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Impact of the Global Financial Crisis on Poverty: Evidence from Nine Villages in Cambodia

TONG Kimsun

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March 2013

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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

ADB	Asian Development Bank
CDRI	Cambodia Development Resource Institute
CSES	Cambodia Socio-Economic Survey
GDP	Gross Domestic Product
SMEs	Small and Medium Enterprises

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ABSTRACT

This paper investigates the impact of the global financial and economic crisis on Cambodian rural households, mainly focussing on trends in household consumption and poverty, i.e. the poverty headcount ratio, poverty gap and squared poverty gap, using four-period panel data covering the years 2001, 2004, 2008 and 2011.

Descriptive statistics reveal that all study villages except Andoung Trach experienced a sharp drop in consumption per capita between 2008 and 2011. As a result, the 2011 poverty headcount ratio shot up by 52.4 percent compared to 2008. The stochastic dominance approach reconfirms that the poverty headcount ratio in the nine study villages in 2011 definitely increased compared to 2008, regardless of poverty line. Furthermore, our sub-sample data (90 households) reveal that the poverty headcount ratio in 2009 was higher than in 2011. This suggests that food and oil price increases and the global financial crisis hit Cambodia's economy hardest in 2009, after which the economy started to recover slowly.

In line with our descriptive results, the econometric approach (random-effects and population-average probit models) also confirm that the global financial and economic crisis is likely to have increased the poverty headcount ratio by 37 to 44 percent. However, taking into account the fact that food and oil price increases and the global financial crisis hit Cambodia's economy hardest in 2009, the increase in the poverty rate could be even higher.

1

INTRODUCTION

Repercussions of the global financial and economic crisis that originated in the United States quickly spread to many countries around the globe, including developing countries such as Cambodia. It is widely acknowledged that the crisis could affect developing countries in two ways. First, there could be financial contagion and spillovers for stock and bond markets. Second, a protracted economic downturn in developed countries could impact on four chief resource flows to developing countries—trade, international capital, remittances and aid—which could affect firms and households through transmission channels such as taxes and transfers, prices, assets, employment, investment and access to goods and services. Consequently, the financial crisis could translate into higher poverty and slower progress towards the Millennium Development Goals.

Chen and Ravallion (2009), in their study of the impact of the crisis on the world's poorest, predicted that it would push 53 million more people below the international poverty line of USD1.25 a day and that the incomes of an additional 64 million would drop to less than USD2 a day in 2009. Given the low country-specific economic growth projections for 2010, they estimated that a further 73 million people would be living on less than USD1.25 a day and 91 million more on less than USD2 a day by the end of 2010. However, the poverty rate was still expected to decline, albeit at a slower pace, over time. It was estimated that the poverty rate based on a per capita daily income of USD1.25 would fall from 21 percent in 2008 to 18 percent (1040 million people) in 2009, and incomes of USD2 a day were expected to fall from 42 percent in 2008 to 39 percent (2232 million people) in 2009.

Several studies have attempted to measure the impact of the global crisis on poverty in Cambodia (Tong *et al.* 2009; World Bank 2009; ADB 2008). They all report that the number of poor has increased significantly compared to the pre-crisis period, but their findings are limited by some methodological shortcomings. Tong *et al.* (2009) did not take into account the effect of idiosyncratic shocks that can also lead to a rise in poverty, and, furthermore, their study sample of only 90 households is small. The ADB (2008) study to estimate the impact of increased oil and food prices and the World Bank (2009) report on the effects of the global financial crisis both failed to state clearly their sampling methods.

In contrast to earlier research on the issue, this study benefits from using a unique long panel data set compiled by CDRI covering 793 households in nine villages over 2001–11. This allows us to control for idiosyncratic shocks and other unobserved factors that affect poverty, thus providing insights and deepening understanding of the impacts of the economic crisis on poverty dynamics as they began to be felt by rural households and communities, and which can usefully inform policy responses and strengthen social protection systems.

