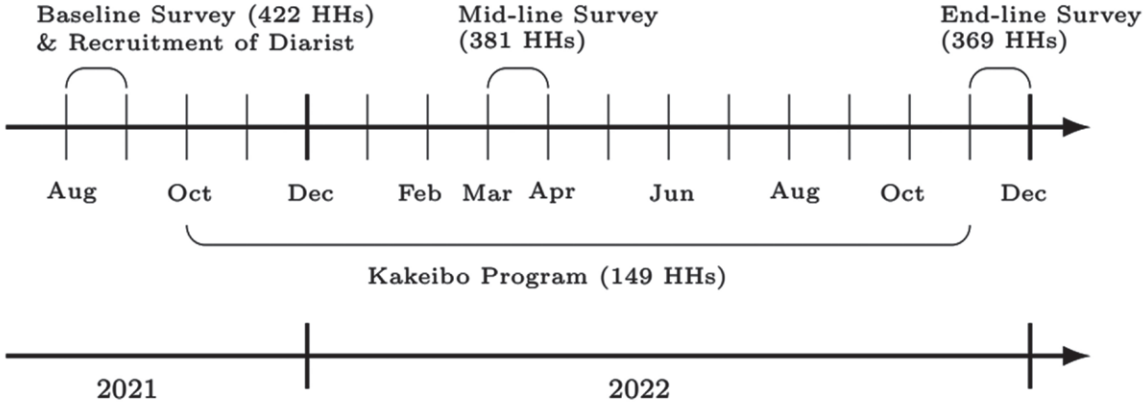
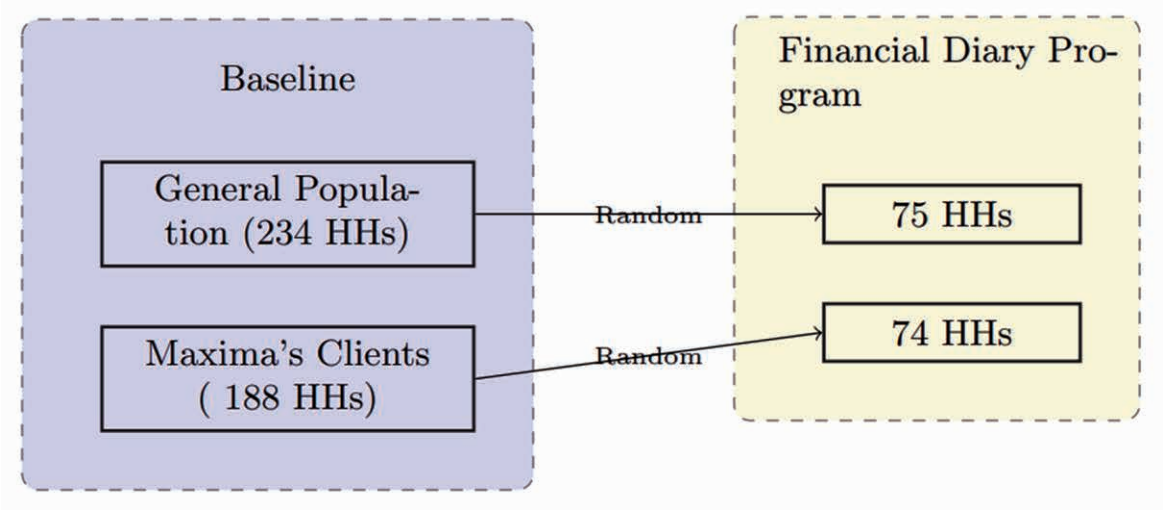


Figure 2. Sampling Strategies for the Treatment Sample of Households



earlier baseline survey. In our study, we use those participating 149 HHs as a treatment group, and the rest of the sample households as a control group.

After implementing the program, we conducted two follow-up surveys, the first was implemented 6-months after and the second was implemented 12-months after the program started. In each round of the follow-up survey, we tracked the households which were interviewed in the baseline survey. In the follow-up surveys, there was attenuation in the sample. We were able to track 381 households in the first follow-up survey, and 369 households in the second survey. The main reason we failed to track all the households was the impact of out-migration from the study area.

In the selection of the survey locations, we targeted communes for the program from the operational communes of Maxima. As in 2021, there are 14 branches of Maxima in Cambodia, and we selected 5: Banteay Meas (BTM), Kang Meas (KOM), Kaoh Okhna Tei (KOT), Preaek Pnov (PRP), and Samraong Tong (TTT). The target households were selected from these communes. After we selected the target communes, we set two sampling strata in each target commune. One stratum is Maxima's clients, and another is the general population in each target area (Figure 2). For the baseline survey, we collected a 200 household sample through interview with randomly selected Maxima clients, and the household sample through interview with randomly selected households in each target area. After the baseline survey, we selected 60 HHs from the two strata to be participants in the Kakeibo program.

In total, 149 households participated in the program. During the program, the participants

received 10USD every month in order to prevent them dropping out from our program, and to incentivize them to report correct data. The financial rewards were only provided to invited households in the program. The control group of the household sample was not provided with any financial rewards.

In the project, we also made booklets to show the summary of recorded data and distributed them to each household on a monthly basis to capture how much cash inflow and outflow they have in each month. And we further provided average income and expenditure and its breakdown to all the households to compare the Country's income and expenditure pattern to their own income and expenditure patterns.[4]

Table 2 presents summary statistics of household characteristics using the baseline survey conducted in 2021. In our sample households, the average monthly income is 498.32USD and average income per capita is 107.54USD.[5] According to Cambodian Socio-Economic Survey 2021, the average monthly income in Cambodia is 583.5USD and the average income per capita is 135USD. In rural areas, the average monthly income in Cambodia is 500.5USD and the average income per capita is 113.75USD. Therefore, our sample household likely represents rural households in Cambodia.

In our sample, the 58% of households have at least one household member whose primary income is from farming. In addition, 35% of households have at least one member who migrated to other cities or abroad. Furthermore, the ratio of female household head is 19% in our sample.

[4] An example booklet is shown in Appendix 1.
[5] For simplicity of analysis, we consider the exchange rate as 4000KHR/USD.

Table 2. Summary Statistics of Household Characteristics in Baseline Results

Variable	Obs	Mean	Std. dev.	Min	Max
Total Income (monthly)	411	498.32	346.02	0	1810
Total Expenditure (monthly)	409	425.89	471.99	0	1975
Total Income (monthly, per member)	411	107.54	74.22	0	500
Total Expenditure (monthly, per member)	409	95.58	110.05	0	698
Education Level of Household Head	422	5.05	3.54	0	16
Age of Household Head	422	48.87	12.70	22	88
Number of Household Members	422	4.83	1.78	1	13
Female Household Head Dummy	422	0.19	0.40	0	1
Number of Migrated Household Member	422	0.35	0.74	0	4
Having of Migrated Household Member	422	0.39	0.81	0	5
Number of students	422	0.98	0.98	0	4
Self Employment	422	0.77	0.97	0	4
Farmer Dummy	422	0.58	0.93	0	6
Unemployed Members	422	1.02	1.15	0	11

Note: Farmer dummy takes on if any household member's primary income is from farming.
Note: Data is from the baseline survey conducted in August 2021. The total income and total expenditure are converted in USD.

4 Empirical Analysis of the Kakeibo Data

4.1. Description of the Kakeibo Data

Table 3 compiles the total number and cumulative amount of all transactions recorded for a total of 149 households (with an average of 129 households) participating in the Kakeibo program. The survey period spanned 54 weeks (378 days), from October 12, 2021, to October 24, 2022. All transactions have been categorized into four quadrants. In the upper left quadrant of Table 3, we have captured income. In the lower left quadrant, we have documented expenditures. The upper right quadrant represents inflows from financial or

Table 3. Number of Transactions and Total Transaction Amounts

Income	#	USD	
Business income	9,730	434,178	42.5%
Salary	2,915	297,605	29.2%
Agriculture (in)	4,390	126,530	12.4%
Remittances	1,490	79,681	7.8%
Gifts (in)	417	63,004	6.2%
Government/NGO	1,183	17,357	1.7%
Property rental (in)	47	1,485	0.1%
Others (in)	33	1,099	0.1%
total	20,205	1,020,939	

Expenses	#	USD	
Business expenses	8,034	364,111	30.5%
Food	98,881	273,629	22.9%
Ceremonies	6,902	163,652	13.7%
Agriculture (out)	2,826	63,341	5.3%
Unknown uses	20,376	58,706	.9%
Transportation	18,166	57,278	4.8%
Housing	280	49,529	4.1%
Medical services	3,688	49,126	4.1%
Education	15,141	29,799	2.5%
Alcohol, Cigarette, Entertainments	9,580	24,677	2.1%
Utility	4,646	21,057	1.8%
Clothing	2,177	13,673	1.1%
Phones, Internet services	3,731	11,333	0.9%
Gifts (out)	568	6,862	0.6%
Grocery	1,798	5,848	0.5%
Others (out)	161	2,799	0.2%
total	196,955	1,195,418	

Financial Inflows	#	USD	
Loan from institution	20	66,123	46.6%
Loan repayment received	231	25,236	17.8%
Land sales	5	23,825	16.8%
ROSCA (in)	27	10,081	7.1%
Loan from individual	54	4,675	3.3%
Other asset sales	74	4,323	3.0%
Loan from relatives	34	3,828	2.7%
Gold/Jewelry sales	7	2,008	1.4%
Car/Moto sales	3	950	0.7%
Savings withdrawal	2	500	0.4%
Loan from others	2	200	0.1%
Business equipment sales	1	100	0.1%
total	460	141,847	

Financial Outflows	#	USD	
Loan repayments	984	151,698	58.4%
Car/Moto	39	25,189	9.7%
Home construction	42	21,210	8.2%
ROSCA (out)	561	13,699	5.3%
House equipment	786	12,899	5.0%
Loan to others	40	12,673	4.9%
Agri equipment	4	10,615	4.1%
Other asset purchase	88	4,254	1.6%
Gold/Jewelry	32	4,147	1.6%
Business equipment	17	2,104	0.8%
Savings deposited	13	1,138	0.4%
total	2,606	259,625	

Note: Authors' calculation based on data from the Kakeibo program

asset transactions, while the lower right quadrant represents outflows from financial or asset transactions.

Income

Income is categorized into the following eight classifications: (1) Business income; (2) Salary; (3) Agriculture (in); (4) Remittances; (5) Gifts (in); (6) Government/NGO; (7) Property rental (in); and (8) Others (in). Business income is overwhelmingly significant both in terms of frequency and amount. However, a large part of the transactions in the category is composed of sales from inventories, so direct comparisons with other items require caution. For instance, when comparing with Salary, it is important to consider business expenses in the lower-left quadrant, which is also significant. The salary category primarily encompasses wages earned by family members as laborers. It includes monthly, weekly, or daily wages and temporary earnings. Considering that there are corresponding expenses for business and agriculture income, salary stands as one of the significant sources of income. Agriculture (in), similarly to the Business income, consists of sales, requiring a combination with Agriculture (out) expenses in the lower-left quadrant when making comparisons with other items. Many households combine Salary, Business, and Agriculture to form their income.

Remittances involve income sent by family members working away from home, domestically or internationally. For many households, income from such remittances constitutes a significant portion, accounting for 7.8% of total income. Gifts (in) are monetary gifts from relatives, friends, or acquaintances that do not carry an expectation of direct repayment. While the lower-left quadrant includes expenses related to ceremonies,

Table 4. Income - Number of Transactions and Total Transaction Amounts

Income	#	USD	
Business income	9,730	434,178	42.5%
Salary	2,915	297,605	29.2%
Agriculture (in)	4,390	126,530	12.4%
Remittances	1,490	79,681	7.8%
Gifts (in)	417	63,004	6.2%
Government/NGO	1,183	17,357	1.7%
Property rental (in)	47	1,485	0.1%
Others (in)	33	1,099	0.1%
total	20,205	1,020,939	

Note: Authors' calculation based on data from the Kakeibo program

this category often involves occasions such as weddings and funerals. Typically, when receiving wedding gifts for family members, they are recorded here. Government/NGO includes support from various organizations, encompassing benefits from the ID Poor Card and allowances for the Kakeibo program participants. The Property rental (in) records income from partial rental of residences or lending equipment like agricultural machinery, primarily carried out by some households.

Expenses

Expenses are categorized into the following sixteen classifications: (1) Business expenses; (2) Food; (3) Ceremonies; (4) Agriculture (out); (5) Unknown uses; (6) Transportation; (7) Housing; (8) Medical services; (9) Education; (10) Alcohol, Cigarette, Entertainment; (11) Utility; (12) Clothing; (13) Phones and Internet services; (14) Gifts (out); (15) Grocery; and (16) Others (out).

Business expenses constitute a substantial amount, yet a portion of this category comprises inventory purchases, necessitating careful comparison with other items. It represents expenditures expected to contribute to future income and needs to be considered alongside

Table 5. Expenses - Number of Transactions and Total Transaction Amounts

Expenses	#	USD	
Business expenses	8,034	364,111	30.5%
Food	98,881	273,629	22.9%
Ceremonies	6,902	163,652	13.7%
Agriculture (out)	2,826	63,341	5.3%
Unknown uses	20,376	58,706	4.9%
Transportation	18,166	57,278	4.8%
Housing	280	49,529	4.1%
Medical services	3,688	49,126	4.1%
Education	15,141	29,799	2.5%
Alcohol, Cigarette, Entertainments	9,580	24,677	2.1%
Utility	4,646	21,057	1.8%
Clothing	2,177	13,673	1.1%
Phones, Internet services	3,731	11,333	0.9%
Gifts (out)	568	6,862	0.6%
Grocery	1,798	5,848	0.5%
Others (out)	161	2,799	0.2%
total	196,955	1,195,418	

Note: Authors' calculation based on data from the Kakeibo program

the significant business income in the upper-left quadrant.

Food, with its overwhelming transaction count and high amounts, stands as the dominant expenditure item. Across the 378-day survey period and an average of 129 households, this translates to a daily per-household spending of $5.60 from two transactions.

The Ceremonies group encompasses expenses related to weddings, funerals, and other ceremonies. Due to its significant size, it often is combined with Gifts (in) in the upper-left quadrant. This category reports on a substantial proportion of expenditures, implying its cultural significance across many households. Further discussion follows in the subsequent section.

The Agriculture (out) includes expenditures for agricultural activities, warranting cautious comparison with other items. Similar to business expenses, this represents expenditures expected to contribute to future income, necessitating its consideration alongside Agriculture (in) in the upper-left quadrant.

Unknown uses classify relatively minor expenditures made by family members other than those directly engaged in interviews. Typically, this involves giving money to husbands going to work or children going to school for their expenses, the specifics of which may not be known to the interviewee—usually the household head wife.

Transportation includes costs for buses, taxis, other modes of transportation, gasoline expenses, and vehicle repairs for cars and motorcycles. The Housing category covers expenses for home repairs and furnishings. Medical services encompass medical expenses, including diagnosis and medication costs, while education pertains to education-related expenses. The Alcohol, Cigarette, Entertainment group includes dining out and entertainment-related expenses, and the Utility category primarily covers electricity, gas, and water expenses.

Financial Inflows

Inflows generated through financial, or asset transactions are categorized into the following twelve classifications: (1) Loan from institution; (2) Loan repayment received; (3) Land sales; (4) ROSCA (in); (5) Loan from individuals; (6) Other asset sales; (7) Loans from relatives; (8) Gold/Jewelry sales; (9) Car/Moto sales; (10) Savings withdrawals; (11) Loans from others; and (12) Business equipment sales.

Table 6. Inflows from Financial Transactions - Number of Transactions and Total Transaction Amounts

Financial Inflows	#	USD	
Loan from institution	20	66,123	46.6%
Loan repayment received	231	25,236	17.8%
Land sales	5	3,825	16.8%
ROSCA (in)	27	10,081	7.1%
Loan from individual	54 4,675	3.3%	
Other asset sales	74	4,323	3.0%
Loan from relatives	34	3,828	2.7%
Gold/Jewelry sales	7	2,008	1.4%
Car/Moto sales	3	950	0.7%
Savings withdrawal	2 500	0.4%	
Loan from others	2	200	0.1%
Business equipment sales	1	100	0.1%
total	460	141,847	

Note: Authors' calculation based on data from the Kakeibo program

Loans from institutions pertains to loans acquired from financial institutions during the survey period. While the count of cases is limited to 20, the amounts involved are substantial, varying in size from a few hundred dollars to amounts exceeding $10,000.

Loan repayments received primarily represents the repayment of money lent to relatives, friends, and acquaintances. Although significant in count and amount, this stems from some participants actively lending within their localities or workplaces and considering this as part of their income. Conversely, many participants utilize those small, flexible, unofficial loans as a common practice.

The Land sales category involved a smaller number of cases but a relatively higher average amount. Only five households were involved.

The ROSCA (in), known locally as Tong-Tin, refers to inflows from financial activities conducted by community groups. Members bring money to the regular meetings; one member receives the total amount during each meeting. This generates a mixed flow resembling a combination of loans and deposits for each participant.

The amount of loans from individuals are smaller compared to loans from financial institutions but the count is higher, indicating their significance as a crucial tool for

managing household finances.

The other asset sales encompass inflows from the sale of assets other than Land, Gold/Jewelry, Car/Moto, and Business equipment. The majority of the income originates from the sale of cows.

Loans from relatives are smaller than loans from financial institutions, but the count is higher, signifying their importance in managing household finances.
And finally, following the above, relatively less frequent transactions such as Gold/Jewelry sales and Car/Moto sales are observed. Of note, savings withdrawals are notably low, indicating minimal use of banking services among the surveyed participants.

Financial Outflows

Outflows resulting from financial or asset transactions are categorized into the following eleven classifications: (1) Loan repayments; (2) Car/Moto; (3) Home construction; (4) ROSCA (out); (5) Household equipment; (6) Loans to others; (7) Agricultural equipment; (8) Other asset purchases; (9) Gold/Jewelry; (10) Business equipment; and (11) Savings deposited.

Loan repayments include those from financial institutions, individuals, and relatives. These transactions significantly contribute to outflows both in terms of count and amount,

Table 7. Outflows from Financial Transactions - Number of Transactions and Total Transaction Amounts

Financial Outflows	#	USD	
Loan repayments	984	151,698	58.4%
Car/Moto	39	25,189	9.7%
Home construction	42	21,210	8.2%
ROSCA (out)	561	13,699	5.3%
House equipment	786	12,899	5.0%
Loan to others	40	12,673	4.9%
Agri equipment	4	10,615	4.1%
Other asset purchase	88	4,254	1.6%
Gold/Jewelry	32	4,147	1.6%
Business equipment	17	2,104	0.8%
Savings deposited	13	1,138	0.4%
total	2,606	259,625	

Note: Authors' calculation based on data from the Kakeibo program

constituting over half of the outflows generated through financial or asset transactions. From another perspective, they are approximately half the size of the Salary category in income or the Food category in expenditure.

Car/Moto represents the purchase of automobiles or motorcycles. While motorcycle purchases constitute a significant portion of the amount, this category also includes bicycles, boats, as well as parts and repairs.

Home construction pertains to expenditures related to building houses. Given the possibility of resale, it is categorized as an asset transaction rather than a mere expenditure. Purchasing completed homes is rare, with most cases involving intermittent expenses for construction materials, home components, and payments to carpenters.

ROSCA (out), known locally as Tong-Tin, refers to outflows for financial activities conducted by community groups. Although the amounts are comparable to inflows from ROSCA, the count is considerably higher, reflecting the program's characteristic where all participants bring money to the regular meetings, and one member takes all of it.

Household equipment represents expenditures on home appliances and furnishings. This category is also classified as housing-related asset transactions, considering that certain items may be sold.

Loans to others refers to money lent to relatives, friends, or acquaintances. While loans from individuals and loans from relatives account for inflows, unexpected situations might lead households to lend money to others in need. Some participants actively lend money as a part of their income.

Agricultural equipment involves the purchase of agricultural machinery. The other asset purchases include the acquisition of various assets, including cows. These are followed by Gold/Jewelry, which serves as a form of deposit substitute and is also of an asset nature. The business equipment and savings deposited follow, with the latter showing minimal usage, indicating the limited use of banking services among the surveyed participants.

When examining the scale of financial or asset transactions, it becomes apparent that they comprise around 15% to 20% of the size of income or expenditures. At the household level, it is commonly understood as the proportion of loans or asset transactions to total

inflows and the proportion of loan repayments or asset transactions to total outflows. The scale is likely to vary based on the prevalence of financial and asset transactions within different countries.

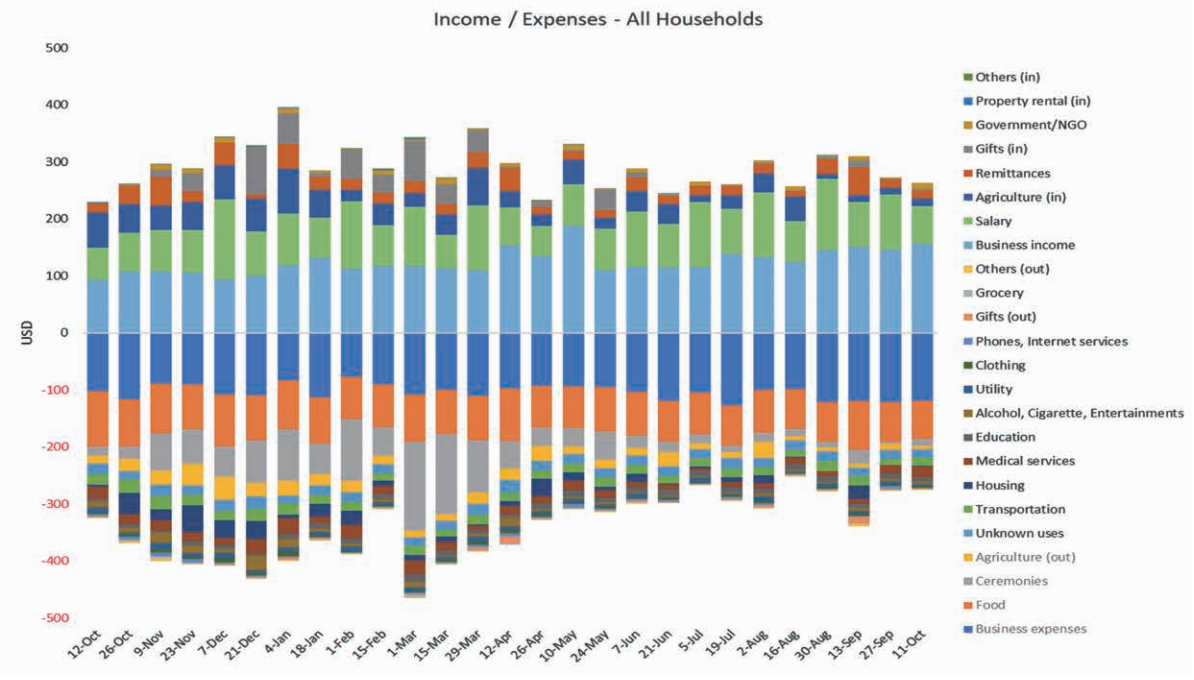
An imbalance exists between income and expenses, or between inflows and outflows resulting from financial or asset transactions. All transactions are recorded as cash flows, and the imbalance signifies instances where cash kept within households was withdrawn during the survey period. It can be attributed to the period covering the recovery from the COVID-19 pandemic. In Cambodia's rural areas, it is common to store several thousand dollars in cash at home.

4.2. Patterns of Income and Expenses

We now delve into the temporal progression of these transactions based on specific attributes in greater detail. Figure 3 aggregates the bi-weekly chronological sequences of total transaction amounts for income and expenditure per household, recorded for a total of 149 households (with an average of 129 households) participating in the Kakeibo program.

