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The Role of Rural Credit during the Global Financial Crisis: Evidence From Nine Villages in Cambodia

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LUN Pidé

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Responsibility for ideas, facts and opinions presented in this research paper rests solely with the authors. Their opinions and interpretations do not necessarily reflect the views of the Cambodia Development Resource Institute.

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
CDRI	Cambodia Development Resource Institute
CMA	Cambodia Micro-finance Association
FL	Formal Loan
GFEC	Global Financial and Economic Crisis
HHH	Household Head
IDRC	International Development Research Centre
INFL	Informal Loan
MFI	Microfinance Institution
NGO	Non-governmental Organisation
PRA	Portfolio and Risk
PCA	Principal Component Analysis
PDS	Poverty Dynamic Study
RGC	Royal Government of Cambodia
TL	Total Loan
USA	United States Dollar

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ABSTRACT

This paper studies the role of rural credit in Cambodia during the global financial and economic crisis that began in 2008. The paper briefly reviews rural credit in Cambodia during 2008, analyses rural households' formal and informal credit demand during the crisis and proposes policy options. The results suggest that household demand for credit increased during the crisis. The demand for formal loans was higher than for informal ones, indicating the important role of the formal rural credit market in times of economic downturn. There is no evidence of a positive relationship between the crisis and loans to smooth consumption; instead loans were used for farming investment and debt repayment.

1

INTRODUCTION

Many questions have arisen concerning the impact on individual economies of the global financial and economic crisis that swept the globe during late 2008. While low investment and high unemployment were observed in advanced economies, the grave worry for developing countries is the potential to tip many people back into poverty. An immediate question is how people could cope with the crisis and what could save them from falling into poverty. A flourishing literature has developed suggesting that the rural credit market plays a major role in times of crisis (Udry 1994; Besley 1995).

In theory and practice, besides being used to smooth household consumption, diversify investment and increase income and assets (Adams & Vogel 1986; Braverman & Guasch 1986; Hossain 1988; Hoff & Stiglitz 1993; Rosenzweig & Wolpin 1993), rural credit helps households weather various shocks and pool risks (Udry 1994; Townsend 1995; Barslund & Tarp 2008). Moreover, using credit to smooth consumption during an income crisis can also have a positive effect on farming productivity (Eswaran & Kotwal 1989). A short-term consumption crisis could constrain farmers' productivity; hence taking loans to smooth consumption can help maintain productivity (Goetz 1996). Credit as insurance is even more crucial for poorer households than for wealthier ones because the former own fewer assets than the latter, which depend more on income transfers than credit for consumption or investment (Rosenzweig 1988).

In Cambodia, recent works show that households had to incur more debt during the crisis to smooth consumption, particularly to buy food and repay existing debts (Chan 2009; Jalilian *et al.* 2010; Theng & Kem 2009; So 2009; ODI 2009). Not only did the high cost of borrowing during the crisis push households into severe indebtedness but so also did the sudden food price spike just before the global financial and economic crisis hit (Jalilian *et al.* 2009). Non-food commodity prices such as farming inputs rose in tandem with food prices, taking production costs to unprecedented highs. Yet the next crisis had already put downward pressure on output prices, making poor farmers suffer even further hardship. Furthermore, increasing household debts after the crisis parallel the rising number of loans extended by microfinance institutions. This partly explains why Cambodia's rural credit market during the crisis did not experience setbacks as severe as might have been expected.

There has been scant empirical research on the role of rural credit during the financial and economic crisis in Cambodia. Although previous studies highlighted the vital role of credit during the economic downturn, they did not prove their findings empirically. Moreover, the conclusions drawn from descriptive statistics do not provide a reliable picture of the role of credit during the crisis. This study intends to fill this gap. It is based on unique longitudinal household data, originally compiled for CDRI's (2012) Poverty Dynamics Study. Such a study may inform decision makers and planners of needed support and directions to ensure the development of a robust and accessible rural credit market.

This study employs empirical methodology to understand the role of credit in Cambodia during the 2008 crisis. Specifically, it answers two empirical questions. After controlling for socio-economic characteristics, the study examines whether the crisis has increased household demand for formal and informal credit. Second, it explores how credit was used.

Section 2 describes the rural credit market in Cambodia. Section 3 discusses the data and theoretical models used in the estimations. Section 4 presents the findings on the impact of the crisis on credit demand and how loans were used to cope with shocks. Section 5 concludes.