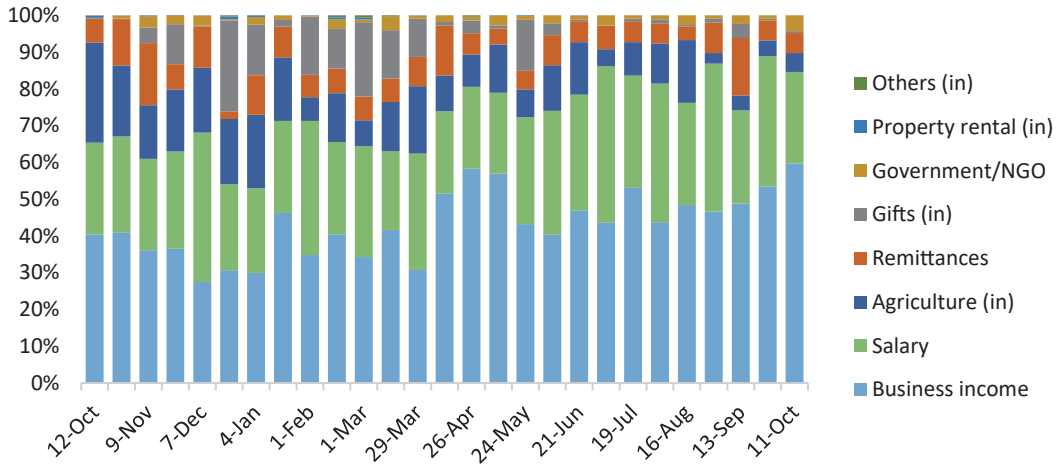
These sequences represent the aggregated records of income and expenditure transactions

Figure 3. Income and Expenses on a Bi-Weekly Basis - Average across all households



Note: Authors' calculation based on data from the Kakeibo program

Figure 4. Income Components – All households



Note: Authors' calculation based on data from the Kakeibo program

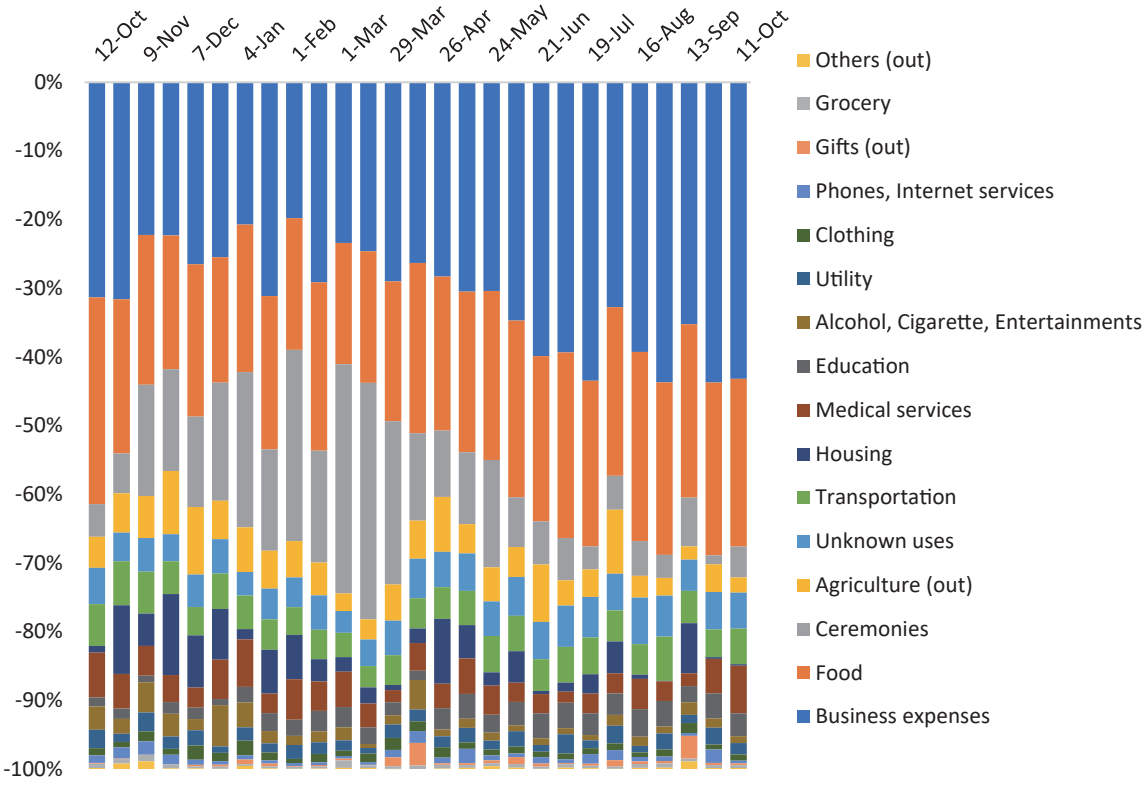
over the survey period for each household. Throughout the period, business income and salaries consistently accounted for a significant portion of income. On the other hand, Agriculture (in) exhibited a gradual seasonal pattern, with relatively higher activity from around October to March and a decrease thereafter. Examining the Gifts (in) category also shows a seasonal trend with relatively higher occurrences from around November to April.

On the expenditure side, business expenses and food consistently dominate a significant portion throughout the period. Meanwhile, Agriculture (out) displays a similar seasonal pattern to Agriculture (in). These financial records suggest that during the dry season, households are likely to harvest and prepare for the next production, reflecting the patterns seen in Agriculture (in).

Figure 4 illustrates the proportion of income over a bi-weekly time series. Throughout the entire period, Business income and Salary consistently account for a significant portion of income. However, Agriculture (in) shows a gentle seasonal pattern, with higher income occurring from around October to March and decreasing thereafter. Gifts (in) also exhibits seasonality, with a relatively high occurrence from November to April. This pattern is related to Ceremonies expenditure.

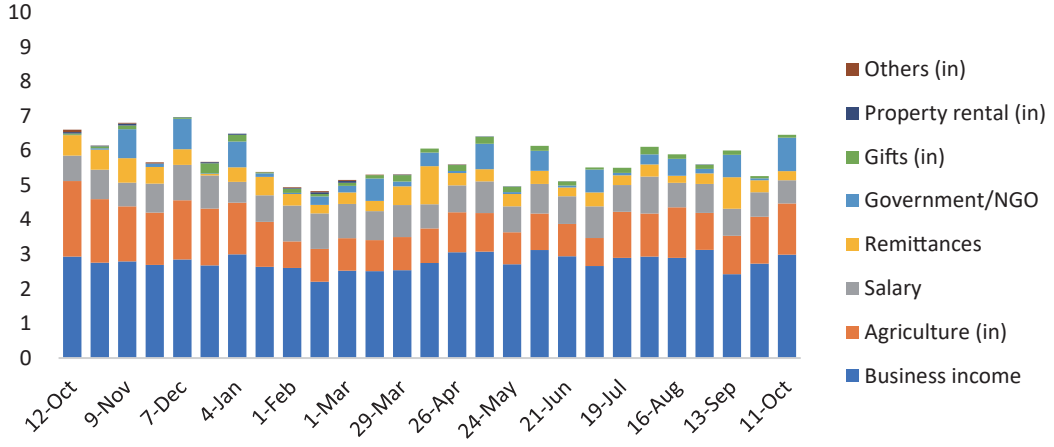
In Figure 5, the expenditure side's proportion is recorded as a bi-weekly time series. Business expenses and Food consistently represent significant portions throughout the entire period. Agriculture (out) generally follows a seasonal pattern similar to Agriculture (in). Ceremonies display seasonality, with higher occurrences from around November to

Figure 5. Expenses Components – All households



Note: Authors' calculation based on data from the Kakeibo program

Figure 6. Frequency of Income Occurrence – Average of all households



Note: Authors' calculation based on data from the Kakeibo program

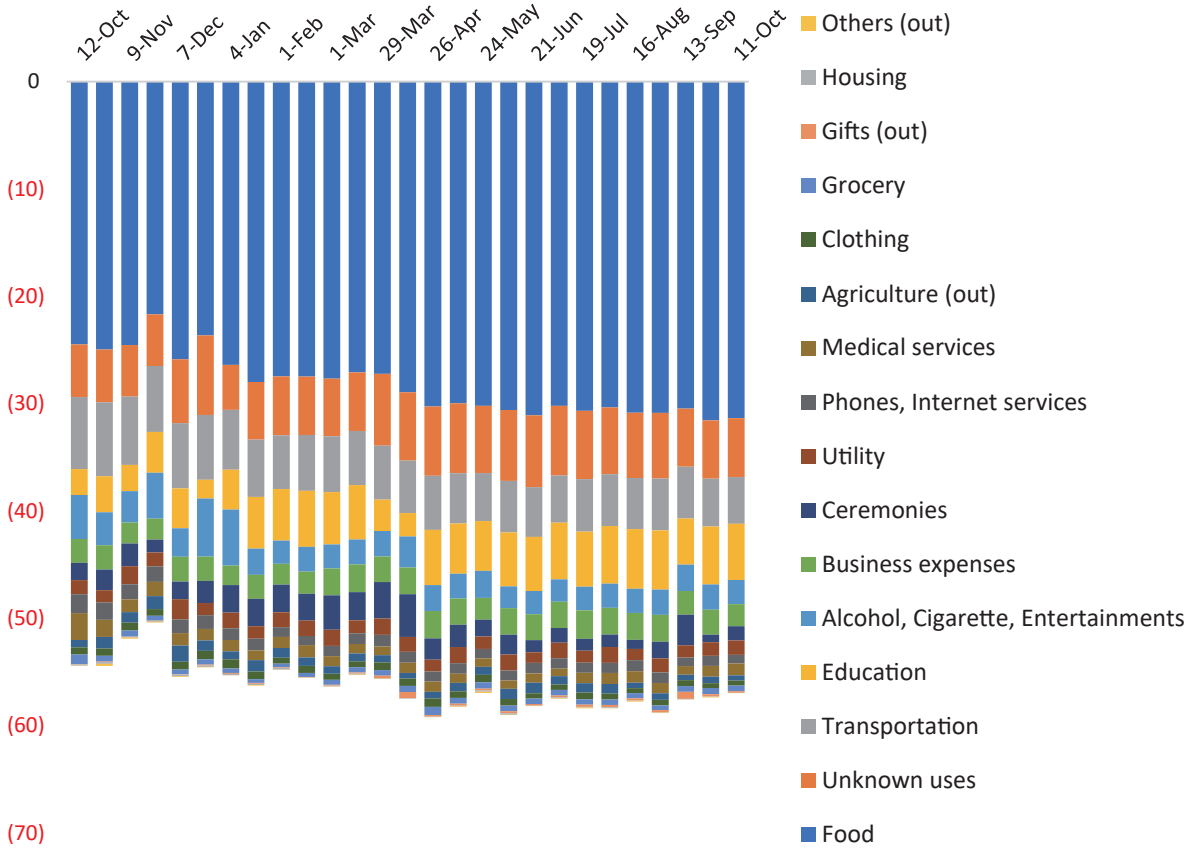
April. The pattern is replicated in Gifts (in) income.

Figure 6 displays the frequency of income over a bi-weekly time series. The vertical axis counts the number of times the income occurred per household. Business income and

Agriculture (in) show higher frequencies throughout the entire period. Many households engaged in retail businesses generate daily sales. In contrast, salary often occurs on a monthly basis and, concerning frequency, surpasses Agriculture (in).

Figure 7 represents the frequency of expenditure over a bi-weekly time series. The vertical axis counts the number of times the expenditure occurred per household. Food dominates in frequency throughout the entire period, with most households making multiple food purchases almost daily. This is followed by Unknown uses and Transportation. Typically, the former involves handing daily expenses to husbands leaving for work or children going to school, with the specific use being unknown. In such cases, transportation costs often occur, resulting in high frequencies for these two items. Additionally, Education expenditures increase from around January when the impact of the COVID lockdown diminishes.

Figure 7. Frequency of Expense Occurrence – Average of all households



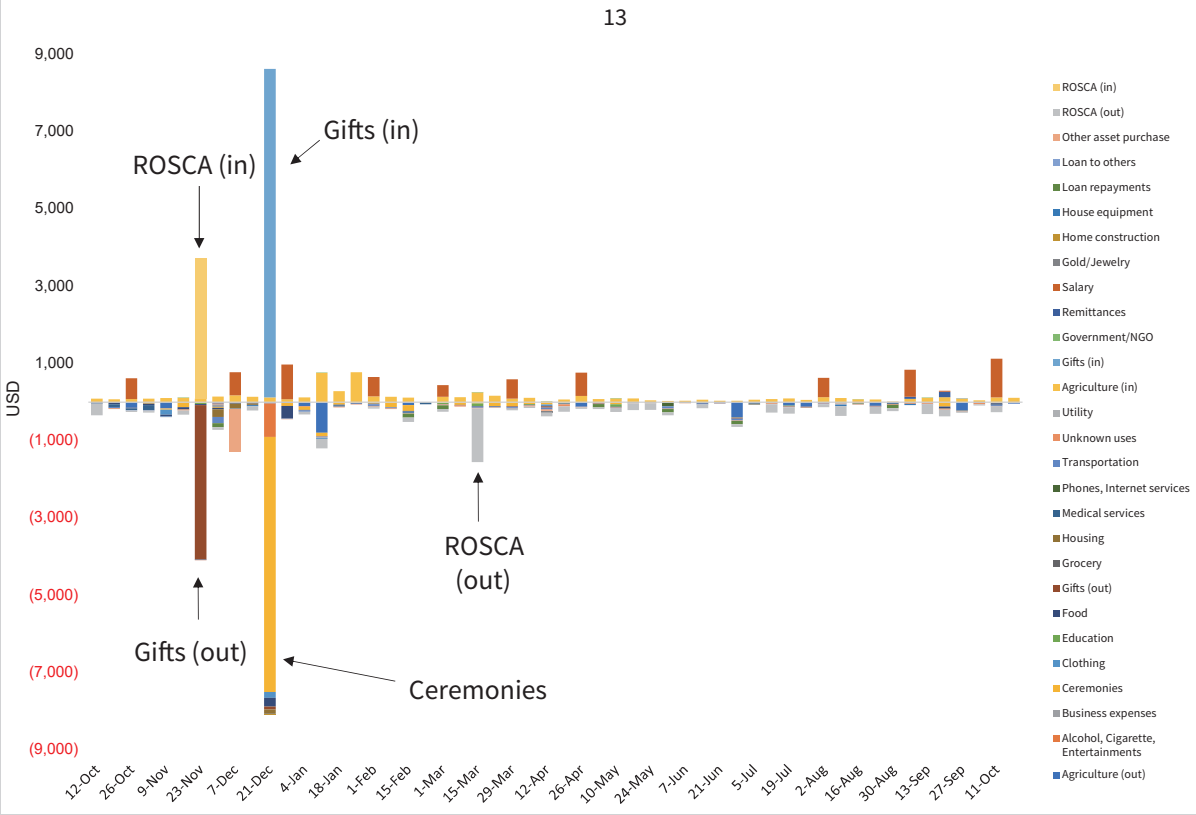
Note: Authors' calculation based on data from the Kakeibo program

Box 2. Case Study 1 – Household No.13 – The Grand Wedding

In the Kakeibo program, the daily lives of individuals are meticulously recorded as data. Even when we directly observe the lives of individual households without aggregating the data into groups, valuable insights are often obtained. In this section, we delve into several intriguing cases of low-income Cambodian households to closely examine and gain insights into their financial management.

Household No.13, a couple residing in Kampot province, primarily supports themselves through agricultural activities. They have three children, one of whom is set to get married in December. Their household transaction records are presented in Figure A1, summarizing weekly inflows and outflows. Significant income and expenses emerge in the latter half of November, with huge ones appearing in the latter half of December.

Figure A1. Bi-weekly incomes and expenses of Participant No.13



Note: Authors' calculation based on data from the Kakeibo program

All the considerable expenses in December are related to the wedding ceremony. Preparing the house, arranging food for the celebration, adorning the bride's dress, inviting a priest, engaging local cooks and musicians—all these expenditures are primarily covered by the gifts brought by attendees, totaling nearly the same amount. While the income and expenses for this week revolve around the wedding, comparing their magnitude to regular weeks highlights the profound significance of the event in their lives.

A major November expense involves the payment of Dowry for the wedding. The substantial amount of $4,000 is intriguing, and equally interesting is how they managed to cover this expense. They received from two different ROSCAs (Rotating Savings and Credit Associations) $1,275 on the day before the payment (November 27) and $2,350 on the payment day (November 28). The combined total from both ROSCAs covered most of the Dowry. It underscores the significant role that ROSCAs, known locally as Tong-Tin, play in people's lives during major events.

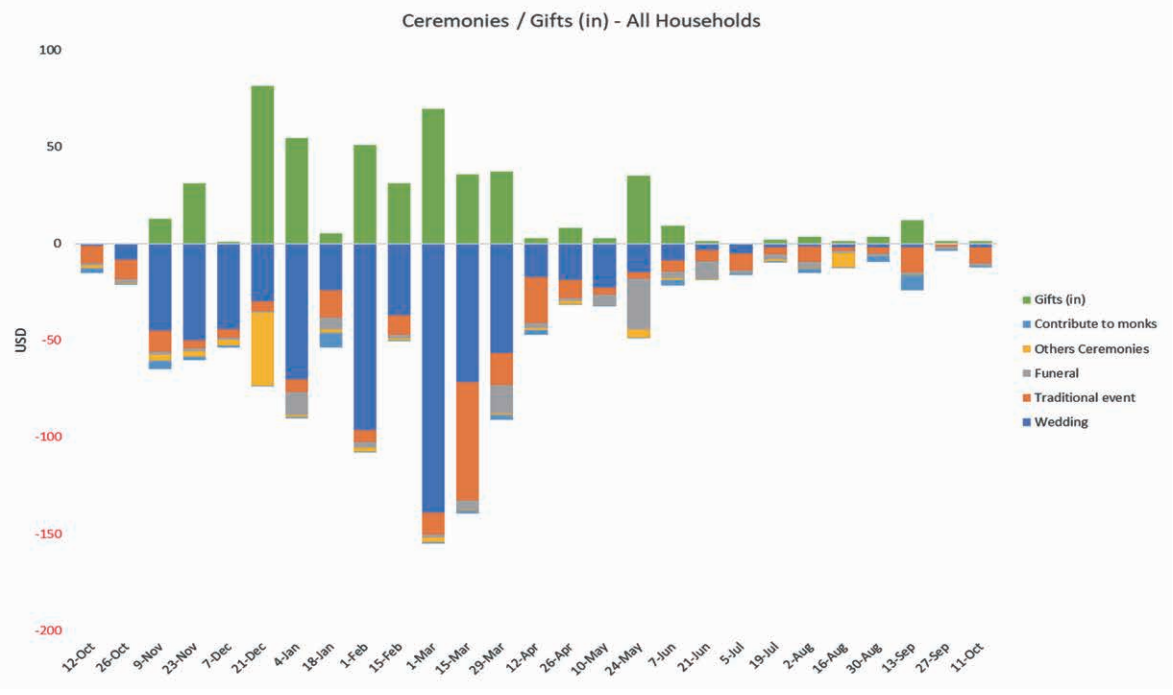
4.3. Patterns of Cash Flows for Ceremonies and Gifts

In Figure 3, it was observed that Ceremonies expenses exhibit a significant increase from around November to April, indicating a seasonal pattern. We further explore the expenditure and income pattern relating to ceremonies and gifts. Figure 8 presents the per-household total transaction amounts for ceremonies and the Gifts (in) from all households aggregated them into bi-weekly chronological sequences. For the ceremonies, we have categorized them into the following five sub-categories: (1) Wedding; (2) Traditional event; (3) Funeral; (4) Other ceremonies; and (5) Contributions to monks.

Weddings overwhelmingly constitute the majority of the ceremonies, followed by traditional events and funerals. Unlike funerals, which are not chosen based on timing, weddings are generally scheduled for desirable periods, often avoiding the rainy season and opting for good weather, creating the observed seasonality.

Similarly, the Gifts (in) category also displays the same pattern of seasonality, with larger amounts often linked to wedding-related expenses. Typically, families receive gifts from attendees such as family members, relatives, and friends and use the money for the wedding. Thus, a symmetrical seasonality is observed here compared to the ceremonies category.

Figure 8. Ceremonies and Gifts (in) - Average across all households



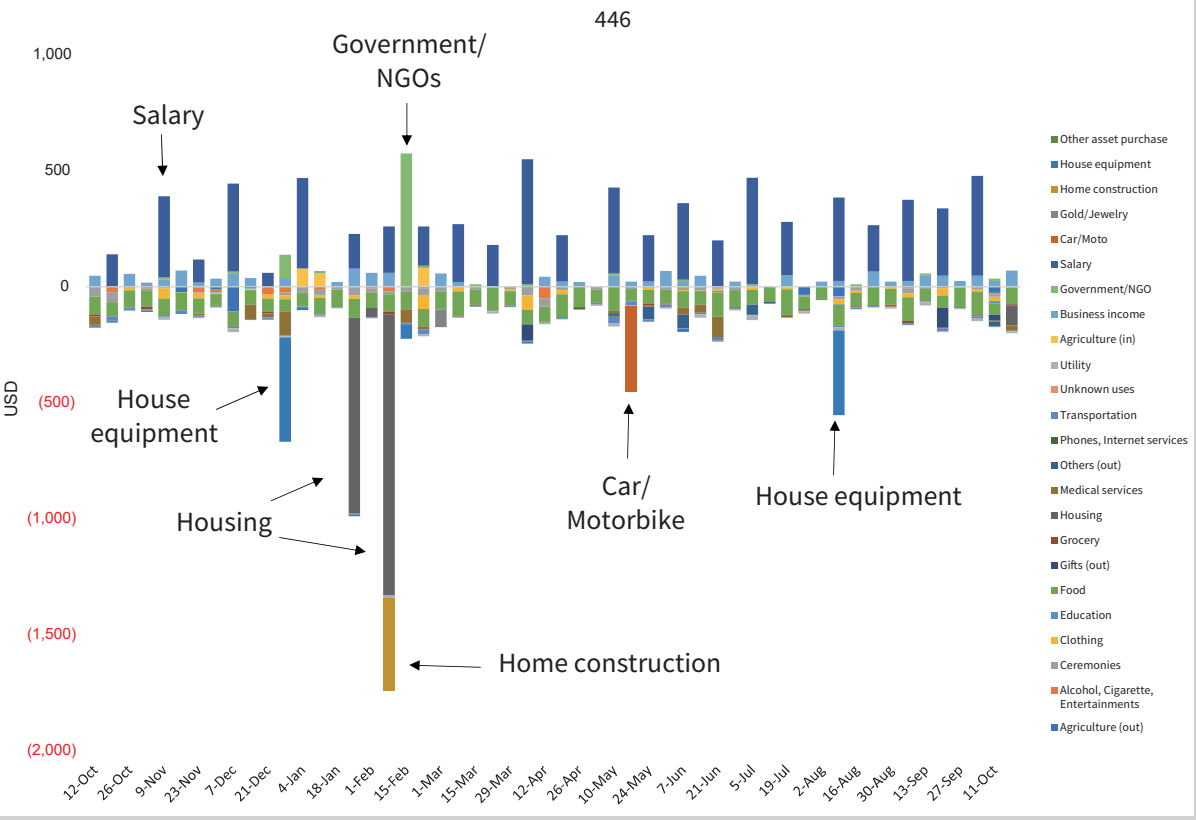
Note: Authors' calculation based on data from the Kakeibo program

As is evident from the overall aggregation, wedding expenses are generally substantial. Upon examining costs associated with individual weddings, it is apparent that expenses range from a few hundred to several thousand dollars, and sometimes even as high as eight thousand dollars. While such substantial expenses are primarily covered by the Gifts (in) or using cash stored at home, cases of borrowing loans or utilizing ROSCA are also observed.

Box 3. Case Study 2 – Household No.446 – Building a Home

Household No.446, a widow residing in Kampong Speu province, lives with her daughter and son-in-law, relying primarily on their combined income for her livelihood. Their household transaction records are displayed in Figure A2, summarizing weekly inflows and outflows. Several relatively substantial expenses are observed from December to February.

Figure A2. Bi-weekly incomes and expenses of Household No. 446



Note: Authors' calculation based on data from the Kakeibo program

This series of expenses is part of the process of building a home. While this trend is evident among other households as well, it is common among low-income families in Cambodia to gradually build their homes as an ongoing project. Purchasing a completed house and relocating is rare. There are no significant corresponding inflows to match these large expenses. Hence, they gradually save cash for their home and resume the project when enough funds are accumulated for the planned process to go ahead.

On December 31, $450 was spent to reinforce the foundation of the house. Then, on January 28, they purchased iron for roofing. On February 1, they acquired cement, pipes, and tools for cutting and welding the iron. Nails were purchased on February 3, followed by tin sheets on February 8. After completing the roof, they paid wages to the carpenter on February 14. Building a home unfolds as an intermittent and long-term project, requiring careful management of material procurement, processing, and coordination with the carpenter and payments.

4.4. Loan Repayments and Incomes

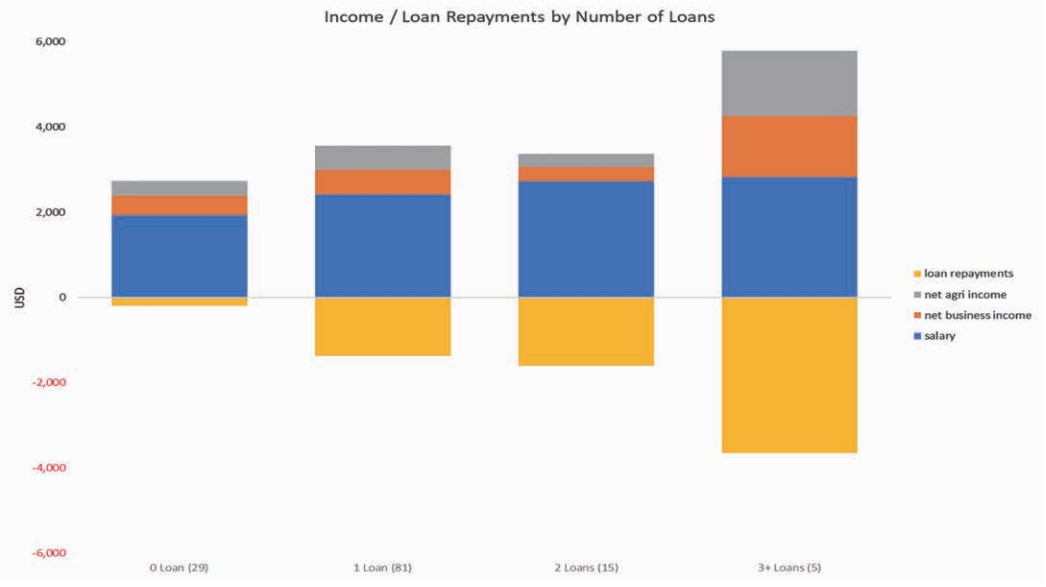
Microfinance has become prevalent in Cambodia, with some households among the participants already utilizing such loans, while others are not. As of October 2021, when the survey began, there were 29 households that had not used loans, 81 households with one loan, 15 with two loans, and 5 with three or more loans. We aggregated the sizes of salary, net business income, net agricultural income, and loan repayments during the survey period for these groups in Figure 9.

A clear positive relationship between the number of loans and income was observed. The more loans a household had, the higher the repayment and income amounts. Conversely, households with fewer loans exhibited lower repayment and income amounts. This suggests that it is more natural to infer that households with higher incomes are able to borrow loans and repay them, rather than assuming that borrowing loans leads to increased household income.

4.5. Cash Flows by Income Quartile

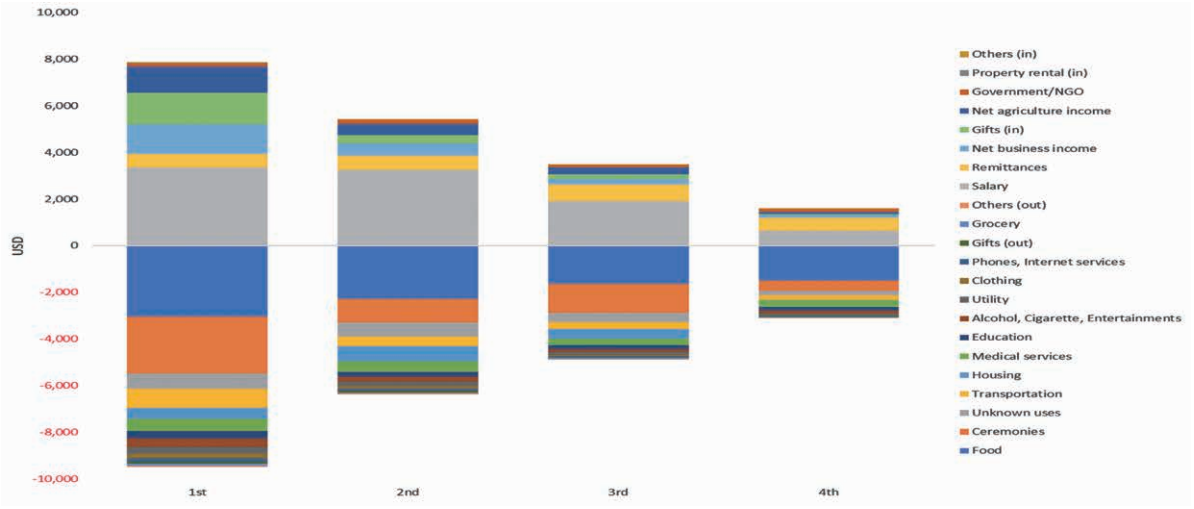
We examine the breakdown of income and expenditures based on income levels, as well as delve into the details of financial transactions or asset dealings conducted by these households. The participants are divided into four groups based on the size of their income. Income and expenditures, as well as the details of their financial transactions or asset dealings are divided into small categories. For income from business and agriculture

Figure 9. Loan Repayments and Income by Number of Loans



Note: Authors' calculation based on data from the Kakeibo program

Figure 10. Income and Expenses by Income Quartile



Note: Authors' calculation based on data from the Kakeibo program. The first quartile receives over $22 per day; the second quartile over $14 but less than $22 per day; the third quartile over $7.30 but less than $14 per day; and the fourth quartile, less than $7.30 per day.

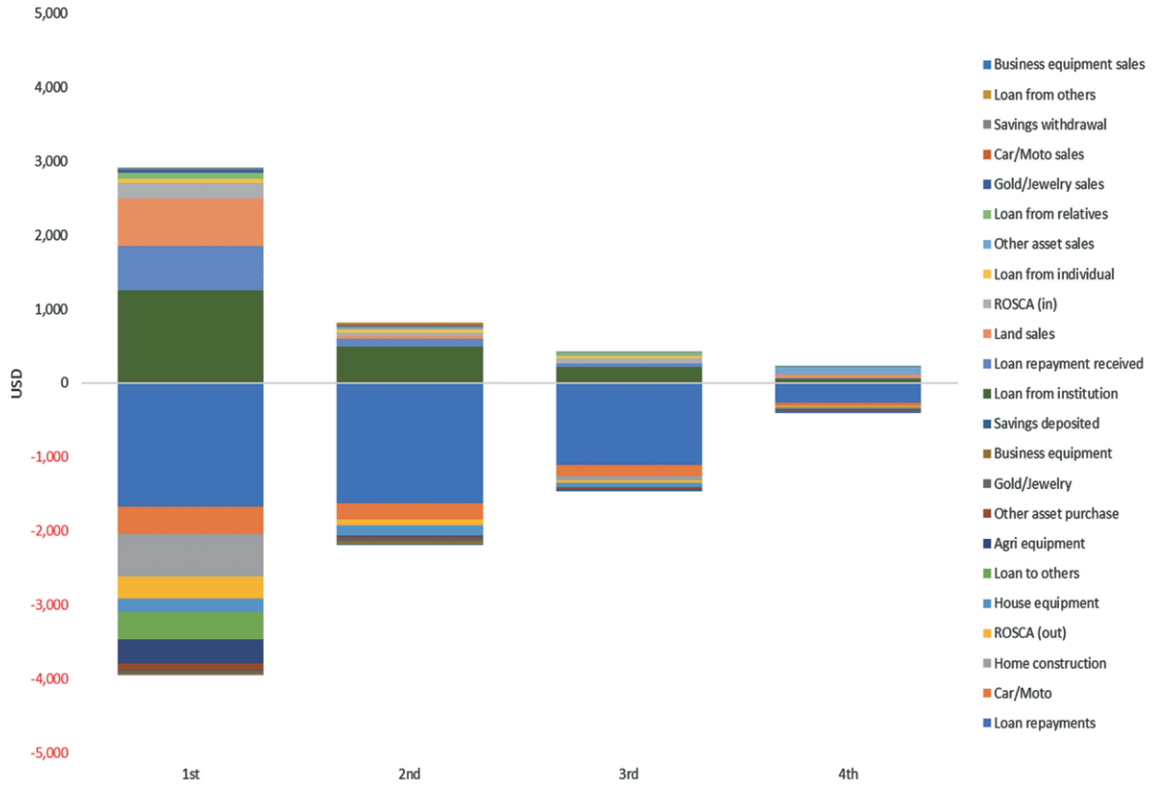
sector work, we look at the net amount obtained by subtracting expenses from those incomes.

The breakdown of income and expenses over the entire period is presented in Figure 10. It is natural for salary, net business income, and net agricultural income to vary according to the income grouping. Similarly, the Gift (in) size also increases with higher income and decreases with lower income. On the other hand, remittances show no significant variation across income groups. In other words, lower-income households tend to have a higher dependency on such remittances. Additionally, the Government/NGO support, though minor, increases for households with lower income.

Turning our attention to expenditures, the largest category, food, gradually increases in size for groups with higher income. Similarly, ceremonies also show larger sizes in groups with higher income. On the other hand, the education and medical services exhibit relatively smaller positive relationships. In other words, for the education and medical services, the burden remains relatively consistent even for lower-income groups, making them relatively significant compared to other expenditure categories.

The breakdown of financial transactions or asset dealings over the entire period is depicted in Figure 11. As with Income and Expenses, the sizes of both total inflow and total outflow also change based on the size of income, but the extent of the change is more dramatic here. The group with the highest income has significantly larger inflows and outflows,

Figure 11. Financial Transactions by Income Quartile



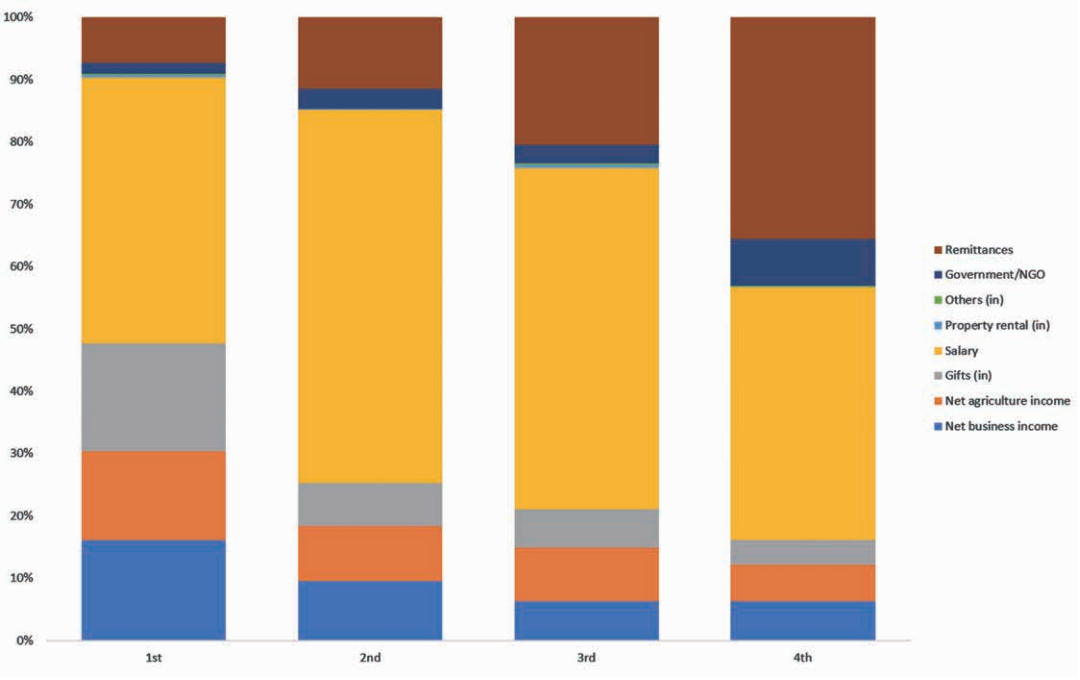
Note: Authors' calculation based on data from the Kakeibo program. The first quartile receives over $22 per day; the second quartile over $14 but less than $22 per day; the third quartile over $7.3 but less than $14 per day; and the fourth quartile, less than $7.3 per day.

while those with the lowest income have minimal inflows and outflows.

A significant portion of these differences primarily arises from loan-related transactions. The higher-income groups receive larger loans from financial institutions and have higher repayment amounts. Conversely, lower-income groups receive fewer loans from financial institutions and have smaller repayment amounts. Additionally, expenditures related to real estate, such as land sales and home construction, are more pronounced in the group with the highest income.

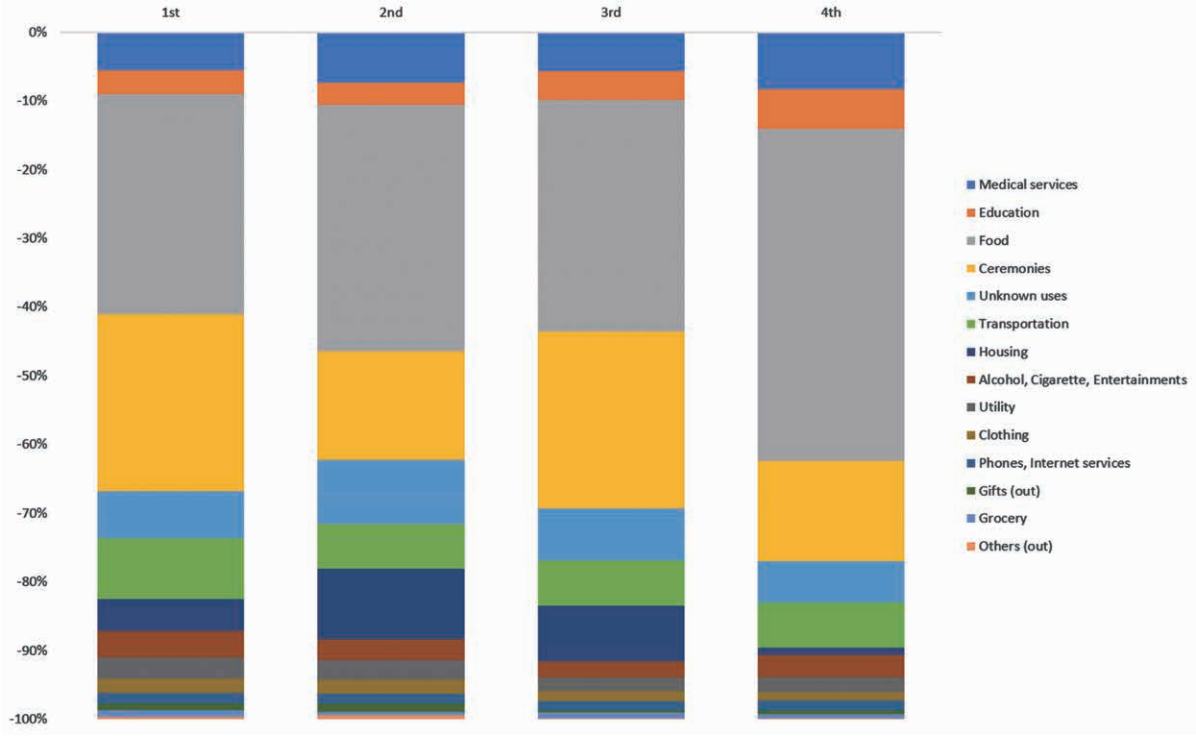
Figure 12 gives the breakdown of income by size, indicating the proportion of income sources over the entire period. The proportion dependent on remittances increases with lower-income groups. Similarly, the proportion dependent on Government/NGO sources also increases with lower-income groups. In the highest income group, some households earn substantial income from Business and Agriculture, resulting in a very high proportion for these categories. Gifts (in) is believed to be influenced by significant wedding events

Figure 12. Income Components by Income Quartile



Note: Authors' calculation based on data from the Kakeibo program. The first quartile receives over $22 per day; the second quartile over $14 but less than $22 per day; the third quartile, over $7.3 but less than $14 per day; and the fourth quartile, less than $7.3 per day.

Figure 13: Expenses Components by Income Quartile



Note: Authors' calculation based on data from the Kakeibo program. The first quartile receives over $22 per day; the second quartile over $14 but less than $22 per day; the third quartile over $7.3 but less than $14 per day; and the fourth quartile, less than $7.3 per day.

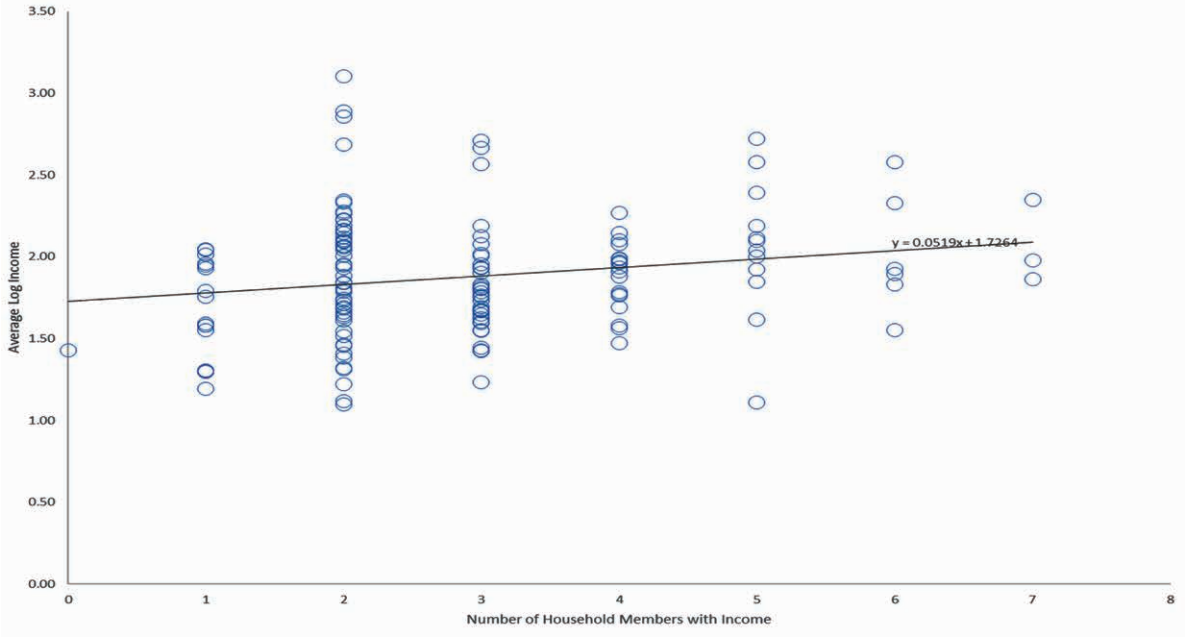
during this period.

Figure 13 presents the breakdown of expenditures by income size, indicating the proportion of expenditure categories over the entire period. Lower-income groups allocate a higher proportion of their overall expenditures to food. Medical services and education also exhibit a higher proportion in the overall expenditures of lower-income groups, and ceremonies and housing are thought to be influenced by events specifically occurring during this period.

4.6 Average and Volatility of Income by Number of Household Members with Income

When examining the income structure for each household, it is common to find that multiple members are contributing to the household's total income through their respective jobs. This analysis examined the relationship between the number of employed members contributing to income and the total household income in Figure 14. The horizontal axis represents the number of employed members within each household, while the vertical axis represents each household's average weekly logarithmic total household income. For a household indexed as i during the kth week, denoting its income as $I_{i,k}$, this is calculated using the following formula:

Figure 14. Average Log Income by Number of Household Members with Income



Note: Authors' calculation based on data from the Kakeibo program.

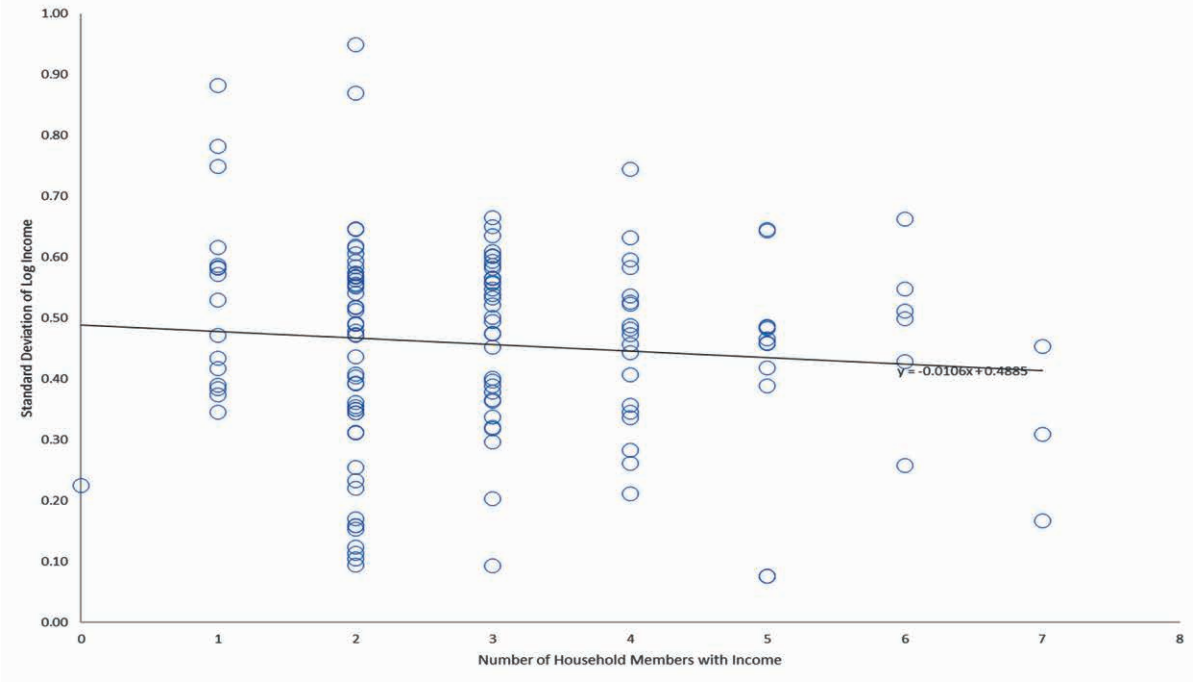
$$\overline{I_i} = \frac{1}{N} \sum_{k=1}^{N} \log (I_{i,k}).$$

where N represents the total number of weeks.

While the trend is gradual, an observable pattern emerges where households with a higher number of employed members tend to have a larger total income. Depending on the nature of each individual's job, income could be earned on a daily or monthly basis. When combined across multiple members, the natural outcome is an increase in the average total income.

In this analysis, we also plotted the number of employed members within each household on the horizontal axis and the standard deviation of weekly logarithmic total household income on the vertical axis as in Figure 15. The trend here is opposite to that of the average, indicating that households with a lower number of employed members have a larger standard deviation of total income, meaning more variability in income from week to week. For a household indexed as i during the kth week, denoting its income as $I_{i,k}$, this is calculated using the following formula:

Figure 15. Standard Deviation of Log Income by Number of Household Members with Income



Note: Authors' calculation based on data from the Kakeibo program.

$$\sqrt{\frac{1}{N}\sum_{k=1}^{N}\{\log(I_{i,k}) - \overline{I_i}\}^2}.$$

where N represents the total number of weeks.

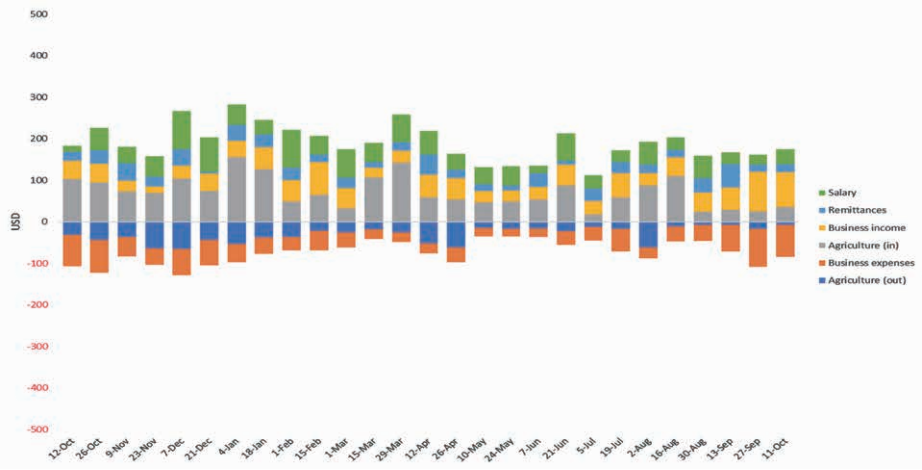
The timing of income generation from one member and another may not align perfectly. Therefore, combining multiple earners results in relatively stable household income patterns when viewed over time. As the disparity between earning and non-earning periods diminishes, the need to transfer purchasing power across time is reduced, making financial management easier for households.