2

BACKGROUND

In Cambodia, rural credit is viewed as one of the important tools for poverty reduction (RGC 2009). Expanding access to credit helps improve livelihoods of resource-poor rural households and, especially via formal credit, helps mobilise assets to improve agricultural productivity (ADB 2008). In rural Cambodia there are formal and informal sources of credit. Informal sources are relatives, friends or neighbours, and private moneylenders. The former often charge no or minimal interest, while loans from the latter generally carry higher interest rates. CDRI (2012) reports that that the average interest rate charged by moneylenders in 2011 was around 6.6 percent per month,[1] compared to the mere 1 percent per month on loans from relatives and friends (Table 1). Siamwalla *et al.* (1990) relate the high interest rates charged by moneylenders to high information costs, whereas Besley (1995) associates the existence of moneylenders with their ability to get around information asymmetries and take advantage of loopholes not available to formal institutions, which are typically constrained by sanctions. The share of informal loans, particularly those extended by moneylenders, has generally declined amid the growth of formal loan providers like micro-finance institutions (MFIs). With the growing presence of formal institutions, the interest rate charged by informal moneylenders has also declined (see Table 1).

Table 1: Monthly Interest Rates

Loan source	Interest rate per month (%)			
	2001	2004	2008	2011
Relatives or friends	0.85	1.34	2.08	0.98
Moneylenders	11.14	7.84	8.07	6.65
NGOs or self-help groups	2.63	2.55	2.65	2.49
MFIs	4.19	3.74	3.12	2.60

Source: CDRI (2012)

There is evidence that Cambodian households had to incur more debt during the crisis in 2008. Faced with declining income, people had to borrow more from MFIs, private moneylenders and other social networks (Jalilian *et al.* 2009). Theng and Kem (2009) suggest that the number of MFI borrowers increased by as much as 50 percent during the first half of 2009. These new loans were used to smooth consumption, particularly to buy food or pay existing debt. The severe indebtedness reported was partly due to the high cost of borrowing, especially from private moneylenders (Theng & Kem 2009; So 2009).

Shocks may or may not affect credit markets. International economics literature suggests a decline in available credit because rural credit markets in developing countries can be negatively affected by shocks (Besley 1994). These shocks often drive farmers to default, causing lenders to tighten or cease lending despite increasing demand for credit. The other possible outcome points to a reverse situation where the amount of available credit remains largely unchanged because the lenders' loan portfolios are spread across activities or sectors not affected by shocks (*ibid*).

[1] Basu (1989) and Bouman (1989), cited in Besley 1995: 96, report that moneylenders charge between 5 and 10 percent per month.

Despite loan diversification, credit might be limited as a result of the global economic and financial crisis. It seems that formal creditors, let alone informal ones, suffered and subsequently reduced their credit supply. On the other hand, the resulting supply gap prompted the government to induce bank lending in order to encourage investment and spur growth. The upshot is that rural credit supply can either rise or decline post-crisis. While credit can help address short-term consumption crises resulting from shocks, a fall in credit supply can be bad for an economy. Lack of credit, a vital form of insurance in times of crisis, has serious implications for poverty.

MFIs' outstanding loans from 2007 to 2009 show increasing lending despite the crisis. Between 2008 and 2009, the outstanding loan amount increased by about 8 percent and the number of borrowers jumped by 6.5 percent (Table 2). Nevertheless, in the aftermath of the crisis the portfolio at risk ratio[2] (Table 3) and the number of multiple loans rose substantially (CMA 2008, 2009). To cope with the income shock, already indebted households sought further loans from other sources, thus increasing the risk of default (*ibid*).

Table 2: Cambodian MFIs' Outstanding Loans

	2007	2008	2009
Amount in Million USD million	272.00	277.06	299.30
Number of borrowers	777481	825238	878559

Source: CMA (2008, 2009)

Table 3: Portfolio at Risk Ratio of Selected MFIs (%)*

	2006	2007	2008	2009	2010
Acleda	0.34	0.06	0.29	0.76	0.43
AMK	0.02	0.02	0.05	2.14	1.42
Amret	0.02	0.01	0.15	3.04	0.59
HKL	0.45	0.12	0.12	2.89	0.86
Kredit	1.04	0.24	0.14	2.55	1.41
Prasac	0.23	0.19	0.14	1.44	0.96

* Over 90 days

Source: www.mixmarket.org/profiles-reports (accessed 7 May 2012)

[2] The proportion of loans whose repayment is delayed over a specific time.

3

EMPIRICAL SPECIFICATION

The main purpose of this study is to estimate the impact of the global financial and economic crisis on household credit. The hypothesis is that households faced with declining income had to borrow more to maintain consumption. The framework used is adapted from the credit demand function proposed by Barslund and Tarp (2008), who studied the determinants of formal and informal credit demand in Vietnam. The logistic function of demand for credit is

$$P(demand = 1) = \Phi(h(H, D)) \quad (1)$$

For longitudinal data, the model can be written as

$$Y_{it}^{*} = \alpha + \beta H_{it} + \delta D_{t} + u_{i} + v_{it} \quad (2)$$

$Y_{it}=1$ if $Y_{it}^{*}>0$ and 0 if otherwise

where household $i=1,...,n$ and year $t=1,...,4$. Here, H_{it} is a vector of household characteristics, D_t is a vector of year dummy variables, u_i is other unobserved individual specific heterogeneity and v_{it} is an error term. The main variables of interest are the year dummies and household reported shocks, particularly income shocks (explained below) which are captured in H_{it}. We observe whether these variables increase the statistical probability of a household incurring more debt.

The amount of credit demanded (provided that a household demands credit) is given by the following model

$$Z_{it} = \alpha + \beta H_{it} + \delta D_{t} + u_{i} + v_{it} \quad (3)$$

where Z_{it} is the number of outstanding loans that household *i* has in year *t*. Ideally loan size (total loan amount) rather than the number of loans should be used, but data on loan size is unreliable. We also group the dependent variables on the number of outstanding loans into formal and informal credit and observe the difference between the two. Our analysis is mainly based on the regression results from equations (2) and (3).

3.1 Description of Variables

In the logistic model, the dependent variable is the loan dummy variable, which takes the value of 1 if a household reports at least one loan and 0 otherwise. For the linear model, the predicted variable is the number of outstanding loans. Household characteristics include age, gender and education level of household head, number of dependants and adults in the household, household assets and reported shocks. Variables in household assets are total land size, total value of livestock holding and other. We employed principal component analysis (PCA) to generate an asset index for each household. The asset variables used to calculate the index consist of transport vehicles, agricultural tools and household appliances.

We used polychoric PCA technique, which deals with ordinal variables. Here, our interest is whether a household owns, for instance, a bicycle or not[3] or a house is ranked 1 to 4[4] according to the quality of construction materials. We choose polychoric PCA over normal PCA so as to avoid possible reporting errors on the value of these assets. Hence, categorical discrete household asset variables are used instead of continuous variables.

Three dummy variables are generated to capture household shocks; "weather shock" takes the value of 1 if a household reports crop failure and/or crop or other damage due to natural disasters and 0 if otherwise. "Individual shock" takes the value of 1 if a household reports the loss or injury of household member(s) and/or house fire and/or animal death/theft and/or theft or being cheated, and 0 otherwise. "Income shock" takes the value of 1 if a household reports lost wage employment and/or reduced income and/or business closure. A year dummy variable for the years 2001, 2004, 2008 and 2011 is included. In the regression model, 2008 is set as a base year so that the difference in terms of probability as well as the size of demand for credit can be measured.

The problem of attrition bias, which commonly occurs in panel data, is addressed by calculating inverse probability weights. The assumption is that households that drop out of the sample might have different characteristics than those still in the sample, meaning the remaining households would no longer be representative of the original population. In such instances, more weight should be given to households that have comparable characteristics to the households dropped from the sample than to households with characteristics that make them more likely to remain in the panel (Baulch & Quisumbing 2011). The calculated weights are factored into all data analyses, including the regressions.

3.2 Data Source

The data used in this study are taken from the household surveys for the Poverty Dynamics Study in 2001, 2004, 2008 and 2011 from nine villages in Cambodia: Ba Baong, Prek Kmeng, Trapeang Prei, Andoung Trach, Krasaing, Khsach Chi Ros, Kanhchor, Dang Kdar and Kompong Tnaot. The surveys collected information on household demographics, labour markets, housing conditions, durable and livestock assets, land ownership, credit markets, agricultural production, production expenditure, household income, common property resources and food and non-food consumption. See Tong (forthcoming) for a detailed description of the survey data sets.

[3] Such a binary variable is a special case of ordinal variable: e.g. having a bicycle is better than not having one (Kolenikov & Angelese 2008)

[4] The ranking is 1=thatch house, 2=wooden house roofed with tin sheets, 3=wooden house roofed with tiles and fibro and 4=concrete/brick house.