4.7. COVID Impacts on Income and Expenditure

Regarding the impact of COVID-19, the baseline survey conducted for each household had one section to assess whether their income decreased, if any family members lost their jobs, if businesses had to be closed, or if there were COVID-19 infections within the family. Based on the magnitude of these impacts, households were categorized into three groups. The number of low-impact households was 49, mid-impact households was 54, and high-impact households was 46. In this section, we have aggregated the per-household total transaction amounts for the items Salary, Remittances, Business income, Agriculture (in), Business expenses, and Agriculture (out) for each group in a bi-weekly chronological sequence. The results for each group are presented in Figures 16 to Figure18.

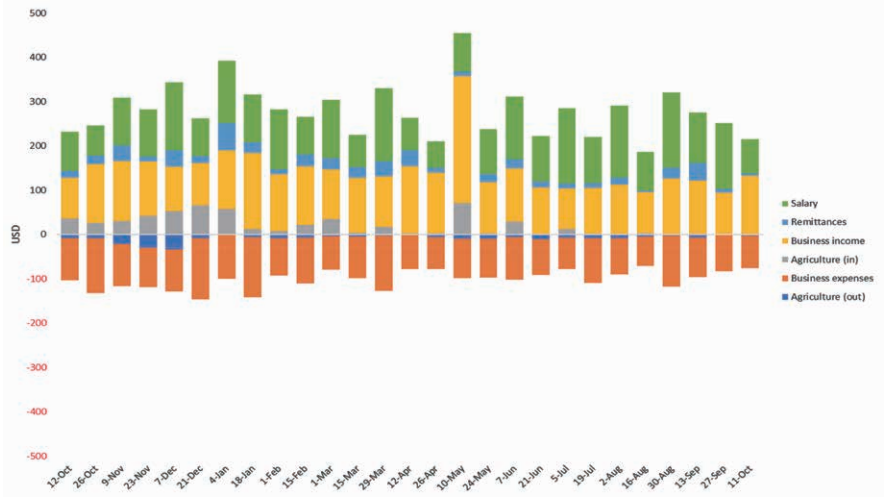
Households that experienced a relatively minimal impact from COVID-19 were found to have a higher proportion of income coming from agriculture. This could be attributed to the fact that agricultural processes are less affected by quarantine restrictions. Meanwhile, the size of the business and salary are comparatively smaller in this group. Additionally, these households exhibit lower overall income levels compared to other groups. Households that faced a moderate impact from COVID-19 demonstrated characteristics that fell between those of the low and the high impact groups. The proportion of income derived from agriculture is slightly lower, resulting in a relatively higher proportion of income coming from business. There also seems to be a tendency for households in the group to have a higher proportion of income from salary. Finally, households that experienced a significant impact from COVID-19 showed a higher proportion of business income and expenses in their income and expenditure profiles. While there are various types of businesses, those involving procurement and sales appear to have been particularly affected by quarantine periods. Additionally, a trend of recovery is noted in business

Figure 16. Low COVID Impact Households



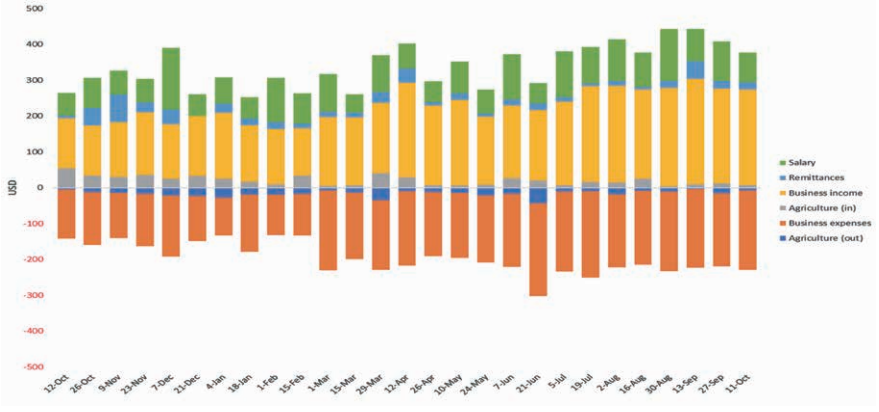
Note: Authors' calculation based on data from the Kakeibo program.

Figure 17. Mid COVID Impact Households



Note: Authors' calculation based on data from the Kakeibo program.

Figure 18. High COVID Impact Households



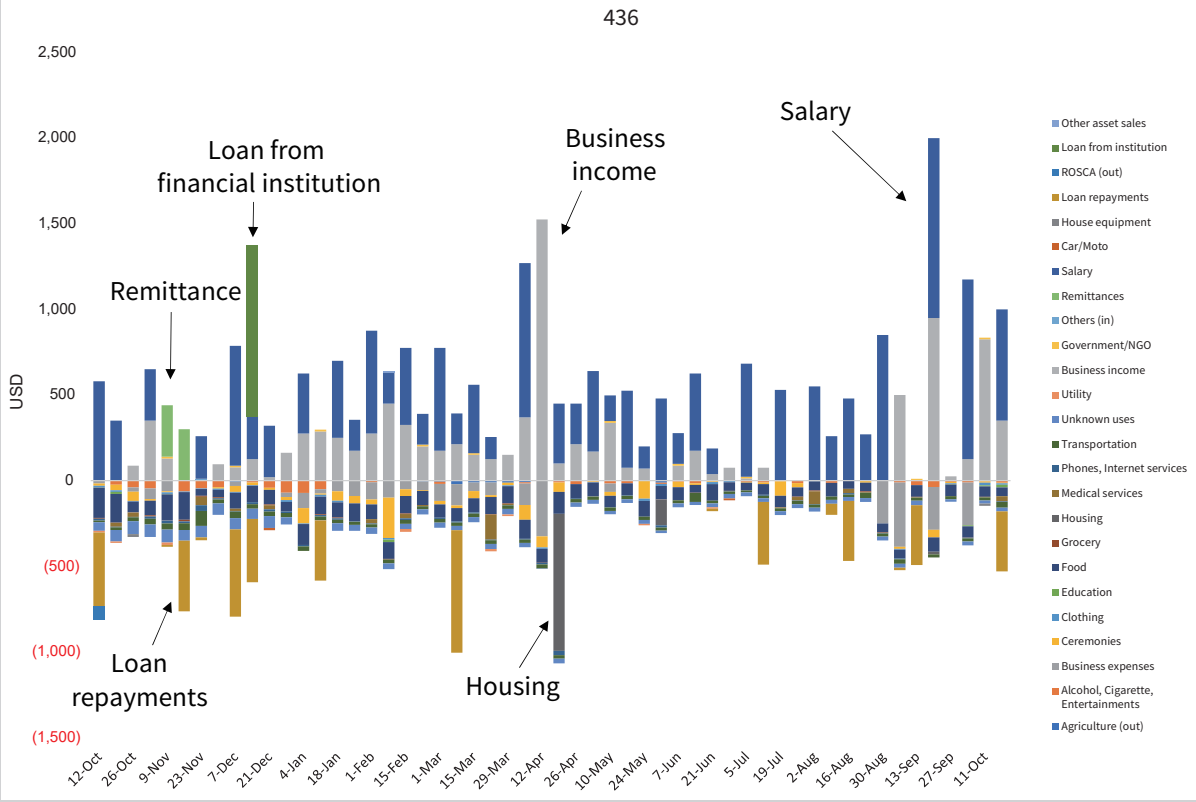
Note: Authors' calculation based on data from the Kakeibo program.

income and expenses towards the latter part of the period. Such recovery trends are not particularly observed in salary or agriculture.

Box 4. Case Study 3 – Household No.436 – A Debt trap by MFI Loan

Household No.436, a widow in Kampong Spue province, lives with her four children. Her eldest daughter is married, and her son-in-law and grandchild also live with them. The family engages in business activities, and the children contribute to income from work outside the home. Their household transaction records are depicted in Figure A3, summarizing weekly inflows and outflows.

Figure A3. Bi-weekly incomes and expenses of Household No.436



Note: Authors' calculation based on data from the Kakeibo program.

Due to the larger household size, this household experiences relatively higher inflows and outflows. Of note is that on December 16, they borrowed a $1,000 loan from a microfinance institution. Consequently, the inflow for the week is significant in comparison to others. However, no particularly significant corresponding expenses appear nearby on the outflow side. On closer inspection of the outflow, Loan Repayments are frequently observed. It suggests that this household makes use of loans.

In the case of the household, was the $1,000 loan necessary? Even when considering inflows and outflows over preceding and subsequent periods, there seems to be a considerable margin in the net amount. At least retrospectively, the necessity of this loan cannot be ascertained. Cases of borrowing loans, even when not essential, are not uncommon. Sometimes, it is to prepare for emergencies, while other unfortunate instances involve meeting loan officer quotas. In Cambodia, where microfinance is widespread and issues of over-indebtedness are raised, the question arises: What defines a "necessary" loan?

4.8. Vulnerability in Rural Households

The concept of poverty lines for income or expenses often gives the impression that these boundaries distinctly divide households. Typically, surveys evaluate income or expenses over the course of a year and compare them to the poverty line. However, delving into the day-to-day details of household budgeting reveals that even households not deemed the poorest can experience extremely challenging periods. Conversely, households facing severe poverty can still have occasional substantial income or expenses. Here, we aggregated the distribution of income and expenses for a total of 149 households on a bi-weekly and monthly basis.

We counted the income for each household over a two-week period and aggregated the frequencies based on the magnitude in Figure 19 (upper). The leftmost bar represents the number of two-week periods with no recorded income. Income levels such as less than $10 or less than $20 were the most frequently observed. As the income increases, the frequency decreases, but the distribution has a broad tail, indicating occasional instances of substantial income.

On the other hand, the downward bar graph represents the count of expenses for each household over a two-week period, aggregated by magnitude in Figure 19 (lower). There were no instances of zero expenses over a two-week period. Levels such as less than $20, less than $30, and less than $40 were the most common expense levels. In comparison to the income distribution, the distribution of expenses is more skewed. It suggests that expenses are necessary even when there is no income; in cases of substantial income, some of it is saved instead of spent.

In Figure 19 we marked the poverty line based on the Cambodia Socio-Economic Survey (CSES) 2019-20, in which the Royal Government of Cambodia set the national minimum at 10,951 riel per person per day.[6] The number of two-week periods falling below the line amounts to 13.7% for income and 15.2% for expenses. Evaluating the normalized poverty gap,[7] the concept discussed in works such as Merfeld and Morduch (2022), which is the average of the differences when income or expenses fall below the poverty line, yielded

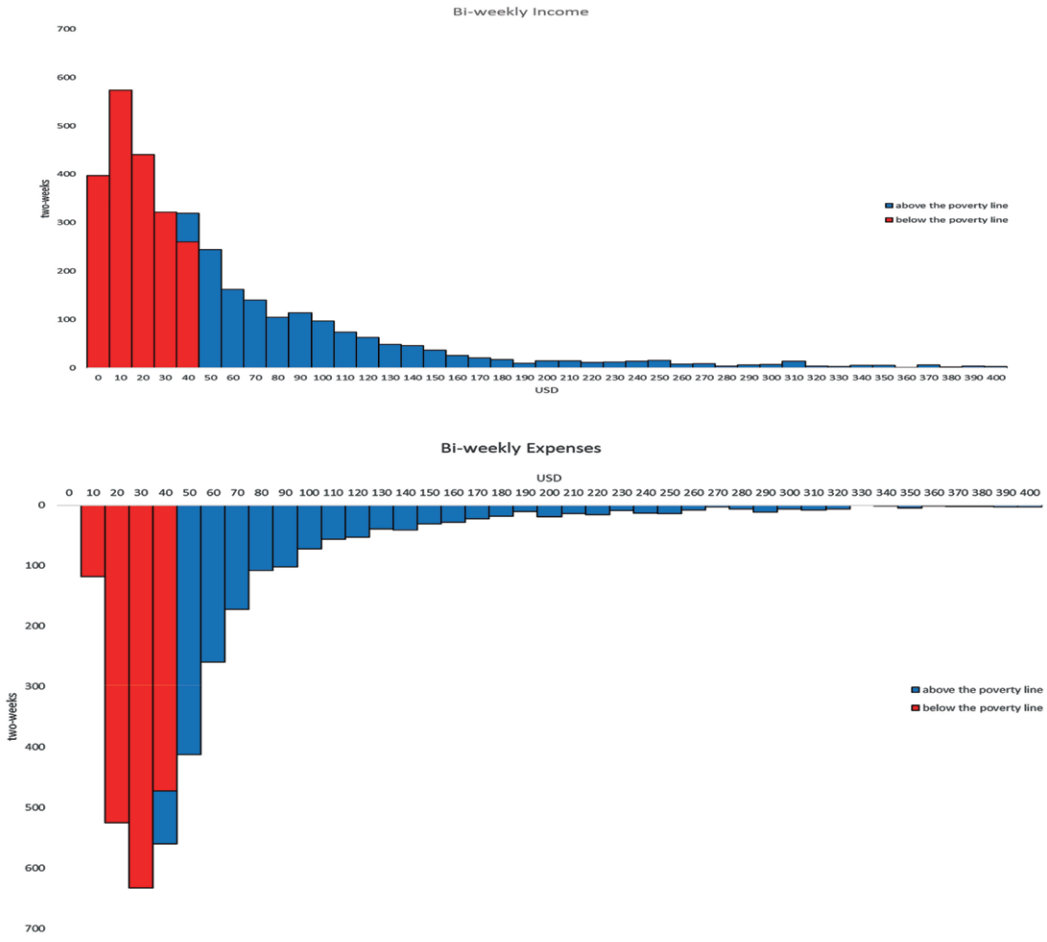
[6] https://www.nis.gov.kh/index.php/km/14-cses/12-cambodia-socio-economic-survey-reports.

[7] The normalized poverty gap is:

$$\frac{1}{N}\sum_{i=1}^{N}\left[\left(\frac{z-c_i}{z}\right)\cdot 1_{c_i<z}\right].$$

where z is the poverty line, and ci is the monetary measure. The indicator 1ci<z is one when households are poor in the given period and zero otherwise.

Figure 19. Bi-weekly Distribution of Income and Expenses



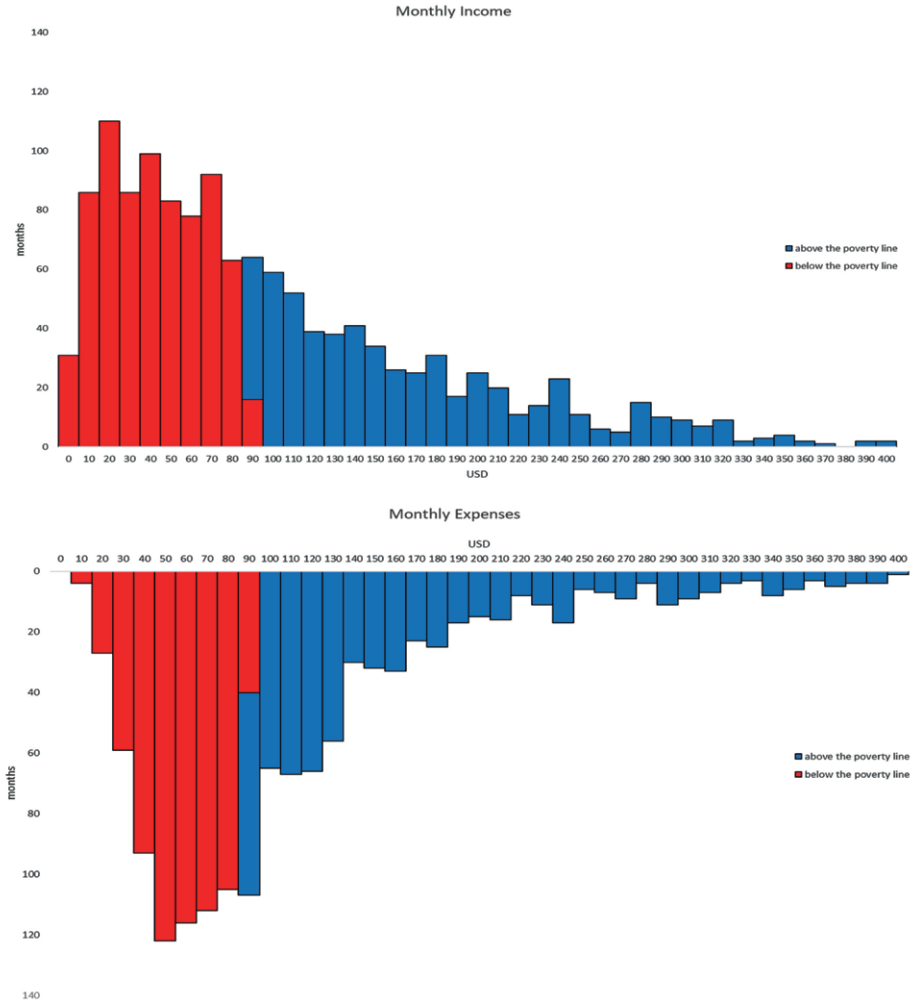
Note: The poverty line is set at 10,951 KHR = 2.671 USD (KHR/USD = 4100) per day. Authors' calculation based on data from the Kakeibo program.

37.3% for income and 19.6% for expenses. It suggests that cases where income falls significantly below the poverty line are more common than in the case of expenses.

By altering the frequency, we counted the monthly income for each household and aggregated the frequencies based on magnitude (Figure 20 (upper)). The leftmost bar represents the number of months with no recorded income. Levels ranging from less than $10 to around $70 were the most frequently observed income levels. Similar to the bi-weekly data, as income increases, the frequency decreases, but there is a wide distribution indicating occasional instances of substantial income.

The downward bar graph represents the count of expenses for each household over a monthly period, aggregated by magnitude in Figure 20 (lower). There were no instances of zero expenses over a month. Levels ranging from less than $50 to around $90 were

Figure 20. Monthly Distribution of Income and Expenses



Note: The poverty line is set at 10,951 KHR = 2.671 USD (KHR/USD = 4100) per day. Authors' calculation based on data from the Kakeibo program.

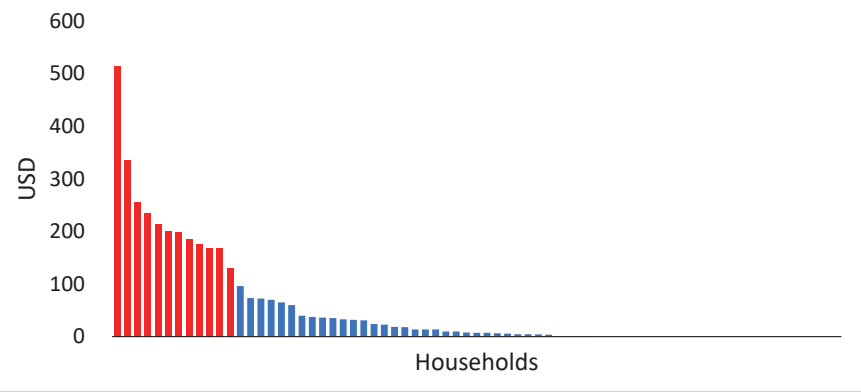
the most common expense levels. Similar to the bi-weekly distributions, the distribution of expenses is more skewed than the income distribution. It suggests that expenses are necessary even when there is no income; in cases of substantial income, some of it is saved instead of spent.

As with the bi-weekly data, we marked the poverty line in Figure 20. The number of months falling below the line amounts to 13.7% for income and 15.2% for expenses, which is precisely the same as the bi-weekly pattern. The normalized poverty gap evaluates the average difference between income and expenses when they fall below the poverty line, yielded 28.7% for income and 17.6% for expenses. It reinforces the notion that the cases where income falls significantly below the poverty line are more common than in the case of expenses.

Box 5. Education Expenses in Cambodian Rural Households

In Cambodia, there is a growing concern about the financial burden on households due to their significant expenditure on extra-class programs, driven by factors such as academic competition among students and supplementary income for teachers.[8] In Figure A4, we have extracted the expenses on such extra-class programs for 71 households among the households who send their children to school, arranged in descending order of expenditure for each household.

Figure A4. Annual Expense School Fees in Each Household



Note: Authors' calculation based on data from the Kakeibo program.

Over the approximately one-year survey period, expenditure on extra-class programs exceeded $500 in the largest households, with 12 households spending over $100, as indicated by the red bars. On the other hand, many households either do not incur such extra-class expenses or are unable to do so. In this regard, educational disparities may be emerging.

While the percentage of education expenses as a proportion of total expenditure for all households amounted to 2.5%, as shown in Table 4, this figure includes households without children or households where the children have already graduated and are working. Among the households surveyed, there were a total of 71 households sending their children to school. We have compiled the expenditure breakdown for these households in Table A1. Here, the proportion of education expenses to total

[8] https://cambodianess.com/article/cost-of-extra-classes-hits-students-parents

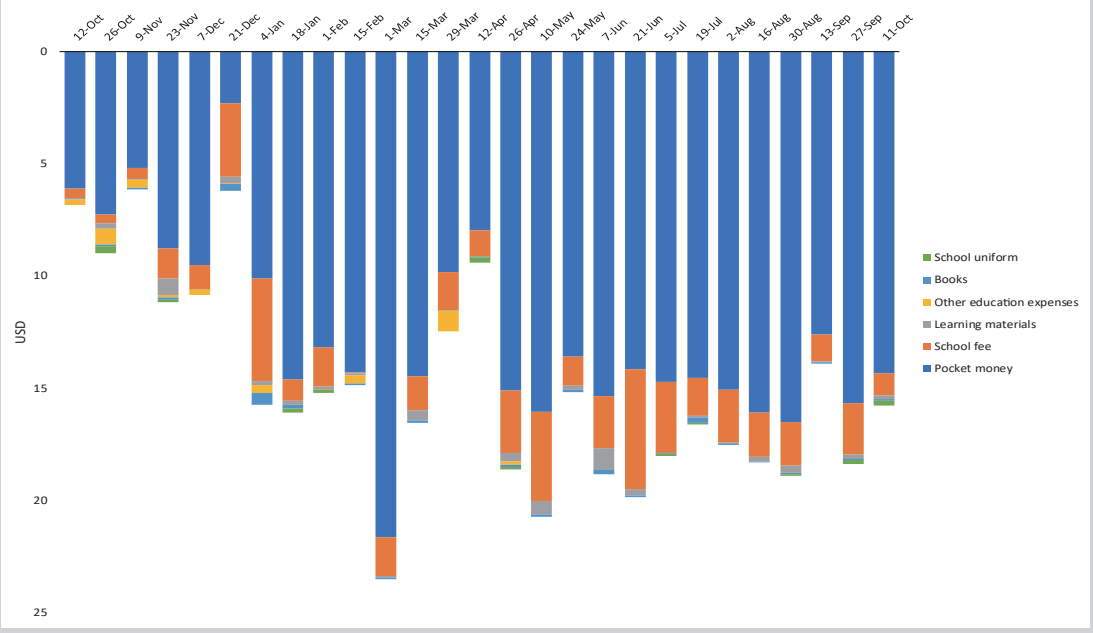
Table A1. Average Annual Expenses by Categories for Households with Students

Expenses per household	USD	
Business expenses	2,776	30.1%
Food	2,005	21.7%
Ceremonies	1,303	14.1%
Transportation	469	5.1%
Unknown uses	456	4.9%
Agriculture (out)	436	4.7%
Education	405	4.4%
Pocket money	339	3.7%
School fee (incl. extra-class)	52	0.6%
Learning materials	6	0.1%
Other education expenses	4	0.0%
Books	3	0.0%
School uniform	2	0.0%
Housing	396	4.3%
Medical services	301	3.3%
Alcohol, Cigarette, Entertainments	186	2.0%
Utility	165	1.8%
Gifts (out)	107	1.2%
Clothing	91	1.0%
Phones, Internet services	73	0.8%
Grocery	44	0.5%
Others (out)	19	0.2%
total	9,232	

expenditure is 4.4%, accounting for a significant portion, nearly one-fifth, of food expenses. The breakdown of education expenses is highlighted in gray. Notably, the majority of the actual education expenses come from "pocket money for school-going children," representing the bulk of education expenses overall.

Figure A5 illustrates the breakdown of these education expenses over time. The vertical axis represents the expenditure per household per two weeks (in US dollars).