4

RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The statistics of the variables for loans and household characteristics are compiled in Tables 4 to 11. As shown in Table 4, the proportion of households with at least one loan ranges between 50 and 55 percent during the study periods. The figure increases slightly from 2008 to 2011. However, these figures alone are not convincing enough to conclude that people have incurred substantially more debt as a result of the 2008 crisis. Opposite trends are observed for formal and informal loans. The number of households taking informal loans is high in 2001 and 2004 but then diminishes, whereas the reverse is true for formal loans. This suggests gradual development of the financial sector, particularly in rural areas, as evidenced by the growing number of micro-finance institutions and various non-government organisations, making financial services accessible to the rural population. Because the cost of informal loans is usually high, people often turn to formal loans if they are accessible.

Table 4: Total Number of Households Holding Loans

Category	2001	2004	2008	2011
Formal loans only	98	217	254	279
Informal loans only	318	317	211	205
Both types of loan	19	67	50	53
At least one loan	397	467	415	431
(loan>=1)	50.06%	58.89%	52.33%	54.35%
No loan	396	326	378	362
	49.94%	41.11%	47.67%	45.65%
Observations	793	793	793	793

Source: Author's calculations based on Poverty Dynamics Study data

Table 5: Number of Loans

Variable	Year	Obs.	Sample mean and (std. dev)	Min	Max
Formal	2001	98	1.26 (0.56)	1	3
	2004	217	1.13 (0.34)	1	2
	2008	254	1.15 (0.37)	1	3
	2011	279	1.12 (0.37)	1	3
Informal	2001	318	1.47 (0.82)	1	4
	2004	317	1.73 (1.09)	1	7
	2008	211	1.51 (0.88)	1	7
	2011	205	1.47 (0.86)	1	6
Total	2001	397	1.49 (0.85)	1	4
	2004	467	1.69 (1.05)	1	7
	2008	415	1.49 (0.84)	1	7
	2011	431	1.45 (0.86)	1	7

Source: Author's calculations based on Poverty Dynamics Study data

The total number of household loans peaked in 2004 but declined in 2008 before rising again in 2011 (Table 5). The total number of loans increased by about 5 percent due to approximately 10 percent growth in the number of formal loans. Credit growth signals two opposite scenarios. It shows the expansion of economic activity as people incur more debt to increase investment; it reflects economic downturn or distress that people can cope with only through borrowing. Hence it is worthwhile investigating household economic well-being and use of loans during the study period.

Table 6: Total Number of Loans by Type

Loan Type	2001	2004	2008	2011
Formal	118	249	282	312
	20.24%	32.21%	47.47%	50.08%
Informal	465	524	312	311
	79.76%	67.79%	52.53%	49.92%
Total	583	773	594	623

Source: Author's calculations based on Poverty Dynamics Study data

Table 7 reports the sources of loans. In the early years, households depended mostly on relatives or friends, followed by moneylenders. In 2001, just over half of loans were from relatives and friends compared to 37.5 percent from moneylenders and just 7 percent from MFIs. Borrowing from relatives and friends dropped to 20 percent in 2011. Loans from moneylenders, despite a slowdown in 2008, shot up to 30.5 percent in 2011, suggesting economic hardship that year as relatives or friends could no longer afford to help as much as in less distressed times. In such instances, people had to turn to moneylenders as well as microfinance institutions. Loans from NGOs and self-help groups doubled in 2004, but the number soon dropped to more or less the 2001 level. The declining share might be due to the expansion of MFIs and the fact that some NGOs transformed into MFIs.[5] In 2011, loans from NGOs and self-help groups increased by about one-fourth, suggesting the need for similar credit programmes to support households during economic strife.

Table 7: Sources of Loans

Source	2001		2004		2008		2011	
	N	%	N	%	N	%	N	%
Relatives or friends	267	50.57	282	36.81	183	30.81	123	20.00
Moneylenders	198	37.50	242	31.59	129	21.72	188	30.57
NGOs or self-help groups	27	5.11	84	10.97	27	4.55	35	5.69
MFIs	36	6.82	158	20.63	233	39.23	237	38.54
Other	—	—	—	—	22	3.70	32	5.20

Source: Author's calculations based on Poverty Dynamics Study data

As presented in Table 8, households primarily use loans for investing in farming and/or other business. The figure peaks at 62 percent in 2008 from 43 percent in 2004 and then subsides to about 54 percent in 2011. The second use of loans is for coping with household needs, as illustrated by loans taken to offset food shortages and pay for health care. A high proportion of loans was used to buy food in 2004 but this dropped in 2008 and 2011, signalling households' better standard of living. This is consistent with the finding on household consumption, which is

[5] For example, the Cambodian Health Committee transformed from an NGO to an MFI named SAMIC in 2005.

generally used as a proxy for standard of living. Consumption per capita increased and peaked just before the crisis hit in 2008, but then slowed down in 2011 (Table 9). Tong (forthcoming) finds that the Cambodian household standard of living declined substantially after the crisis; it has since gradually improved but has not yet recovered to pre-crisis level.