Figure A5. Annual Expense School Fees in Each Household



Note: Authors' calculation based on data from the Kakeibo program.

Due to the impact of COVID-19 lockdowns, expenses were lower in the first half of the survey period. Subsequently, except for the Khmer New Year period, there has been a continuation of relatively substantial expenses. Upon closer examination, it becomes evident that "pocket money for school-going children" overwhelmingly dominates the expenses, with expenditures on extra-class programs following suit.

4.9. Co-movement of income and expenditure

If the borrowing market is well-functioning and saving devices are available, households can smooth out the income shocks on expenditure by borrowing money from financial institutions or family/relatives, or by withdrawing money from their savings. However, if the financial market is not functioning, households cannot borrow or use savings, and then the decline in income will lead to a decline in expenditure.

Following Merfleld and Morduch (2022), we examine how expenditure reacts to changes in income flows in the case of Cambodia. To examine degree of the co-movement of income and expenditure, we employ a series of fixed effect panel regressions:

$$C_{it} = \alpha_i + \alpha_i + \beta_1 * Y_{it} + \beta_2 * Edu_i * Y_{it} + \varepsilon_{it}$$

Where subscript t represents the t^{th} week, and i represents the i^{th} household. C_{it} is weekly expenditures, Y_{it} is weekly income, ε_{it} is a white noise, and α_i household-level fixed effects, and α_t is a weekly-level time fixed effect. The variable Edu_i is an indicator of the education of the household head. If households' smooth consumption perfectly and permanent income does not change, for example, income and expenditure should not covary within households and β_1=0. Co-movement of income and expenditure, conditional on fixed effects, is reflected by β_1>0, and we are particularly interested whether the degree of

Table 8. Frequency of Education Years of Household Head

Education years	Freq.	Percent	Cum.
0	56	13.27	13.27
1	13	3.08	16.35
2	28	6.64	22.99
3	56	13.27	36.26
4	68	16.11	52.37
5	34	8.06	60.43
6	28	6.64	67.06
7	39	9.24	76.3
8	22	5.21	81.52
9	30	7.11	88.63
10	8	1.9	90.52
11	8	1.9	92.42
12	29	6.87	99.29
16	3	0.71	100
Total		422	100

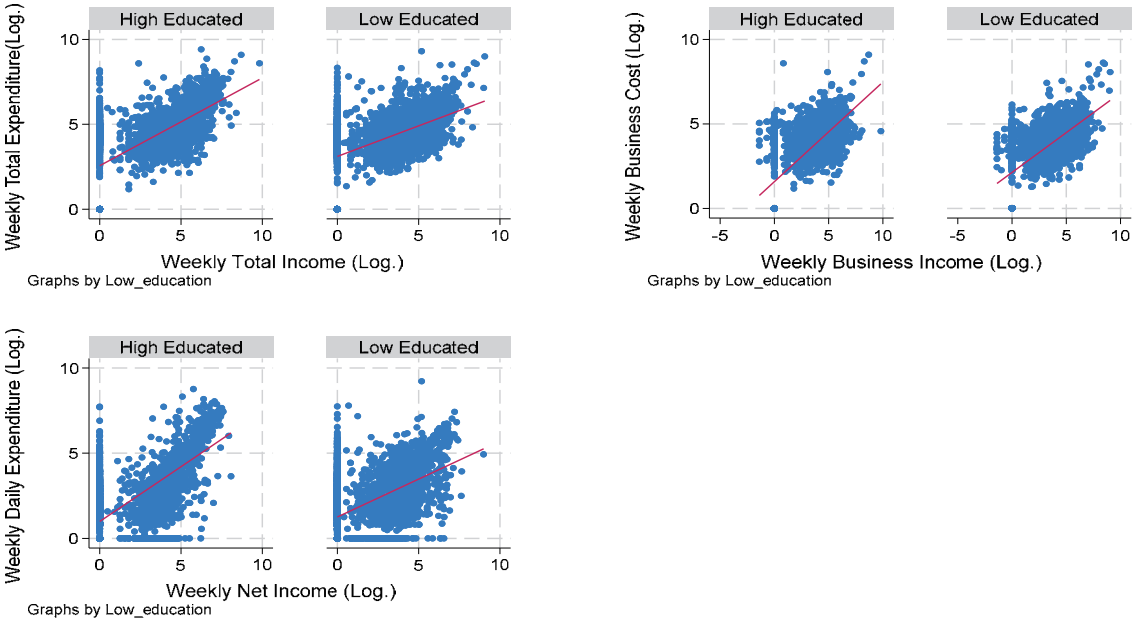
Note: The data is from the baseline survey.

smoothing is greater for households with higher education levels.

We divided the households into a low education group and a high education group. Table 8 shows the distribution of education years in our sample at the baseline survey. Since 52.37 percents of sample household heads have attended the school less than 5 years, we set the cut-off point as 5 years. Thus, low education group is defined as the households of which household head's education year is less than 5 years, and high education group is defined as the households of which household head's education year is no less than 5 years.

Figure 21 shows scatter plots of weekly income and expenditure by education level. We plotted total income, and total expenditure in the upper left panel, and business income, business expense in the upper-right panel. We further plotted net income, which is defined as total income minus net business income, and daily expenditure, which is defined as total expenditure minus business expenses. The line in each panel represents the regression line based on the ordinary least squared estimation. We found that the slope of the fitted line is higher in the higher education group in each definition of the income and expenditure. The results mean that higher education groups are more sensitive to changes in income flow. In other words, they reduce expenditure, possibly including necessity expenses, when they experience a decline in their income. These results are different from the findings in Merfeld and Morduch (2022). Their study documented that

Figure 21. Co-movement of income and expenditure by education levels



Note: Authors' calculation based on data from the Kakeibo program.

Table 9. Fixed-effect Estimation of Degree of Co-movement

	Dependent Variable		
	Total Expenditure	Business Expenditure	Daily Expenditure
Log (Gross Income)	0.289***		
	(0.05)		
Low Education Dummy * Iog(Gross Income)	–0.092		
	(0.07)		
Log(Business Income)		0.421***	
		(0.07)	
Low Education Dummy * Iog(Business Income)		–0.225***	
		(0.08)	
Log(Net Income)			0.336***
			(0.06)
Low Education Dummy * Iog(Net Income)			–0.095
			(0.08)
Low Education Dummy	2.006***	1.829***	1.751***
	(0.16)	(0.10)	(0.20)
Household Fixed Effect	Yes	Yes	Yes
Week Fixed Effect	Yes	Yes	Yes
R-Squared Adjusted	0.40	0.67	0.75
Observations	8046	8046	6013

Note: The results of fixed-effect estimation are presented in the table. Cluster-robust standard errors are adopted at village level.

low education groups are more sensitive to changes in income flows in India.

However, we did not find robust results in the relationship between education levels and degree of co-movement of income and expenditure. Table 9 shows the results of the fixed-effect estimation. We only confirmed the abovementioned relationship between education level and degree of co-movements of income and expenditure in the fixed-effect estimation model for business income and expenses. In the meantime, in total income and total expenditure and in net income and daily expenditure, there was no statistical significance in the relationship between education level and degree of co-movements. Those means that the financial constraints are severe for high education group in business compared to low education group, while there are no significant differences in level of financial constraints across education levels.

Apart from education levels, we examined the relationship between income level and co-movement of income and expenditure. We included dummy variable of low-income households in the model as follows.

$$C_{it} = \alpha_i + \alpha_t + \beta_1 * Y_{it} + \beta_2 * Income_i * Y_{it} + \varepsilon_{it}$$

where $Income_i$ is the dummy variable which takes one if the households belong to the low income group.

The median value of average weekly income across households was USD 82.91. Thus, we defined the low-income group as households of which average weekly income is less than USD 82.91. The results of this fixed-effect estimation are presented in Table 10. We found that the estimated coefficient of the interaction term of gross income and low income dummy were 0.136 at the 10 percent significance level. In addition, the estimated coefficient of the interaction term of gross income and low income dummy were 0.219 at 1 percent significance level. In the meantime, there was no significant results for business income and expenses. This means that the daily expenditure of lower-income groups is sensitive to changes in weekly income. The results suggest that the lower income households need to reduce consumption in the wake of decline in the weekly income, perhaps because of less opportunity to borrow or save money in a timely manner.

Table 10. Fixed-effect estimation of Degree of Co-movement

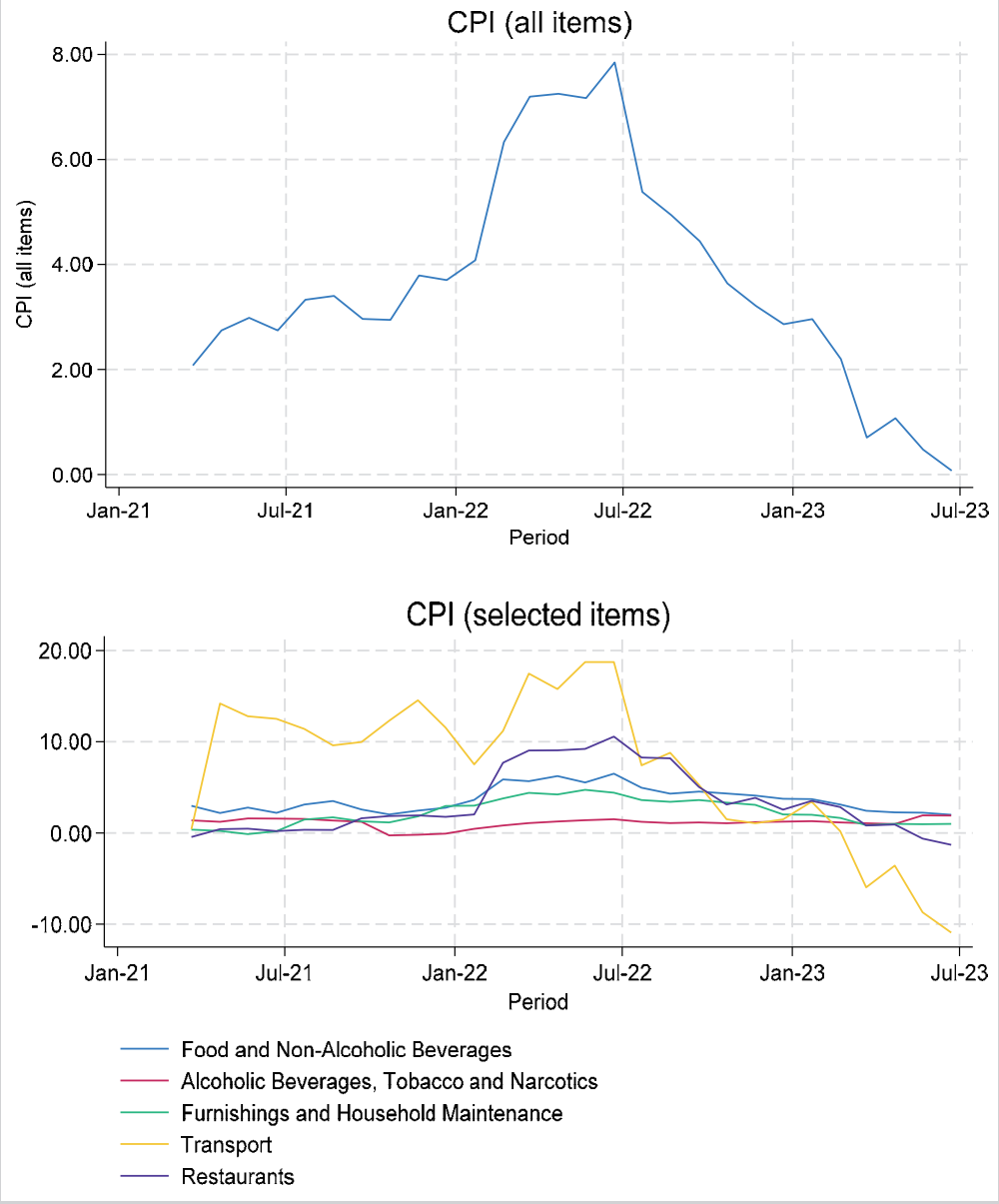
	Dependent Variable		
	Total Expenditure	Business Expenditure	Daily Expenditure
Log(Gross Income)	0.182***		
	(0.05)		
Low Income Dummy * Iog(Gross Income)	0.136*		
	(0.07)		
Log(Business Income)		0.286***	
		(0.05)	
Low Income Dummy * Iog(Business Income)		0.037	
		(0.08)	
Log(Net Income)			0.181***
			(0.06)
Low Income Dummy * Iog(Net Income)			0.219***
			(0.08)
Low Income Dummy	-3.314***	–3.284***	–3.021***
	(0.27)	(0.30)	(0.25)
Household Fixed Effect	Yes	Yes	Yes
Week Fixed Effect	Yes	Yes	Yes
R-Squared Adjusted	0.68	0.67	0.76
Observations	8046	8046	6013

Note: The results of fixed-effect estimation are presented in the table. Cluster-robust standard errors are adopted at village level.

Box 6. Inflation and Household Expenditure

After the corona pandemic and the outbreak of the Ukraine war, the inflation rate increased significantly over the world. This is also the case in Cambodia. Figure A6.1 presents the CPI year-on-year changes in all the items and selected items. Particularly, prices in restaurants temporarily increased by 10% in February 2022, and decreased to normal level in the end of 2022. There are also increases in the price of foods and

Figure A6.1. CPI year-on-year changes

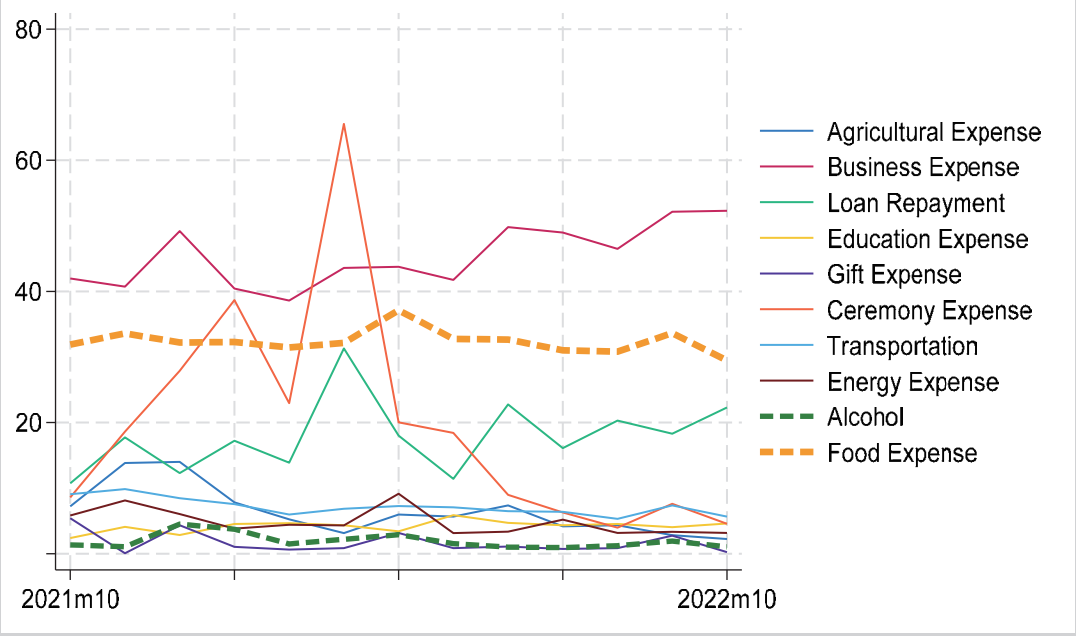


Source: Consumer Price Index, National Bank of Cambodia

household furniture, while the price of transportation has been generally unstable. Using Kakeibo data, we examine how household expenditure reacts to the significant changes in prices. Figure A6.2 shows the average expenditure on selected items of households. The average monthly food expenses are stable over the study period even though there was significant changes in CPI. This is also the case in other items. It is not observed that there were changes corresponding to increases in CPI. Even though there is increases in ceremony expenses in March 2022, this may reflect that March is the popular season for weddings in Cambodia. Those results suggest that households might have complied with price changes by reducing the quantity and/or quality of purchased goods, possibly due to budget constraints. In addition, although the changes are slight, it is observed that expenses on alcohol and other beverages decreased after the hike in overall CPI. It might reflect that households reduced the expenses on non-necessary items, while the expenses on necessary items, such as foods, were not able to be decreased every month.

The Kakeibo data implies that compliance strategies might be limited to rural households because of the lack of opportunity to access convenient saving and borrowing products. Cambodian rural households might thus be vulnerable to rapid increases in food and oil prices.

Figure A6.2. Average Monthly Expenses on Selected Items



Source: Authors' calculation based on data from Kakeibo program

5 Impact Evaluation of the Kakeibo as an Education Tool

In the survey, we also conducted an experiment using Kakeibo in rural households. We randomly selected 124 households to participate in this program. Using this random assignment, we estimated the impact of keeping Kakeibo on household financial literacy and financial behavior. We applied a difference-in-differences approach to estimate average treatment effects on treated households in terms of living standards and financial wellbeing: income, expenditure, financial literacy, and financial behavior.

Note that the timings of treatment are different across the samples, as we newly assigned 12 households for the treatment sample from the baseline sample in the middle of the survey, in response to the dropout of some households. Thus, there are three types of sample groups: (1) Never treated sample; (2) treated sample which participated in the program for 6 months from April 2022; and (3) a sample which participated in the program for 1 year from October 2021. In general, if the timing of the treatments are different across the samples in the presence of heterogeneity in the impact of programs across periods, the difference-in-differences approach fails to estimate the true impact of the program. Given this problem due to the design of the program, we applied the two-way fixed estimator proposed by Wooldridge (2021), and then we estimated the impact of the programs for each duration of the participation of the program.[9]

In this estimation we include covariates: schooling years of the household head, age of the household head, the number of household members, the number of adult households, possession of ID Poor, farming dummy (whether household's main income is farming), and a female head dummy (whether household head is female).[10] In addition, to control variation across interviewers, we also included dummy variables of interviewers.[11] For the calculation of standard errors, we used cluster-robust standard errors at village level. Furthermore, we winsorized variables relating to income and expense at 1% to avoid obtaining biased results from outliers.

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[9] We use the commands "xthdidregress" and "estat aggregation, dynamic" in STATA18.

[10] In the estimation for financial literacy variables, the education level of household head is crucial. Thus, we excluded sample which did not answer the question clearly (for example, some households answer "don't know" or rejected to the question).

[11] As the questions about income, expenses, and financial literacy are sensitive, inclusion of interviewer's dummies may mitigate the biases in self-reporting.

Table 11: Balance tests between the treatment and control samples before the Kakeibo Program

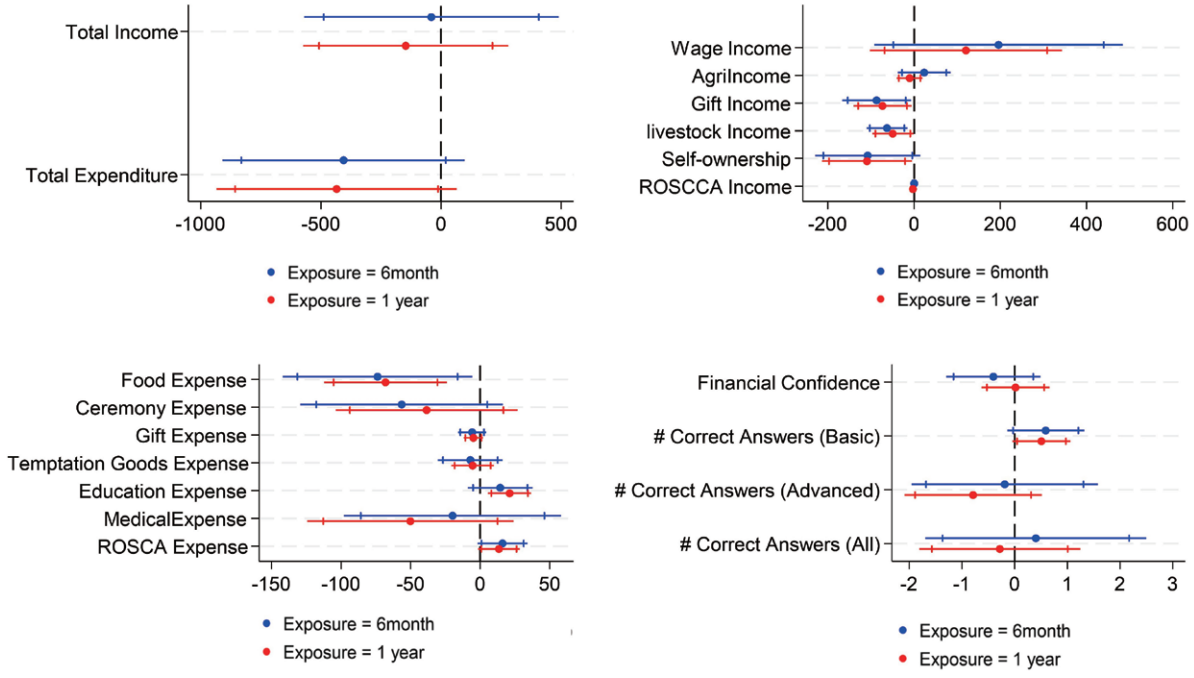
	Control Sample	Treatment Sample	Total	t-test (P-value)
Total Income	520.5 (386.3)	489.0 (332.2)	509.3 (367.9)	0.405
Wage Income	327.3 (360.6)	338.6 (391.3)	331.3 (371.3)	0.766
Agri Income	38.9 (107.1)	39.5 (103.7)	39.1 (105.8)	0.954
Livelistocks	12.9 (40.1)	8.9 (31.8)	11.5 (37.4)	0.294
Self Ownership	91.2 (155.6)	72.3 (124.1)	84.4 (145.3)	0.205
Gift Income	22.1 (72.5)	23.7 (73.8)	22.7 (72.9)	0.835
ROSCA Income	4.0 (14.4)	3.3 (11.1)	3.7 (13.3)	0.609
Total Expenditure	606.3 (1194.6)	421.4 (615.7)	541.0 (1031.1)	0.078
Food Expense	141.7 (75.1)	142.2 (77.4)	141.9 (75.8)	0.951
Ceremony	31.2 (102.2)	26.2 (57.1)	29.4 (88.9)	0.579
Gift Expense	57.7 (220.3)	61.4 (262.1)	59.0 (235.6)	0.877
Temptation Goods	17.4 (26.4)	20.6 (33.1)	18.5 (29.0)	0.289
Education Expense	8.0 (16.4)	5.7 (13.7)	7.2 (15.5)	0.141
Medical Expense	62.7 (165.6)	41.5 (73.6)	55.2 (140.4)	0.138
Debt Expense	163.4 (302.1)	93.6 (182.2)	138.7 (267.8)	0.01
ROSCA Expense	24.6 (187.0)	11.8 (53.7)	20.1 (153.8)	0.416
Financial Confidence	1.1 (0.9)	1.2 (0.9)	1.1 (0.9)	0.574
# Correct Answer (Basic	1.5 (0.7)	1.4 (0.6)	1.5 (0.7)	0.253
# Correct Answer (Advanced)	3.4 (1.2)	3.6 (1.2)	3.5 (1.2)	0.13
# Correct Answers (All questions)	4.9 (1.5)	5.0 (1.4)	4.9 (1.4)	0.483
Education Level of Household Head	4.9 (3.4)	5.0 (3.2)	5.0 (3.3)	0.922
Age of Household Head	48.2 (12.8)	50.2 (12.5)	48.9 (12.7)	0.117
Number of Household Members	4.9 (1.7)	4.8 (1.9)	4.8 (1.8)	0.665
Sample Size	273 (64.7%)	149 (35.3%)	422 (100.0%)	

Note: The statistics are calculated from a baseline survey conducted in August 2021.

Table 11 presents the comparison between treatment sample and control sample in baseline survey, respectively. We also performed t-tests between the treatment and control samples, and the results are also shown in Table 10. We found that differences between treatment sample and control sample are statistically insignificant in most of the outcome variables, although the average of total expenditure is higher for control group at 10% statistical significance. The results support the validity of the assumption that treatment (participation in the program) were randomly assigned across the sample.