Table 8: Use of Loans

	2004				2008				2011			
Purpose	FL	INFL	TL	%	FL	INFL	TL	%	FL	INFL	TL	%
Expenditure on other businesses	88	107	195	25.23	131	88	219	36.87	102	56	158	25.36
Expenditure on farm business	65	72	137	17.72	65	84	149	25.08	86	91	177	28.41
Offset food shortages	39	143	182	23.54	27	47	74	12.46	29	46	75	12.04
Curing ill household member(s)	15	93	108	13.97	15	42	57	9.60	19	45	64	10.27
Building/renovating house	19	52	71	9.18	21	20	41	6.90	24	19	43	6.90
Settling outstanding loan(s)	11	12	23	2.98	4	4	8	1.35	14	24	38	6.10
Costs of job search	2	12	14	1.81	7	6	13	2.19	3	3	6	0.96
Weddings and ceremonies	2	14	16	2.07	5	9	14	2.36	0	2	2	0.32
Education	0	2	2	0.26	1	2	3	0.51	1	0	1	0.16
Others	8	17	25	3.23	6	10	16	2.69	34	25	59	9.47

Note: FL = formal loan; INFL = informal loan; TL = total loan.

Source: Author's calculations based on Poverty Dynamics Study data

Table 9: Household Daily per Capita Consumption

	Mean consumption (per capita per day in riels)		
Year	Food	Non-food	Total
2001	1253	765	2017
2004	1475	768	2244
2008	2692	1442	4133
2011	2544	1551	4094

Source: Author's calculations based on Poverty Dynamics Study data

The upshot is that loans primarily serve two purposes: investment in productive activities and risk management strategies. These show opposite trends. When the economic situation is depressed, more loans are used to buy household food. When the economy is expanding, loans are used more for investment. Another significant observation is that the slowdown in loans for investment after the crisis is associated with repaying existing debts rather than food purchases. This partly explains that households may have incurred more debt in the immediate post-crisis period.

Although the number of loans used to smooth food consumption in 2011 was comparable to the pre-crisis period in 2008, this does not necessarily mean that additional households were not facing food shortages. Perhaps more households faced food shortages but, because they could not afford a loan, instead resorted to buying cheaper food. This strategy is well documented by Chan (2009).

Table 10 summarises the other variables used in our analysis. As of 2011, the average age of household heads was 51 years, within a range of 20 to 88. Household heads generally do not

complete primary education, having an average of just four years' schooling; female household heads' educational attainment (two years) is lower than males' (four years). About 20 percent of household heads in the sample are female. The average number of adults per household is four and that of dependants two, making an average household size of around six, which is common for rural households in Cambodia. The mean size landholding per household is almost two hectares, but only around 34 percent of households own two hectares or more.

In 2011, the mean value of livestock per household was roughly 2 million riels or around USD500. One interesting feature highlighted in Table 10 is that the value of livestock per household, landholding size and asset index were higher in 2008 and 2011 than in 2001 and 2004, suggesting higher investment in agriculture and a better standard of living. However, what needs to be observed is the change between 2008 and 2011, i.e. before and after the crisis. As shown in Table 11, both landholding size and livestock value decreased, but the differences are not statistically significant, whereas the asset index improved considerably in 2011 and the mean difference is statistically significant at the 1 percent level.

Table 10: Household Characteristics

	2001			2004			2008			2011		
Variables	Obs.	Mean	Std.	Obs.	Mean	Std.	Obs.	Mean	Std.	Obs.	Mean	Std.
HHH Age	793	43.74	11.83	793	47.21	11.61	793	48.36	11.45	793	51.80	11.56
Landholding (ha)	669	1.49	1.71	680	1.46	1.54	637	2.01	2.45	636	1.94	2.61
Total land squared	669	5.14	16.72	680	4.50	13.13	637	10.06	50.77	636	10.57	47.70
HHH Education[a]	793	3.88	2.95	786	3.61	2.94	785	3.72	2.95	786	3.70	3.13
Adults	793	3.38	1.42	793	3.59	1.70	793	3.76	1.67	793	3.77	1.69
Dependants	793	2.75	1.68	793	2.43	1.55	793	2.10	1.44	793	1.89	1.45
Livestock[b]	793	127.21	258.68	793	180.35	270.09	793	239.58	350.47	793	209.48	329.28
Asset index	793	−0.45	1.01	793	−0.07	1.08	793	0.39	1.07	793	0.58	1.14

Note: HHH: Household head. [a] Years of schooling. [b] Value of livestock is in ten thousand riels.