We summarize the results of difference-in-differences estimation of the entire sample in Figure 22. We present the estimated impact of participation in the Kakeibo program for 6 months and for 1 year, respectively. The upper-left panel of Figure 22 presents the total

Figure 22. Results of Difference-in-difference estimation (Full Sample)



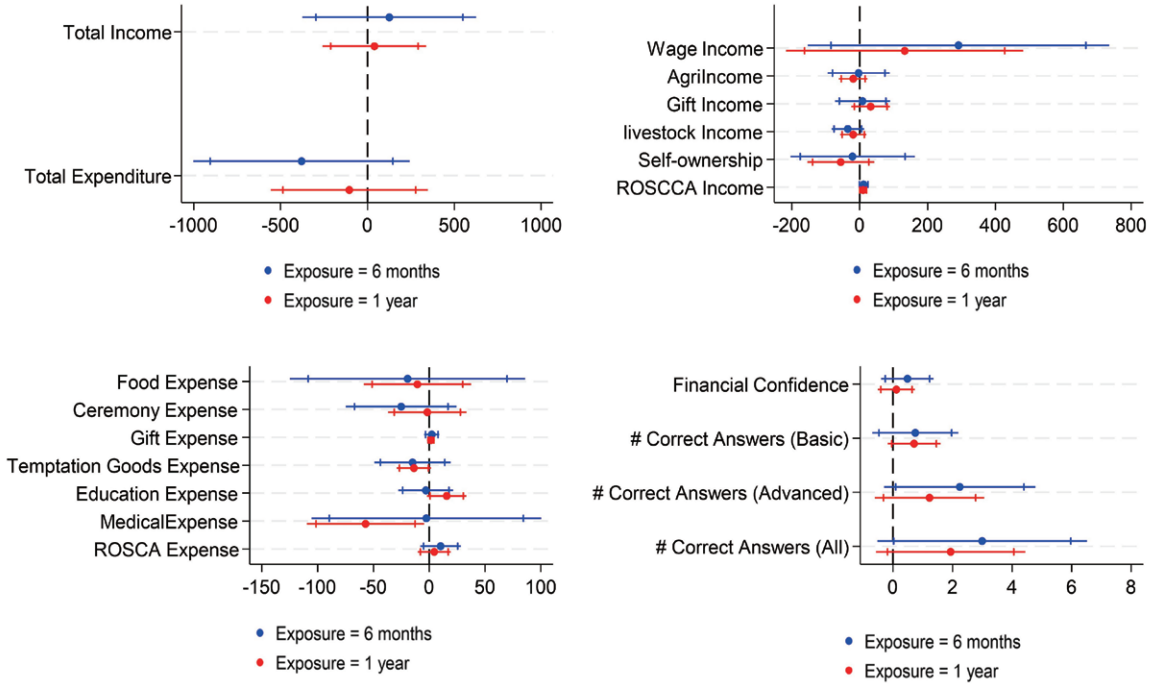
Note: Authors' calculation using data from the baseline, mid-line, and end-line surveys.

expenditure decreased in the treatment sample compared to control sample. The result was particularly statistically significant at the 10 percent level if the household participated in the program for 1 year. In the meantime, there was no statistical significance in the estimated impact on total income.

In the upper-right panel, the estimated average treatment effect is estimated on each income source. We found that the participants in the program are likely to report smaller amounts in gift income (e.g., remittance), livestock sales, and self-ownership business income. In the lower-left panel, the results on the expenditure side are presented. There was statistical significance in decreases in food expenses after the participation of the program. In the meantime, there were statistical significance in increases in education expenses and ROSCA expenses. The results suggest that households reduced the waste in the expenditure, and increased investment in children and savings.

The lower-right panel presents the estimation results for financial literacy variables. The impact on the number of correct answers was estimated as positive regarding basic questions at the 10 percent statistical significance, although there were no significant results regarding advanced questions and all the questions. This result suggests that the keeping these records of income and expenditure improves the financial literacy of the

Figure 23. Results of Difference-in-difference estimation (Higher Levels of Education)



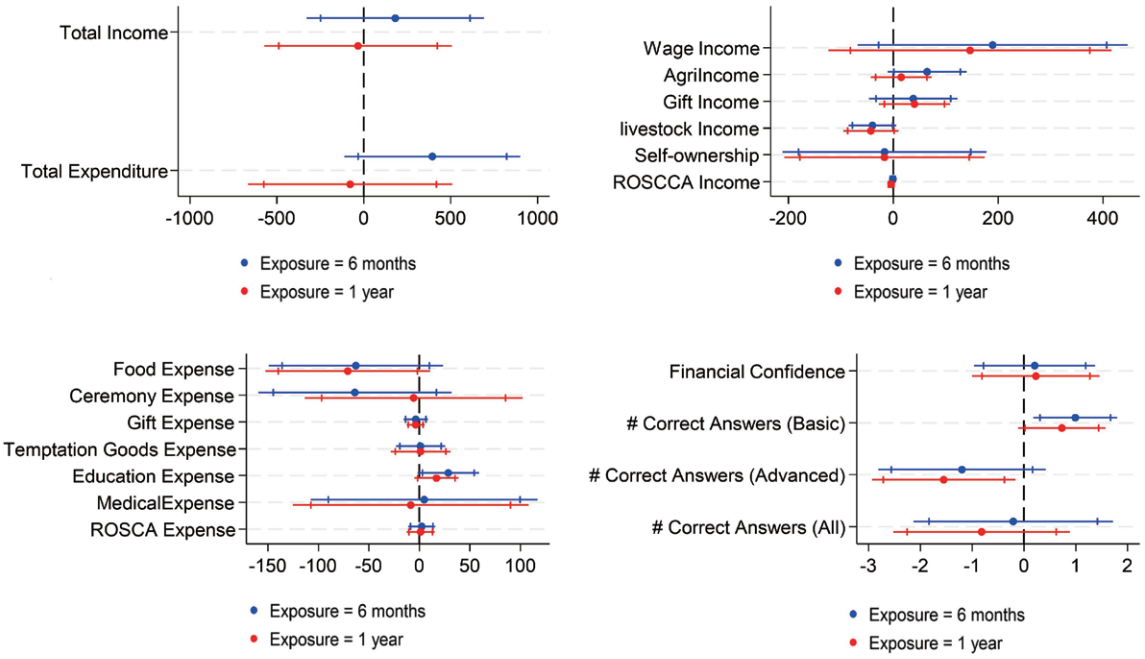
Note: Authors' calculation using data from the baseline, mid-line, and end-line surveys.

average households in rural villages of Cambodia.

We further analyzed the impact by education level. As in Section 4.1.8 we divided the sample into two sub-samples based on whether the household head had more or less than 5 years of education. The high education group is defined as those households where the head had more than 5 years, and the low education group is defined as those having less than 5 years. Then, we performed a fixed-effect estimation with each sub-sample of households, respectively. Figure 23 shows the results of the sub-sample of high education groups, and Figure 24 shows the results of the sub-sample of low education groups.

We found some differences in the results of estimation between high education groups and low education groups. In the outcome variables of financial literacy, there were increases in the number of correct answers of basic financial literacy 1 year after the program started, and the number of correct answers of advanced financial literacy is also improved by a 6 month exposure to the program. There were statistically significant results in the total number of correct answers about the effect of a 6 month exposure to the program. Those results suggest that the Kakeibo program is effective in improving the literacy of high education households regarding basic financial knowledge.

Figure 24. Results of Difference-in-difference estimation (Low Level of Education)



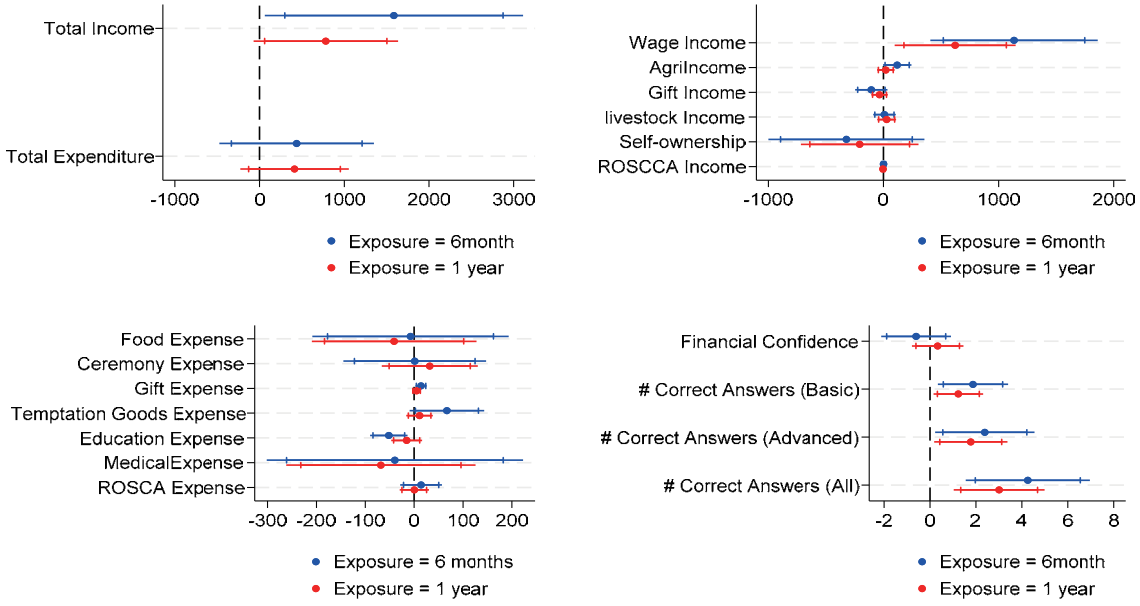
Note: Authors' calculation using data from the baseline, mid-line, and end-line surveys.

The number of correct answers showing basic financial literacy increased for low education groups, while the number of correct answers of advanced financial literacy decreased, but there were no statistically significant changes in the total number of correct answers. These results may suggest that the effect of the program on financial literacy is limited for low education households.

When we look at household spending behavior, there were statistically significant decreases in food expenditure and temptation goods for the higher education group after 1 year of exposure to the program, while the results were not statistically significant for lower education groups. These results mean that households reduced expenditure by participating in the program. Again, the effects of the program was pronounced, particularly for higher education households. This might suggest that keeping a record of daily flow of the income and expenditure makes it easier for households to realize the waste of money in daily expenditure, although this method is more effective for households with high education levels than for those with low education levels.

We further examined the impacts of the program by income levels. As earlier we divided the sample into a high income group and low income group, and then performed a difference-in-difference estimation. The results are presented in Figures 25 and 26,

Figure 25. Results of Difference-in-difference estimation (High Income Groups)



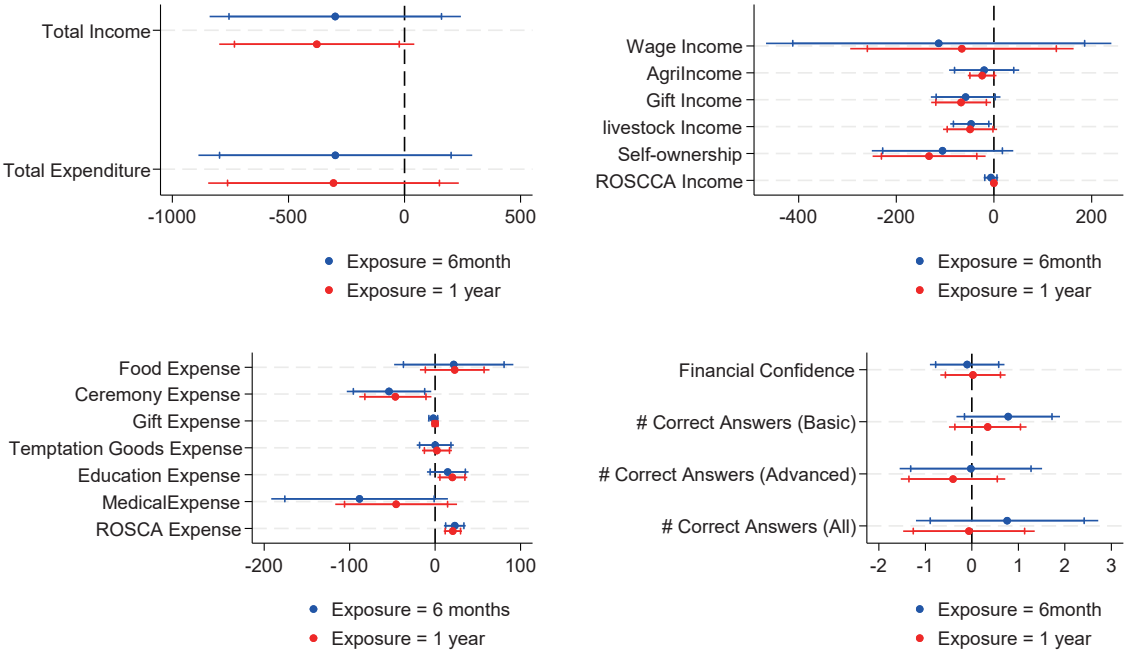
Note: Authors' calculation using data from the baseline, mid-line, and end-line surveys.

respectively. First, we found that there was a statistically significant increase in the total income of high income households. The increase in total income was also estimated as large amounts (USD1585.81) over the 6-month exposure, and USD781.81 over the one-year exposure. Even though participants in the program received USD10 every month as monetary incentive to keep records accurately, the increase is far larger than the amount of the monetary incentive. We found that wage income mainly contributed to the increase in total income. In the meantime, the effect of the program seemed to be negative on the expenditure side. We found that temptation goods expenses increased exposure and education expenses decreased at 6-month exposure.

In Figure 26, we presented the results of difference-in-differences estimation with the low-income group. The effect of Kakeibo was not strongly pronounced for the low-income group. In the upper-right panel, we found that gift income, livestock income, and income from self-ownership business declined for the low-income group. However, while ceremony expenses decreased education expenses increased for this group. Thus, the low income group appears to have succeeded in reducing waste in their expenditure.

Furthermore, financial literacy was significantly improved for the high income group. In the lower-right panel in Figure 25, we found that the number of correct answers increased in basic and advanced questions for the high-income households. In the meantime, there

Figure 26. Results of Difference-in-difference estimation (Low Income Groups)



Note: Authors' calculation using data from the baseline, mid-line, and end-line surveys.

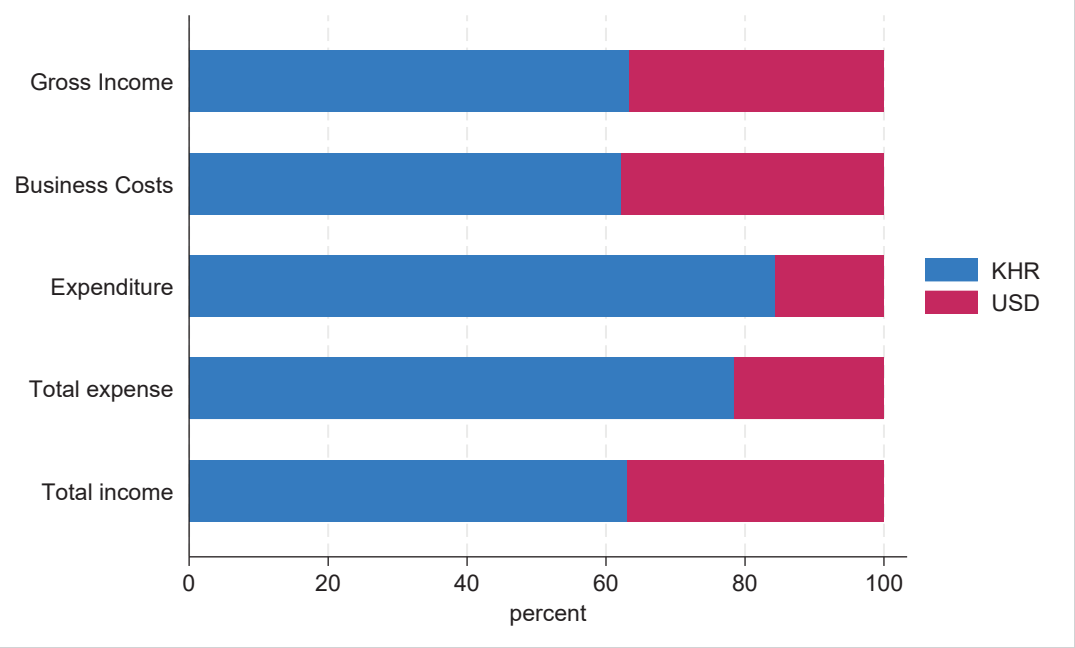
were no significant results in all the outcome variables for the low-income group. This finding is in line with Kaiser and Menkhoff (2017), who show that financial education is less effective for low-income clients than those in lower-middle–income economies. Similarly, in general financial education programs Kakeibo as a financial education tool was less effective for low-income household groups in the case of Cambodia.

Box 7. Multiple Currency Use by Rural Households

In developing countries, it is often observed that multiple currencies circulate in the economy due to instability of local currency. In Cambodia, due to the past experience of macroeconomic instability, USD is also accepted by Cambodian households as well as local currency, KHR. According to the data from the banking sector, about 90% of loans and deposits were in USD (Aiba and Chey, 2023). However, the bank deposits and loans do not represent the currency usage of households as the financial access is limited in Cambodia. In this box, we investigate how rural Cambodian households deal with multiple currencies in their daily lives using our data from the Kakeibo program.

Our data of the Kakeibo program also recorded the currency in income and expenditure. Aiba et al (2023) investigated the currency usage of Cambodian households using the survey data from 2224 households. However, since the data is retrospective self-reporting by households based on the one-shot interview, there could be biases in use of currency. In this regard, our data from the Kakeibo program has advantages in accuracy of currency choice in transactions. In Figure A7.1, we present the shares

Figure A7.1. Shares of KHR and USD in income and expenditure

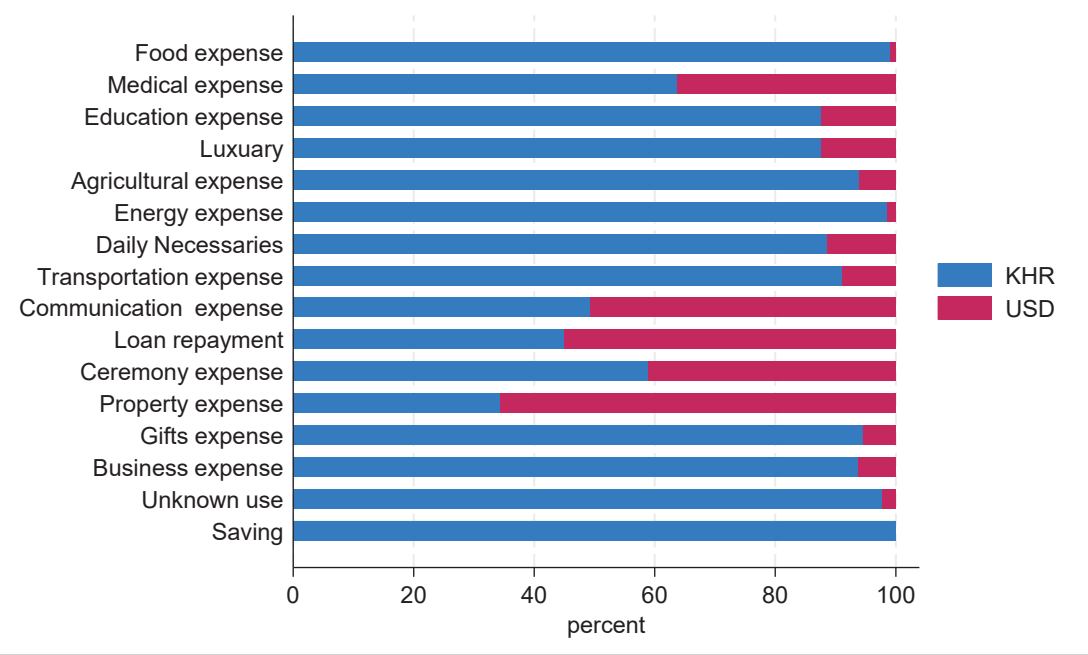


Note: Data is from the Kakeibo program. We aggregated the amounts of income and expenditure of all the household records by currencies.

of KHR and USD in income and expenditure. We found that shares of KHR currency in total income was about 60% , while it was about 80% in total expenditure. Even though the 90% of bank deposits are in USD, the shares of USD in income and expenditure by rural Cambodian households are limited in line with the finding by Aiba et al (2023).

We further investigated the currency usage of households by looking at detailed expenditure categories and income sources in Figure A7.2 and A7.3. We found that there was difference in shares of KHR and USD across expenditure categories and there was also difference across income sources. Most of expenditure are basically paid in KHR, while shares of USD exceeded 50% in communication expenses, loan repayment, and property expenses. Banks have incentive to lend in USD as their liabilities are mainly denominated in USD (Aiba and Chey 2023). Therefore, lending to households tends to be denominated in USD, and households may repay in USD. Communication expenses are mainly fee charges for cellular phone, which are mostly denominated in USD, resulting in large shares of USD in this expenditure category. Large share of USD payment for property can be explained by large volume of payment per transaction in this expenditure category. Odajima, Aiba, and Khou (2018) demonstrated that the

Figure A7.2. Shares of KHR and USD in each Expenditure Categories



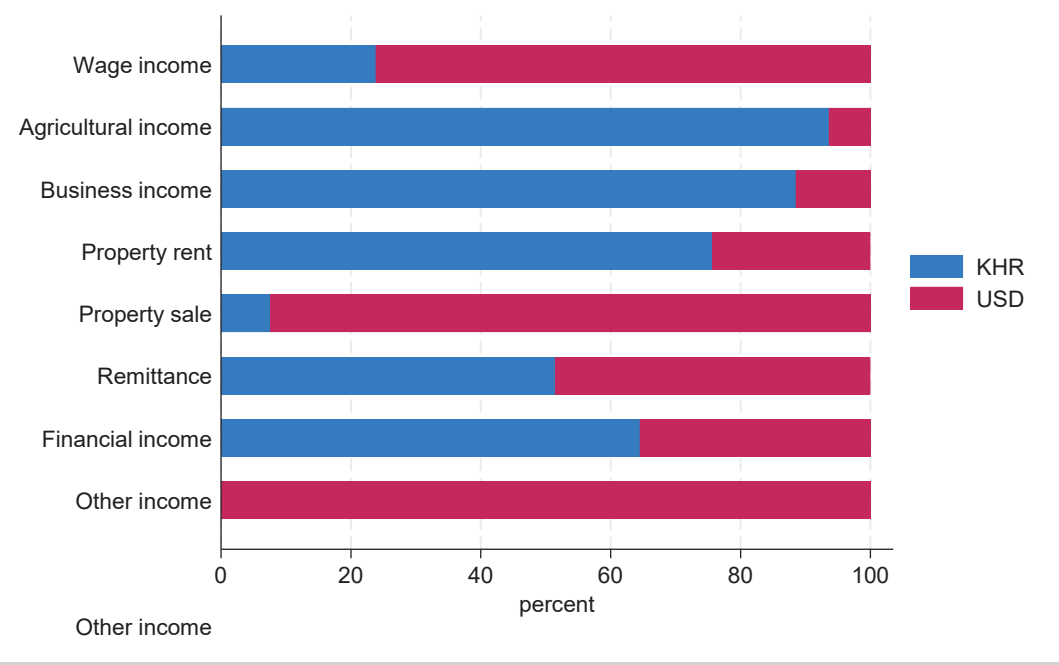
Note: Data is from 149 participants in the Kakeibo program. We aggregated the amounts of income by currencies.

volume of payment per transaction is one of the factors to determine the currency choice and households prefer to pay in USD for a large volume of payment. Therefore, households tend to pay in USD for the property purchase, which usually becomes large values.

On the income sides, we found that wage income and property sales present large shares of USD. Cambodian rural households obtain wage income from factories which mainly produce exporting goods. Therefore, factories usually pay to workers in USD for wage payment as their income is also denominated in USD. Again, for the property sales, the large shares of USD can be explained in large part by the large volume payment per transaction.

We further investigate the difference in size of income and expenses between KHR and USD. Table A7.1 presents summary statistics of KHR sample, USD sample, and all the sample of records of transaction in the Kakeibo data. The size of expense and income is higher for USD than KHR on average and on a median value and standard deviation is also larger for USD than KHR. It suggests that USD is usually used for larger transaction for Cambodian rural households.

Figure A7.2. Shares of KHR and USD in each Expenditure Categories



Note: Data is from 149 participants in the Kakeibo program. We aggregated the amounts of income by currencies.

Table A7.1. Difference in size of income and expenses between KHR and USD.