Source: Author's calculations based on Poverty Dynamics Study data

Table 11: Mean Comparison Test between 2008 and 2011

Variables	Mean difference	Std.	t-value
Total land (hectares)	−0.07	0.17	−0.39
Livestock	−30.10	20.10	−1.50
Asset index	0.18***	0.07	2.80

Note: The null hypothesis for this test is that the mean difference is not statistically different from zero. *** indicates statistical significance at 1% levels.

Source: Author's calculations based on Poverty Dynamics Study data

4.2 Regression Results

Table 12 presents the estimation results of equation (2), where the dependent variable is a binary variable equal to 1 if a household reports at least one loan and 0 otherwise. We report the estimates using both fixed- and random-effects models although the former is preferred because the probability value from Hausman's test rejects the assumption of the random-effects model. For ease of interpretation, the odds ratios of each predictor variable on the probability of credit demand are reported instead of normal coefficients because marginal effects for non-linear logistic estimations using longitudinal data are not easy to obtain.

We are primarily concerned with two determinant variables: income shocks and the year 2011 dummy. The income shocks variable captures the increasing probability of demand for credit *during* the crisis as a result of income shocks. The year 2011 dummy captures the probability of demand for credit *after* the crisis. As expected, income shocks increase the probability of demand for credit; the probability of a household facing income shocks during the crisis is 0.5 times larger than that of a household not facing such shocks. Likewise, households tend to borrow more after the crisis; the probability for year 2011 is 0.3 times greater than for year 2008. It is also worth discussing some of the important determinants in this credit demand model. Our results are very consistent with those found by Barslund and Tarp (2008).

The odds of borrowing for households with bigger landholdings are higher than for those with smaller landholdings: a one hectare increase in landholding corresponds to 1.1 times increase in the probability of borrowing. This can be reasoned in two ways. Households with bigger landholdings have the opportunity to borrow more because land can be used as collateral, and they are encouraged to take out loans to invest in agricultural production. However, the results in Table 13 show that loans could be used for either investing in agricultural production or other purposes, including coping with shocks. There is of course evidence for the latter.

Sex and educational attainment of the household head had no effect on the household's demand for credit. This is not surprising, at least in the rural setting. The probability of borrowing increases in tandem with the number of either adults or dependants. While we expect that having many dependants tends to increase a household's likelihood of borrowing to cope with daily consumption, households with many adults also have higher borrowing odds because each adult member is qualified to borrow either for investment or to cope with individual needs. This is the opposite of the expectation that more adults mean greater income sources and hence a lower likelihood of borrowing.

Households with greater wealth and many livestock have lower borrowing odds. These findings are contrary to Barslund and Tarp's (2008). Although land can be used as collateral, household assets and livestock cannot. Barslund and Tarp argue that greater asset value, including factors of production, increases the probability of borrowing for agricultural investment. In Cambodia, household assets and livestock tend to be liquid assets that can be readily sold to cope with needs instead of borrowing. The household survey reveals that in 2011, for example, about 8 percent of households sold assets, including livestock.

Lastly, not only do income shocks increase the probability of a household borrowing but so do individual shocks including death of household member(s), sickness and injury, house fire and theft.

Table 13 reports the regression results using the number of formal and informal loans as dependent variables (equation 3). Our aim is to investigate whether the variables of interest have significant impact on households taking out more loans, and to see whether the results are consistent with the findings above. We report only the fixed-effects results because Hausman's test statistics reject the random-effects model. Some interesting findings emerge.

More land is associated with more formal loans, but not with more informal loans. This confirms that land serves either as collateral or factor of production for further investment. Moneylenders and the like do not demand assets such as land as collateral. Households with more adults tend to seek formal rather than informal loans. This is logical in that a larger available labour force induces households to invest more in their current business so they are more likely to take formal loans at lower interest rates. However, households with more

dependants are likely to take out informal rather than formal loans; they are likely to suffer from food shortages and therefore resort to informal loans, which can be acquired immediately.