	Mean	Standard Diviation	p25	p50	p75	Min.	Max.
Expenditure							
KHR	5.74	28.49	1	1.75	3.75	0.025	2500
USD	144.89	555.92	3	25	100	1	11000
Total	7.29	66.74	1	1.75	3.75	0.025	11000
Income							
KHR	38.35	82.06	6.25	13.25	37.5	0.25	2500
USD	185.44	711.48	10	100	200	5	18500
Total	56.27	264.32	7.5	15	50	0.25	18500

Note: Data is from 149 participants in the Kakeibo program.

6 Conclusion and Policy Recommendations

We conducted this research project on Cambodian household financial tools from August 2021 to November 2022 using Kakeibo as both a data collection tool and an education tool. In the project, we invited 149 households to participate in a program educating them on how to keep Kakeibo from October 2021 to October 2022. We also asked them to report their record of daily income and expenses every 2-3 days until the program ended. To estimate the impact of the program, we conducted a baseline survey in Augst 2021, a midline survey in March 2022, and an endline survey in November 2022.

Using the data collected in the series of surveys and the Kakeibo that participants kept during the program, we performed two analyses: (1) Analysis of the pattern of daily income and expenditure of households, and (2) the impact of Kakeibo as a financial education tool. As the results of analysis on the pattern of daily income and expenditure, we found that weddings, a substantial part of total expenses, were mainly financed by gift income. We observed that wealthier households tended to borrow more, while lower-income households often relied more on remittances. Education and medical service costs represented a relatively significant burden for lower-income households. Combining multiple income sources resulted in stable household income patterns over time. While many households have income and expenses below the poverty line, there is a wide distribution about the mean.

In addition, the households that reported that they were indirectly and directly affected by the COVID-19 pandemic had low expenditure and low income in the beginning of the program but found these gradually increasing as the Cambodian economy recovered. We further found that expenditure flow was highly correlated to income flow in low-income groups compared to high-income groups. This finding suggests that low-income households are less secured in terms of shocks in income. Their expenditure is sensitive to income flow, probably because of less accessibility to informal risk-sharing networks and formal financial markets.

From the case study based on the Kakeibo data, we found that some households seem to be locked in a debt trap (Case Study 4). Some households have no corresponding expenses after borrowing from financial institutions, suggesting that they keep borrowing to

pay back existing loans and keep paying interest to the financial institutions. Although there were only a few cases in our sample, the finding may highlight the importance of improving financial literacy of rural households for their protection.

As the result of this analysis of the impact of the Kakeibo program, we found that keeping a record of cash flows improve financial literacy and financial behavior. Specifically, households that participated in the program improved their financial literacy relating to the basic economic questions, and reduced food expenses and increased education expenses. However, the positive impact was mainly pronounced for high-education or high income groups. The program was less effective in improving financial literacy and behavior particularly for households belonging to both low-income and low-education groups.

From the findings of our survey, we draw several policy implications for microfinance projects in households in rural villages:

i. *Financial institutions have room to develop flexible and tailored services to address the complex financial management of households.*

   – As seen in the case studies, significant events such as large weddings and home construction are commonly observed among multiple households, and this can be considered typical in Cambodia. However, even when managing such significant expenses, loans from financial institutions are not always used. Cases of using village savings groups (ROSCAs) or saving cash at home are also common. This suggests that there are often situations where existing loan products do not fit well with the financial circumstances surrounding events such as weddings and construction. Specifically, there are challenges such as bothersome loan procedures, difficulty in timing disbursements, and inflexibility in repayment schedules. Encouraging financial institutions to develop products that are more user-friendly for household financial management, considering the financial situations surrounding expenditure purposes, could potentially ease the financial management burden on Cambodian households.

ii. *Integrating the Kakeibo (household bookkeeping) could improve the effectiveness of financial education programs*

- Our study found that keeping a record of income and expenses improved the financial literacy. Thus, integrating the Kakeibo program with the general financial education program will enhance the effectiveness of improving financial literacy. In the case of Cambodia, most households do not have financial literacy. We also recommend that households interact with other households by sharing the results of keeping a financial record with each other and discussing how they can improve the expenditure pattern and usage of financial products.

iii. There is a need to arrange a special program for a low-income and low-education household groups

- Our study also confirmed that the impact of financial education varies across the socio-demographic characteristics of households. Specifically, the impacts were less likely to be pronounced for low-income or low-educated households. Thus, the follow-up for those household groups will improve the effectiveness of the financial education program.

iv. Considering offering lending programs by financial institutions for relatively significant education expenses.

- Education expenses, for households with school-going children, account for about 20% of food expenses, making the burden substantial. On the other hand, participation in extra-class programs to make up for unavoidable absences or insufficient school lessons varies between households that can afford it and those that cannot, potentially leading to educational disparities. However, investing in a child's education, which can lead to employment opportunities, is a favorable prospect from a household's perspective. Furthermore, there is no doubt that an increase in a child's level of education will make a significant contribution to Cambodia's growth.

However, there are still some limitations in our analysis. In a second study of the impact of the Kakeibo program, we estimated the impact of 6 months and 1 year participation in it. Although we found some statistically significant results in some outcome variables, the duration of the study might be too short to confirm the impact on household financial behavior. Even though there were positive results on financial literacy, it may take time for the improvement of financial literacy to improve the financial behavior of households.

It might be not easy to change income sources for households in the short-term. In addition, there is another possibility that keeping Kakeibo will just improve the accuracy of households self-reporting about income and expenditure. Thus, there is a need for further study to identify the effects of this program on self-reporting biases.

Last, the sample size of the second study of the impact of the Kakeibo program is limited to 422 in the full sample and 149 in the treatment sample. Thus, even though there ware no statistically significant differences in some of the outcome variables in estimating the effectiveness of the program, this does not mean that there was no impact from the program on those variables. The insignificant results may also come from the small sample size.

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Appendix 1. Tips for Financial Diaries projects - Classification of transactions

Over the course of the 54-week Financial Diaries survey, the total recorded number of transactions exceeded 220,000. The average number of participating households was approximately 129. On average therefore each household conducted between 4 to 5 transactions per day and around 4,000 data entries every week.

The process of obtaining and recording data from enumerators through phone calls or visits and properly categorizing each transaction in advance for subsequent analysis is not a straightforward task. One approach, to ensure consistent classification, involves merely taking notes during data acquisition and recording all transactions as-is. The idea is then to process them collectively after the entire survey period. However, this method presents challenges. It is difficult to identify simple recording errors or cases where necessary information is missing, and as time passes, attempting to rectify such issues, for example by contacting the project participants, becomes increasingly challenging.

On the other hand, at the start of the survey there was limited knowledge of the daily financial practices of Cambodia's impoverished population. Therefore, creating an "appropriate classification" was itself a difficult task. If essential categories were missing or if there were too many unnecessary categories, the data processing would become inefficient. Hence, for this project, we consulted with a local research firm and initiated the classification process based on a socio-economic survey, which is considered a relatively standard approach. The initial classification was broad, comprising 10 income items and 14 expenditure items:

	Income	Expense
1	Income from regular wage employment	Food (rice, fish, beef, ingredients, etc.)
2	Income from casual employment	Housing (repair, reform, rental fee, etc.)
3	Agricultural income (agricultural product selling)	Medical services (costs paid to hospitals, clinics, medicine, etc.)
4	Income from livestock selling, fishery	Education (school fee, books, uniform, other materials, etc.)
5	Income from self-owned business (non-agriculture like vending store, etc.)	Alcohol (wine, beer, etc.), Cigarette, entertainments,

	Income	Expense
6	Property (land, house, cow, buffalo, etc.) rental income	Seeds (crops and rice), pesticides,
7	Remittances from migrated family members, relatives	Energy (electricity, battery, oil/kerosene for lighting, candle, cooking gas, firewood, wood charcoa
8	Other remittances (gifts, grant assistance)	Cleaning materials (soap, dish cleaning materials, etc.), cosmetics
9	Income from lending (principal, interests), ROSCAs	Transportation (bus, taxi, moto taxi, gasoline, etc.)
10	Others	Clothing
11		Debt/loan payments (interest payments), ROSCAs (Tong-Tin)
12		Pre-paid phone cards, internet services
13		Ceremonies of family, funeral and traditional events
14		Others

After several weeks had passed we attempted to visually review all such transactions in order to assess what data had actually been collected, how they could be classified, and what issues might arise for future analysis. At the beginning, each review of 200 transactions took about an hour. It became clear at this point that with the potential for over 200,000 total transactions in a year, visual confirmation would require more than 1000 hours in total. Setting appropriate classification categories in advance and thus making subsequent cleaning easier was deemed essential. It was also noted that the category "Others" was frequently used and often contained significant amounts. In cases of significant events that were difficult to categorize with the existing labels, this would complicate future analysis. As a result, by referencing the details of the data collected so far, we sought to create new classification categories that would be more researcher-friendly and support future analysis. For example, in financial transactions, we decided to make clear distinctions at the time of recording for:

Financial inflows	Financial outflows
Loan disbursement	Loan repayment
Savings withdrawal	Savings deposited
Loan repayment received	Loan to others

Additionally, for items like:

"Give money to husband to go to work"

"Give money to children to go to school"

which were not anticipated beforehand, new categories were created.

As a result of this exploration, the following new transaction categorizations were created and implemented in this project, including 9 major categories and 40 sub-categories for income, and 19 major categories and 109 sub-categories for expenditure. This was a substantial undertaking.

In conclusion, it is essential to capture as much detail about the subjects of the survey as early as possible, even when the full extent of the survey objectives may not be immediately apparent. This approach significantly enhances the quality of the survey and the subsequent analysis.

Income	Expense
1 Income from employment 20101 Income from regular wage employment 20102 Income from casual employment 20199 Income from other employment 2 Agriculture income 20201 Agricultural income (agricultural product selling) 20202 Income from livestock selling, fishery 20203 Income from selling tree 20299 Other income of agriculture/ livestock product 3 Income from self-owned business 20301 Non-agriculture like vending store 20302 Repair service 20303 Transport service 20304 Brokerage service revenue 20399 Other income from business 4 Property rental	1 Food (rice, fish, beef, ingredients, etc.) 10101 Rice 10102 Fish and meat 10103 Vegetable 10104 Ingredient 10105 Food market basket 10106 Drinking water 10107 Ice for drinking 10108 Dairy products 10109 Snack 10110 Fruit 10111 Soft drink 10112 Egg 10199 Other food expense (unidentified) 2 Housing (repair, reform, rental fee, etc.) 10201 Rental fee (residential) 10202 House repairs expense 10203 House reform expense 10299 Other housing expense 3 Medical services (costs paid to hospitals, clinics, medicine, etc.)

20401 Residential rental
20402 Agriculture land rental
20403 Agriculture cow/buffalo rental
20404 Agriculture tractor/equipment service
20499 Othe rental income

5 Sale property
20501 Land
20502 House building
20503 Means of transport (motorbike, Car)
20504 Agricultural machine
20505 Machinery/equipment for business
20506 Gold/Jewelry
20599 Other property

6 Remittances from migrated family members, relatives
20601 Migrated family members
20602 Relative
20603 Governmental/NGOs assistance
20604 Gifts
20699 Other remittances

7 Financial income
20701 Savings withdrawal
20702 Interest income
20703 Loan payment received
20704 ROSCAs
20705 Principle and interest repay
20799 Other financial income

8 Loan disbursement received
20801 Loan received from Individual
20802 Loan received from relatives
20803 Loan received from institution
20899 Loan received from others

99 Others
29999 Others

10301 Clinical Medical services
10302 Medicine expenses
10303 Para-clinical expenses
10304 Hospital expenses
10305 Hospital administration services
10399 Other Medical services

4 Education (school fee, books, uniform, other materials, etc.)
10401 School fee
10402 Books
10403 Learning materials
10404 Pocket money
10405 School uniform
10499 Other education expenses

5 Alcohol (wine, beer, etc.), Cigarette, entertainment,
10501 Alcohol
10502 Cigarette
10503 Foods in restaurant
10504 Soft drink
10505 Entertainment services (movie, Karaoke)
10599 Others Alcohol, Cigarette, entertainment,

6 Seeds (crops and rice), pesticides,
10601 Seeds
10602 Pesticides
10603 Services for farming
10604 Agriculture land rental
10605 Water for agriculture
10606 Fertilizer
10607 Other agriculture equipment
10699 Others agriculture

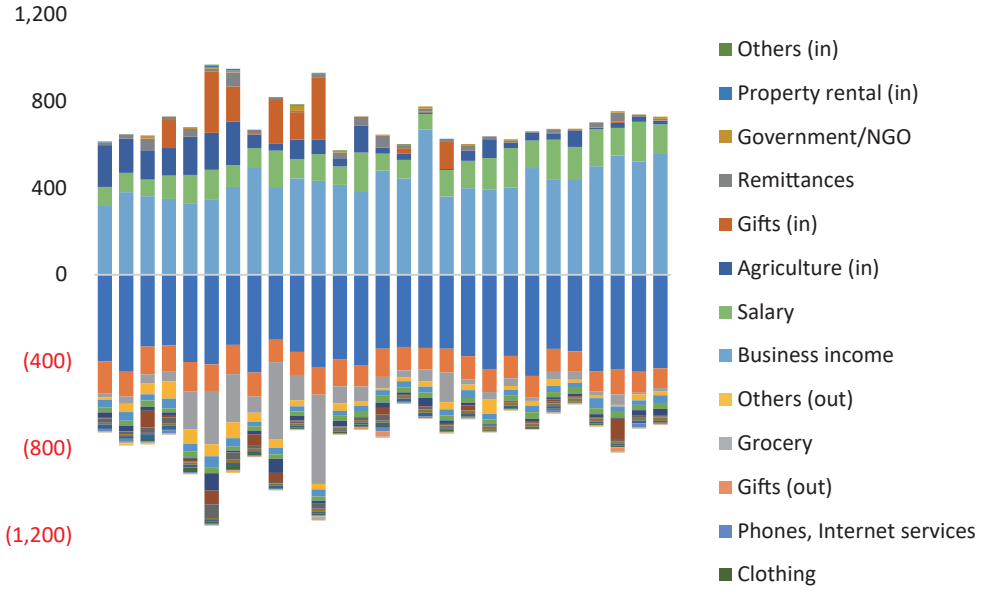
7 Energy (electricity, battery, oil/kerosene for lighting, candle, cooking gas, firewood, wood charcoal, etc.)
10701 Electricity
10702 Cleaning water
10703 Battery/battery charge
10704 Oil/kerosene for lighting
10705 Candle
10706 Cooking gas

	10707 Firewood/charcoal 10799 Other Energy 8 Cleaning materials (soap, dish cleaning materials, etc.), cosmetics, 10801 Soap 10802 Dish cleaning material 10803 Cosmetics 10804 Laundry detergent 10805 Toothpaste 10806 Restroom material 10899 Other Cleaning materials, cosmetics 9 Transportation (bus, taxi, moto taxi, gasoline, etc.) 10901 Bus/taxi 10902 Moto taxi/PassApp meter/ Ferry 10903 Repairs of mean of transport 10904 Gasoline 10905 Changing lubricant 10906 Cleaning and washing motor/ car 10999 Other Transportation 10 Clothing 11001 Clothes 11002 Shoes 11003 Clothe accessary 11004 Repair of clothes 11099 Other clothing 11 Debt/loan payments (interest payments), ROSCAs (Tong-Tin) 11101 Principal payment 11102 Interest payment 11103 Both principal and interest payments 11104 ROSCA payment 11105 Deposit money in bank 11199 Other Debt/loan payments (interest payments), ROSCAs (Tong-Tine) 12 Pre-paid phone cards, internet services 11201 Prepaid phone card to mobile phone 11202 Internet service

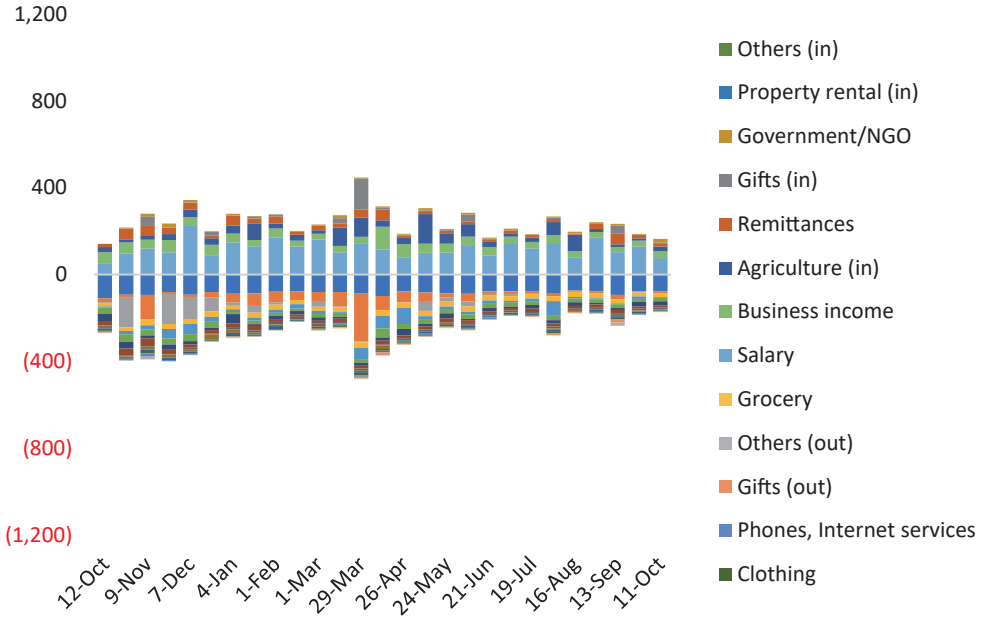
	11299 Other Pre-paid phone cards, internet 13 Ceremonies of family, funeral and traditional events, 11301 Wedding 11302 Funeral 11303 Traditional event 11304 Contribute to monks (ceremonies equipment) 11399 Others, Ceremonies of family, funeral and traditional events, 14 Property expense 11401 Land 11402 House building 11403 Means of transport (motorbike, Car) 11404 Agricultural machine 11405 Machinery/equipment for providing services 11406 Gold/Jewelry 11407 House equipment 11499 Others Property expense 15 Business expenses 11501 Stock for resale 11502 Buy stock to process and sale 11503 Machinery/equipment for resale 11504 Store/land rent for sell 11599 Others Business expenses 16 Gifts 11601 Gift to relative 11602 Gift to outsider 11603 Donation for public interest 11699 Other Gifts 17 Loan to others 11701 loan to Individual 11702 loan to relatives 11703 loan to institution 11704 Loan to other 18 Unknown uses of household member 11801 Income generation member 11802 Non income generation member 11899 Other household member 99 Others 19999 Others