Table 12: Determinants of Credit Demand during Crisis

	Logit (Y=1)			
	(1)		(2)	
Dependent variable (Y) Loan (0= no loan; 1=at least one loan)	Fixed effects odds ratio		Random effects odds ratio	
HHH Age	1.003	(0.007)	0.984***	(0.004)
Landholding	1.123***	(0.040)	1.021	(0.023)
HHH Gender	0.808	(0.148)	0.769**	(0.093)
HHH Education	1.016	(0.026)	1.003	(0.016)
Number of Adults	1.141***	(0.047)	1.172***	(0.034)
Number of Dependants	1.162***	(0.044)	1.172***	(0.034)
Livestock	0.940***	(0.020)	0.920***	(0.016)
Wealth	0.784***	(0.059)	0.720***	(0.035)
Weather shocks	0.934	(0.109)	0.926	(0.095)
Individual shocks	1.211**	(0.107)	1.292***	(0.105)
Income shocks	1.677*	(0.427)	1.181	(0.278)
Year 2001	0.729**	(0.105)	0.639***	(0.078)
Year 2004	1.017	(0.113)	0.955	(0.100)
Year 2011	1.320**	(0.145)	1.414***	(0.150)
Number of observations (groups)	1684 (440)		2604 (735)	
Pseudo R-squared	0.029		—	
Probability > chi-squared	0.000		0.000	
Log-likelihood	1033.900		−2841.152	
Hosmer-Lemeshow probability > chi-squared	0.362		—	

Notes: Numbers in parentheses are adjusted standard errors for number of clusters in group variable. P-value of Hausman's test is 0.000 means null hypothesis is rejected in favour of fixed-effects model. We perform model specification of the link function by running a new regression with the observed Y (loan) against fitted value $\hat{Y}$ and $\hat{Y}2$ as independent variables. The coefficient of $\hat{Y}2$ is statistically insignificant, which means the model is correctly specified. *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

More wealth decreases the number of informal loans but has no relationship with formal loans. This is consistent with the finding above. As shown in Table 8, when dealing with shocks, households often resort to informal rather than formal loans. For instance, in 2004, 81 percent of the total loans to offset food shortages and treat ill household members were informal; the figure decreased to 68 percent in 2008 and 65 percent in 2011 in tandem with the declining share of loans taken to cope with such shocks.

Use of Loans: We regress the same explanatory variables on loan use so as to identify which types of loans households incurred following the crisis. As shown in Table 14, column b, we find no evidence that, because of the crisis, households used loans to address food shortage. Food loans incurred in 2011 were not a result of the global economic and financial crisis but were taken by poorer households whose income could not guarantee sufficient food. This is also consistent with the descriptive statistics—that after the crisis, the proportion of loans used for coping with food shortages remained more or less the same.

Table 13: Determinants of Formal and Informal Credit during Crisis

	Fixed Effects			
Dependent variable Number of loans	Formal coefficient		Informal coefficient	
Age	−0.002	(0.002)	−0.002	(0.003)
Landholding	0.017**	(0.007)	−0.014	(0.011)
Gender	−0.058	(0.048)	−0.016	(0.073)
Education	0.003	(0.007)	−0.005	(0.010)
Adults	0.032***	(0.011)	0.021	(0.017)
Dependants	0.016	(0.010)	0.058***	(0.015)
Livestock	−0.006	(0.004)	0.002	(0.007)
Wealth	−0.009	(0.020)	−0.060**	(0.030)
Weather shocks	−0.011	(0.031)	−0.001	(0.047)
Individual shocks	0.026	(0.024)	0.055	(0.036)
Income shocks	−0.086	(0.062)	0.284***	(0.095)
Year 2001	−0.203***	(0.037)	0.081	(0.057)
Year 2004	−0.033	(0.029)	0.168***	(0.044)
Year 2011	0.059**	(0.028)	0.041	(0.043)
Constant	0.291**	(0.113)	0.284*	(0.172)
Number of observations (groups)	2604 (735)		2604 (735)	
R-squared (overall)	0.053		0.044	
Probability > F	0.000		0.000	

Notes: Numbers in parentheses are standard errors. We report only the results from fixed-effects model regression. *, **, and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

However, we find a positive significant relationship between crisis and loan use for farm investment and debt repayment. Income shocks caused by either the global economic and financial crisis or other difficulties meant households had insufficient funds to finance their farm investment, and consequently they sought loans to bridge the gap. As shown in Table 14, column a, households reporting income shocks are associated with around 9 percent more loans than those who do not report income shocks. Likewise, income shocks caused by the global economic and financial crisis rendered households unable to repay existing debts, so they had to take on more debt to settle outstanding loans. This is consistent with the findings by the CMA that crisis increases the number of multiple loans taken by households. These regression results are consistent with the descriptive statistics in that the number of households taking loans for farm investment and debt repayment increased between 2008 and 2011 (Table 8).