Appendix 2. Figures

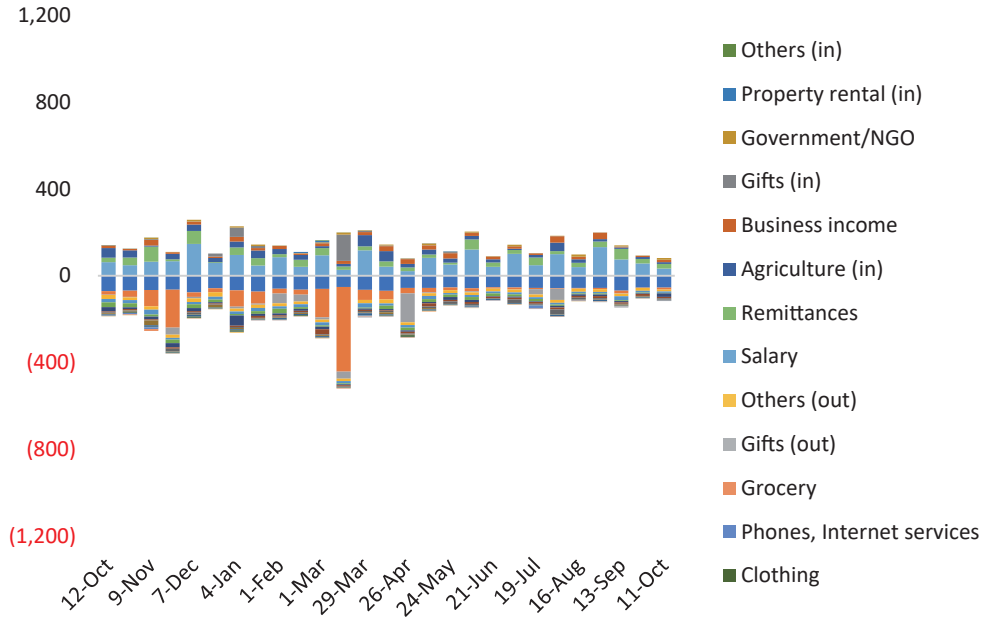
Income / Expenses – 1st Quartile



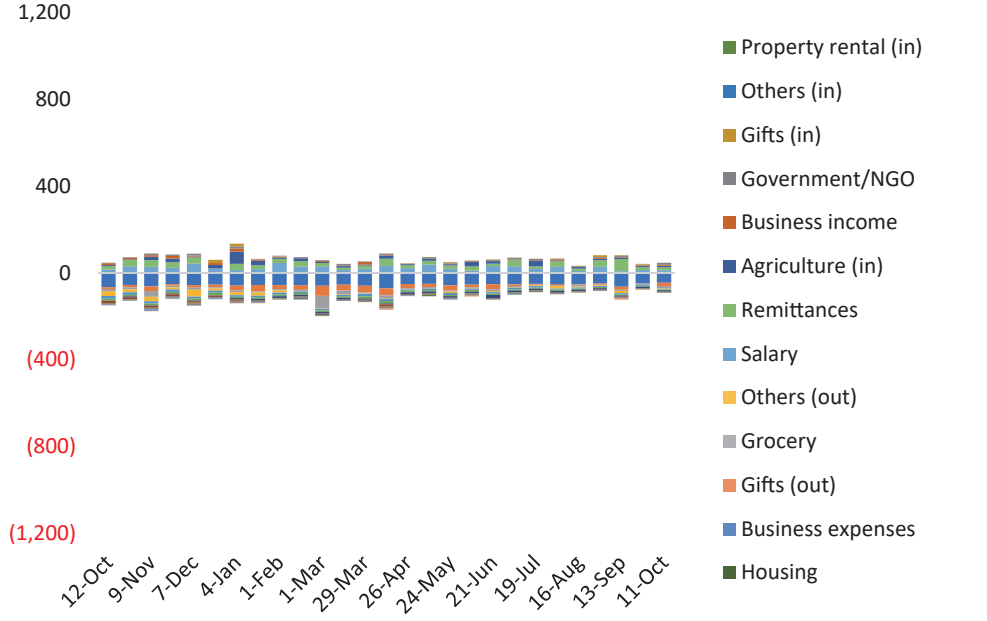
Income / Expenses – 2nd Quartile



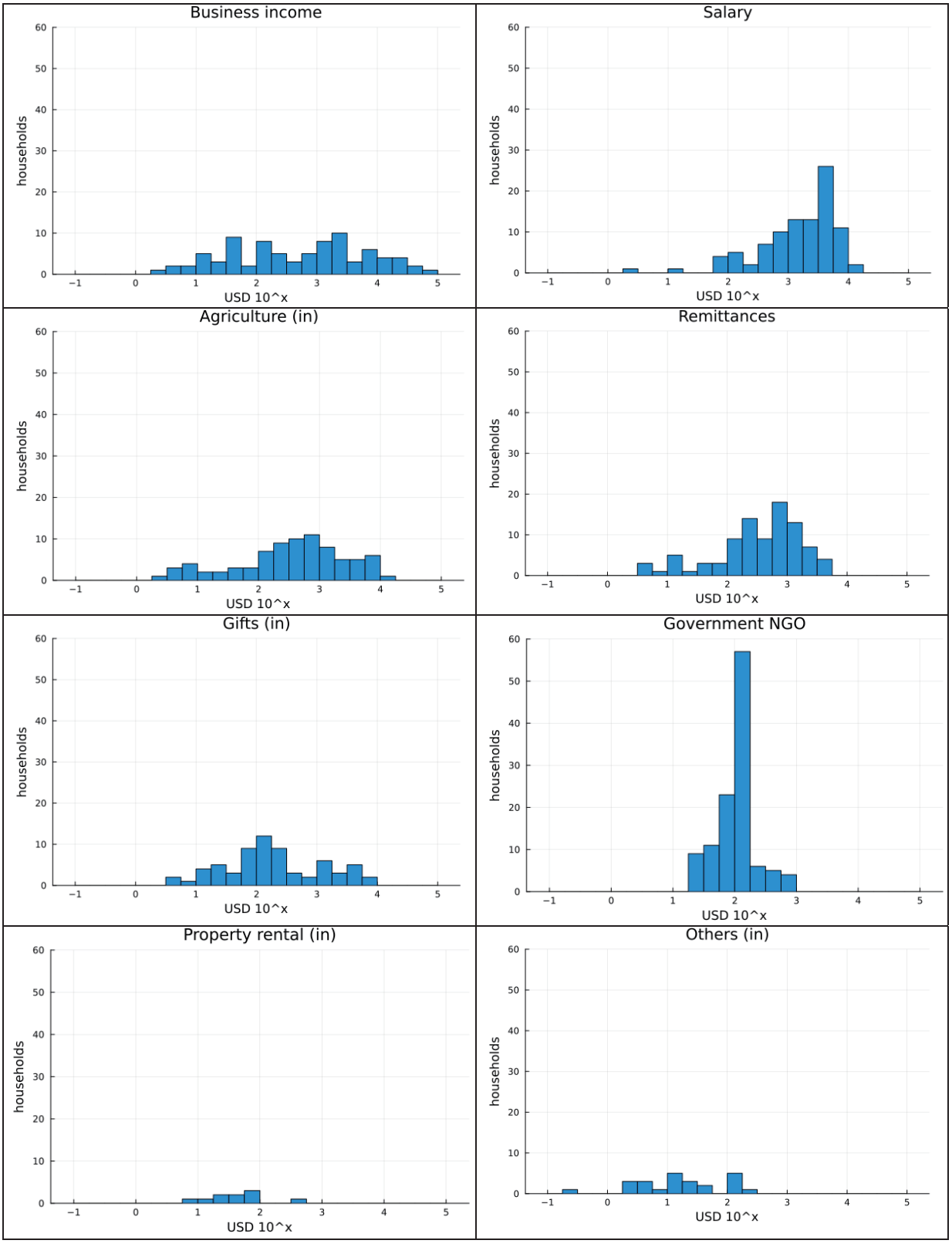
Income / Expenses – 3rd Quartile



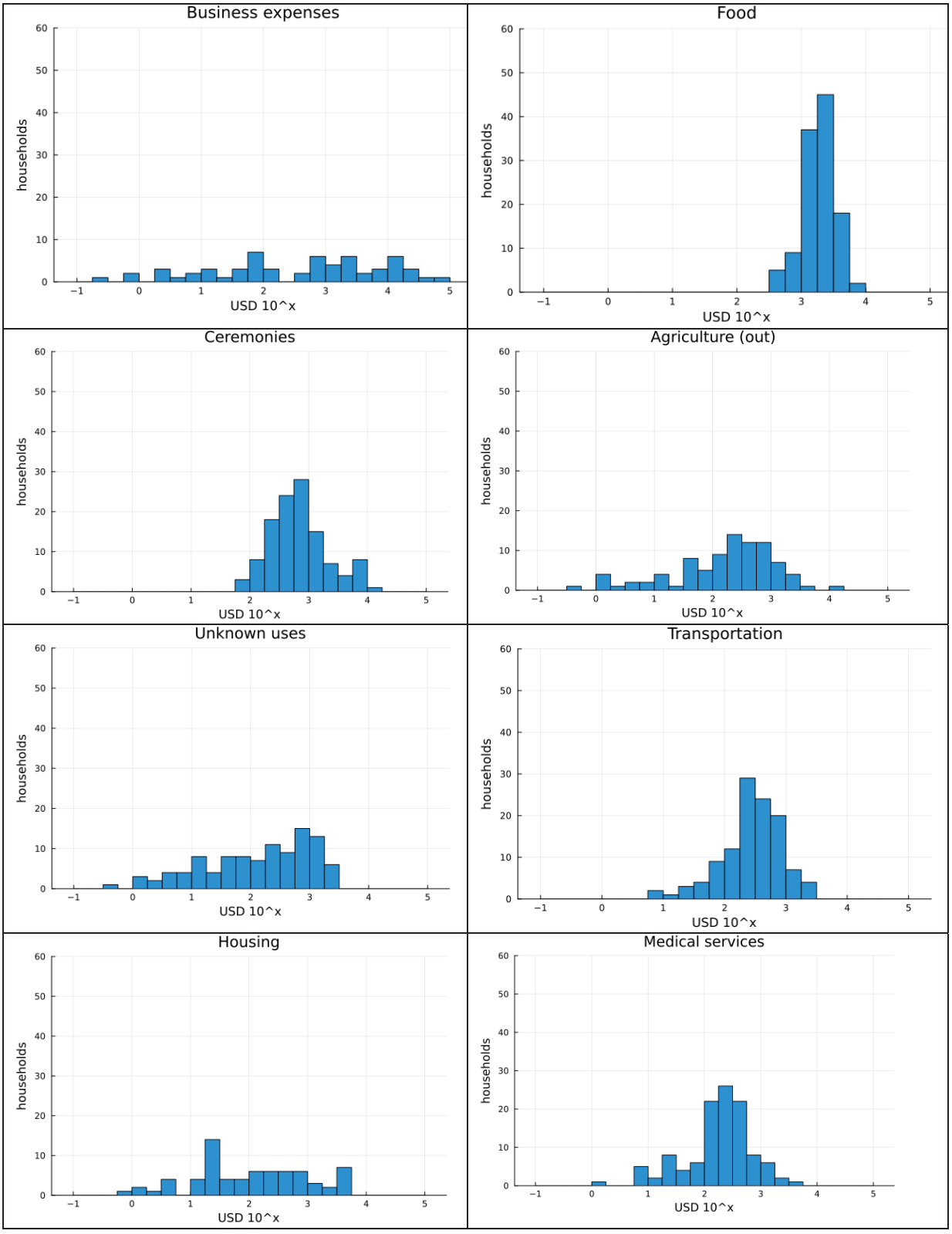
Income / Expenses – 3rd Quartile

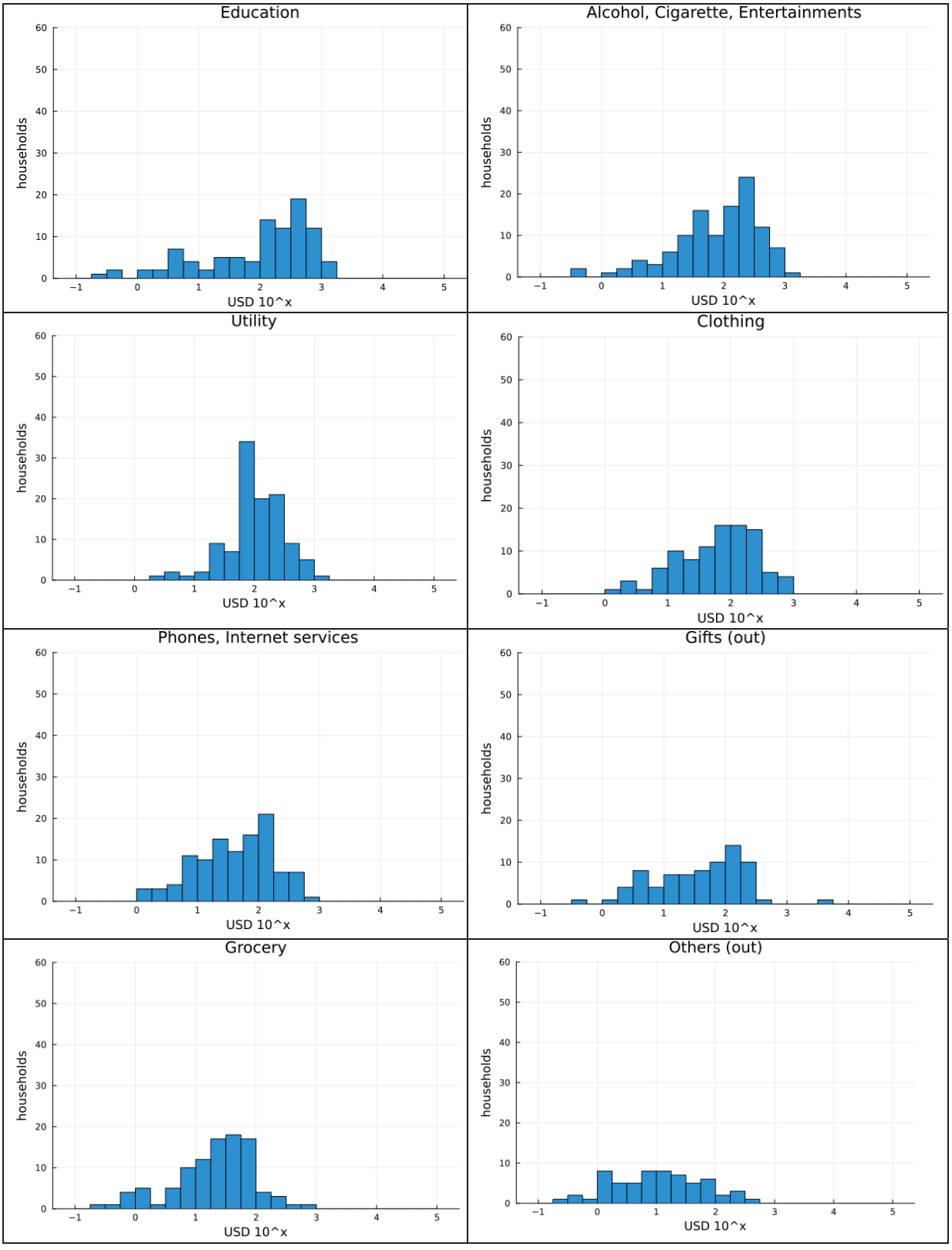


Histogram (income)

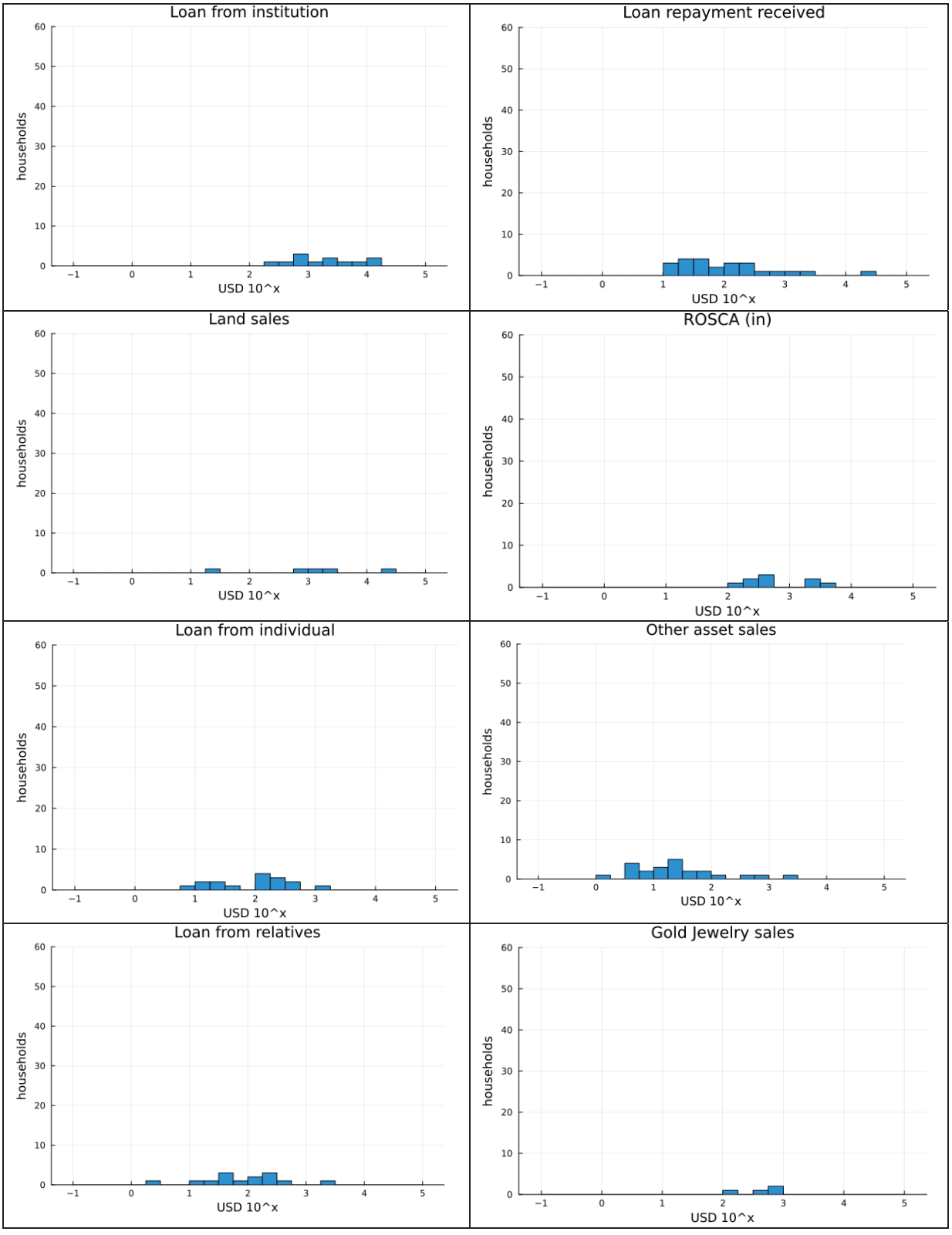


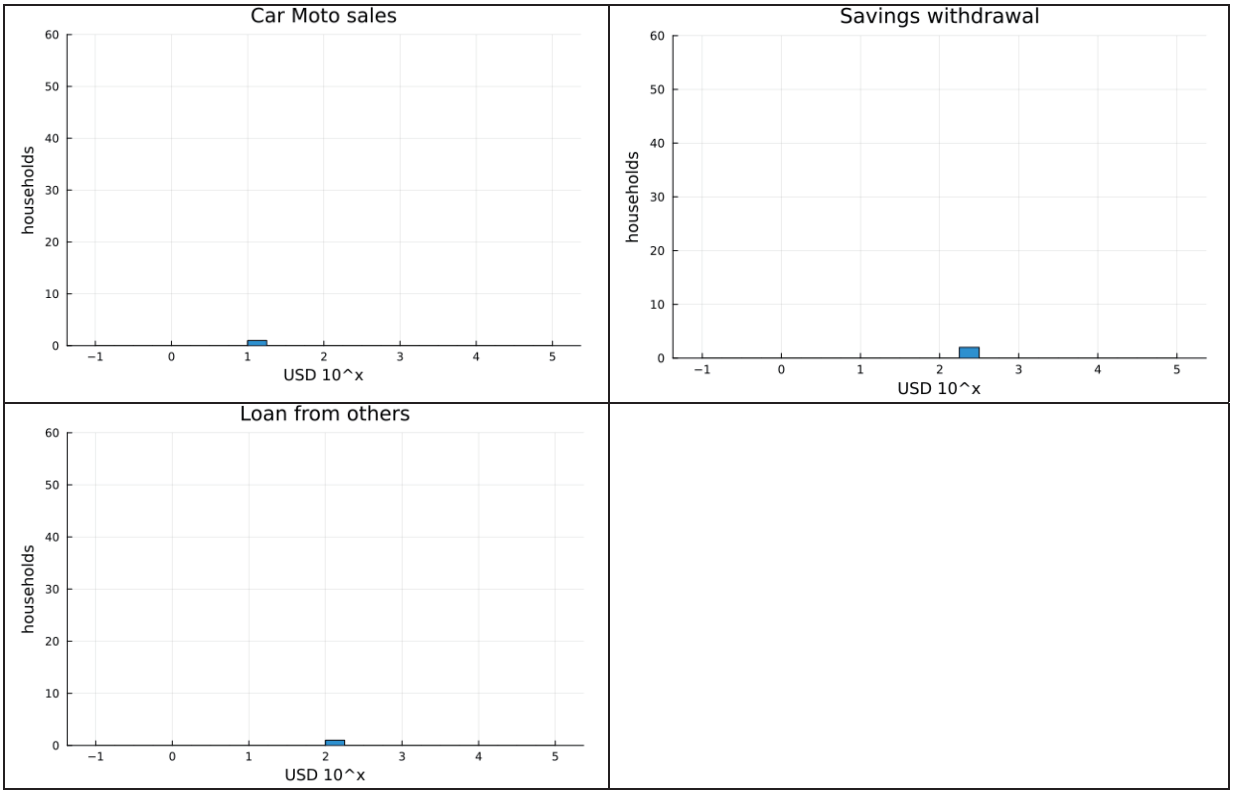
Histogram (Expenses)



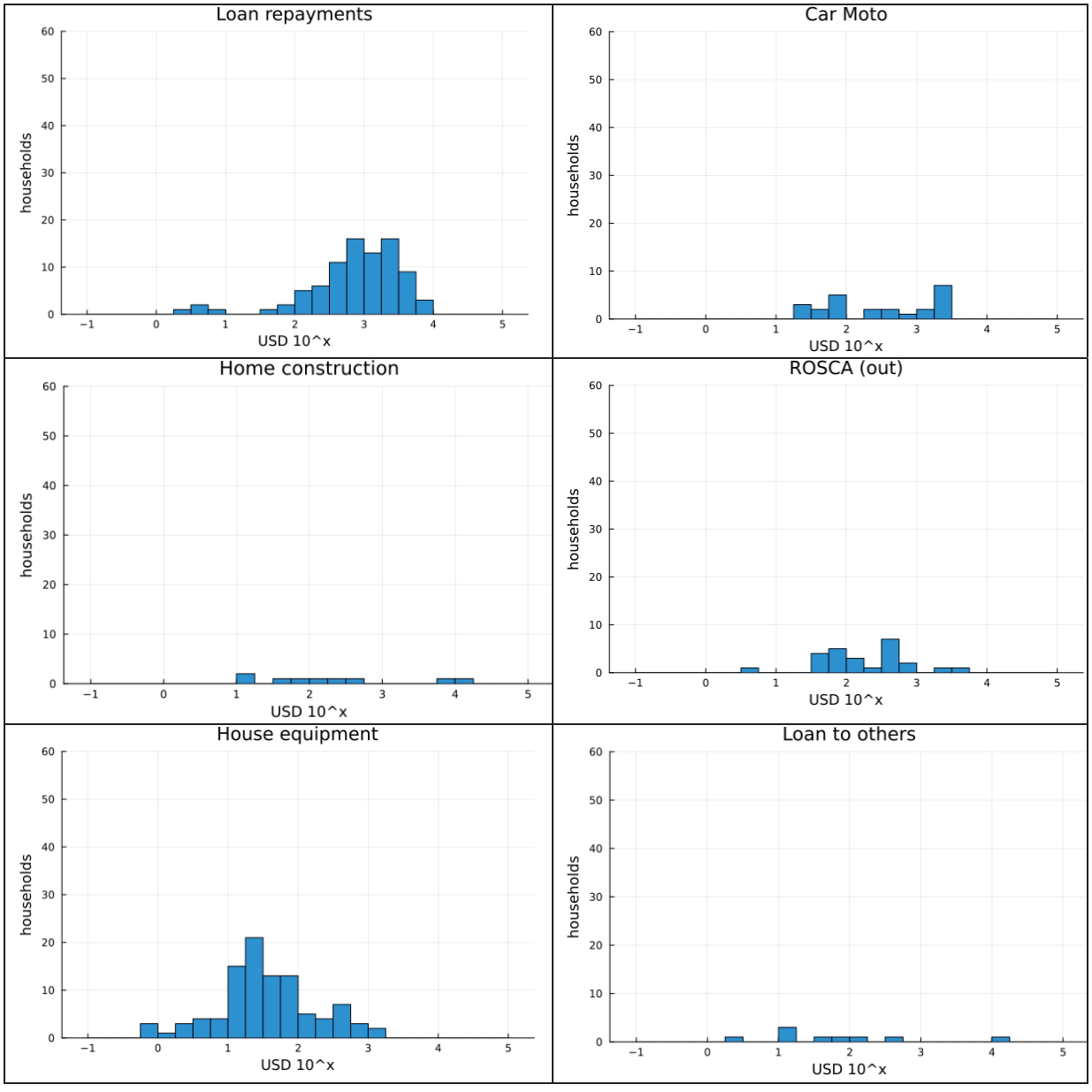

Education
households
USD 10^x
Alcohol, Cigarette, Entertainments
households
USD 10^x
Utility
households
USD 10^x
Clothing
households
USD 10^x
Phones, Internet services
households
USD 10^x
Gifts (out)
households
USD 10^x
Grocery
households
USD 10^x
Others (out)
households
USD 10^x

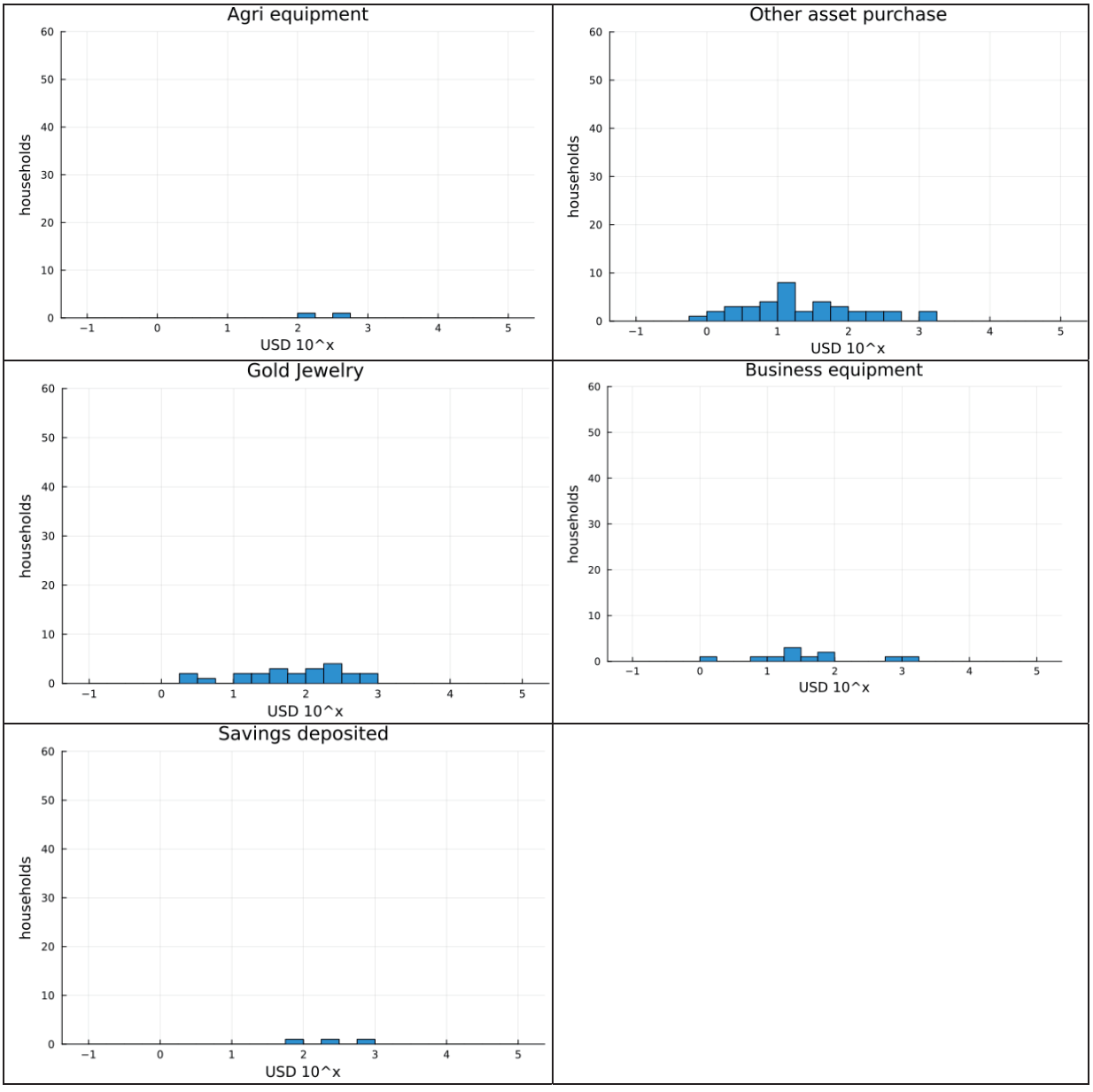
Histogram (Financial Inflows)




Car Moto sales
households
USD 10^x
Savings withdrawal
households
USD 10^x
Loan from others
households
USD 10^x

Histogram (Financial Outflows)




Agri equipment
Other asset purchase
Gold Jewelry
Business equipment
Savings deposited
households
USD 10^x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