We also regress the independent variables on other loan uses such as investment in business other than farming and expenditure on weddings and ceremonies (results not reported), but there is no evidence as to whether the rising number of loans for these purposes is associated with the global economic and financial crisis.

Table 14: Effects on Loan Use

	Fixed Effects		Random Effects			
	a		b		c	
Dependent Variable Loan Use (# of loans)	Farm Investment Coefficient		Food Consumption Coefficient		Debt Repayment Coefficient	
Age	0.001	(0.002)	−0.001**	(0.001)	−0.0001**	(0.0003)
Landholding	−0.002	(0.007)	−0.006*	(0.003)	−0.001	(0.001)
Gender	−0.030	(0.043)	0.005	(0.019)	0.003	(0.008)
Education	0.005	(0.006)	−0.001	(0.003)	0.001	(0.001)
Adults	0.013	(0.010)	0.017***	(0.005)	−0.001	(0.002)
Dependants	0.017*	(0.009)	0.013***	(0.004)	0.0003	(0.002)
Livestock	−0.003	(0.004)	0.000	(0.002)	−0.002	(0.001)
Wealth	−0.024	(0.017)	−0.032***	(0.007)	0.000	(0.003)
Weather shocks	−0.025	(0.027)	0.019	(0.017)	−0.002	(0.008)
Individual shocks	−0.062***	(0.021)	0.008	(0.013)	0.004	(0.006)
Income shocks	0.092*	(0.055)	−0.010	(0.035)	−0.001	(0.016)
Year 2001	−0.234***	(0.033)	−0.110***	(0.020)	−0.008	(0.009)
Year 2004	−0.049*	(0.026)	0.111***	(0.017)	0.013*	(0.008)
Year 2011	0.040	(0.025)	0.020	(0.017)	0.026****	(0.008)
Constant	0.152	(0.100)	0.048	(0.043)	0.014	(0.017)
Number of observations (groups)	2604 (735)		2604 (735)		2604 (735)	
R-squared (overall)	0.054		0.077		0.0096	
Probability > F	0.000		0.000		0.029	

Notes: Numbers in parentheses are standard errors. We report only the results from fixed-effects model regression. *, **, and *** indicate statistically significant at 10%, 5% and 1% levels, respectively.

5

KEY FINDINGS AND CONCLUSIONS

Using longitudinal household data of the Poverty Dynamic Study (CDRI 2012), this paper examines the effects of the global financial and economic crisis on loans. The main findings of this paper can be summarised as follows.

First, the global financial and economic crisis increased the probability of households borrowing. While the observed year designated as post-crisis is 2011, we believe that the probability of households demanding credit increased even more in the immediate aftermath of the crisis, perhaps in 2009–10. Second, the reported income shocks—arguably partly a product of the crisis—also have a positive relationship with the probability of borrowing. Results from other important control variables are mixed compared to the literature. Both adults and dependants increase the probability of household borrowing. The former are qualified to take loans while the latter induce households to borrow more to smooth daily consumption. Assets such as land have a positive effect on credit demand as land can be used as collateral, yet other assets such as livestock and valuables tend to have lower borrowing probabilities. These assets are more liquid than land and hence can be readily sold to cope with immediate needs.

Consistent and interesting findings emerge when we disaggregate loans into formal and informal. First, the crisis induced households to borrow more both formally and informally, but the effects on formal loans were stronger. This suggests that the role of formal credit such as micro-finance was even more important during the crisis. Our data on the number of outstanding MFI-sourced loans during the crisis, which is higher than in the pre-crisis period, verify this claim. Second, reported income shocks show a positive relationship only with informal loans.

The finding on loan use suggests that more loans were taken during the crisis, although these were not used for addressing food shortages but for farm investment and debt repayment. Households need not only to ensure that their income covers daily consumption but must also allocate some of their income for farm investment to secure future consumption. They also have to use some income to repay debts. Our evidence shows that during the crisis households could neither afford to buy inputs for farm investment nor settle outstanding debts; hence they had no choice but to borrow.

The study findings can contribute to policy interventions in Cambodia. They reiterate the important role of a formal rural credit market at times of crisis. While people often resort to informal credit sources during economic hardship, expanding the outreach of formal credit definitely helps. The promotion of rural credit should also be geared towards the agricultural sector, upon which the majority of the rural population depend.

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