The rest of this paper is organised as follows. Existing poverty impact assessments are reviewed in section 2. Data sources used for the study and data limitations are illustrated in section 3, and the econometric approach used to analyse the data is described in section 4. Empirical findings are discussed in section 5, and section 6 concludes.

2

LITERATURE REVIEW

Since the first murmurs in the United States in September 2008, the crisis has exploded into a systemic economic and financial crisis affecting the entire world, but especially developing countries and newly emerging markets. A spate of research and rapid assessments of the likely consequences ensued. A number of pioneering studies attempted to assess its effects on Cambodia's economy. Kang *et al*. (2009) investigated the effect on Cambodia's economy based on focus group discussions, in-depth interviews and multiplier frameworks. They reveal that a significant decline in economic activity was evident in textiles and clothing, construction, tourism and real estate. Job losses were also noticeable in those sectors, particularly in garments and construction.

Jalilian *et al.* (2009) and Jalilian and Reyes (2010) confirm the severe impact of the crisis, which was mainly channelled via contraction in garments, tourism and construction. Growth in clothing export values and volumes remained strong until the third quarter of 2008, but annual growth of total clothing export values had turned negative by November 2008 and reached a low of -24 percent in April 2009 before rising to about 18 percent in September 2009. The difficulty that the domestic garment industry has been facing is also partly explained by its lack of competitiveness and diversification. In terms of three-month moving averages, the value of Cambodia's garment exports to the United States shrank by about 20 percent in the first nine months of 2009 relative to the same period in 2008, while the corresponding values for China and Bangladesh increased by 6 percent and 2.5 percent, respectively. The majority of garment factories in Cambodia are involved in clothing assembly and provide cut-make-trim services—the simplest and lowest value-added activity on the value chain. The number of international visitor arrivals started to decline in early 2008, and registered negative growth for seven months from October 2008 before turning positive in June 2009. In addition to the global financial crisis, internal political crisis in Thailand, which led to the closure of the Thai international airport in November 2008, the Thai-Cambodia border standoff and concern over the spread of the H1N1 virus might also have had both direct and indirect effects on Cambodia's tourism. The construction sector was hit hard by the global financial crisis because of investors in real estate either scaling back or suspending their projects. Also, most major construction projects in the country have been predominantly foreign-financed. With weaker prospects for the Cambodian economy in the medium term and global tightening in liquidity squeezing commercial lending, foreign investors suspended or cancelled their mega-projects; Korean-financed projects, for example, were particularly affected by depreciation of the won and the liquidity crunch in parent companies. As a result, construction growth decelerated from 6.7 percent in 2007 to -0.3 percent in 2008 and declined further to -5.7 percent in 2009. Contraction in construction came close on the heels of the bursting of the real estate bubble in late 2008: due to declining incomes and the credit crunch, property prices—which, driven by speculative mania, had risen rapidly since 2002—dropped by 25 to 40 percent and sales fell by between 50 and 80 percent. Consequently, the country's high average economic growth of around 9 percent (2000–08) dropped to 0.1 percent in 2009 before recovering to 5.0 percent in 2010, and the level and severity of poverty increased.[1] Based on the international poverty

[1] In addition to the 4.5 million people already living in poverty in Cambodia, it is estimated that a further 2 million have fallen below the poverty line due to the food and fuel crises (ADB 2008).

line of USD1.25 a day, the World Bank (2009) estimated that the global financial crisis would increase the number of poor by 200,000 to 500,000.

Taking a different approach to previous studies that did not take other possible factors into account, Khin and Ryuta (2010) used conventional computable general equilibrium models to measure the impact of the global financial crisis on Cambodia's garment exports and its economy. They found that the welfare cost of the global crisis was at least USD281 million, resulting in a 0.3 percent decrease in GDP and 208,000 direct job losses in the garment sector. They also pointed out that the two-year tax policies proposed by the government could reduce the negative impact of the crisis only by USD32 million. Hence, the government needs to inject at least USD304 million to neutralise the impact of the crisis.

To supplement macro and sectoral studies on Cambodia, Tong *et al.* (2009) examined trends in household income, income sources, consumption, asset acquisition, debt and risk-coping strategies using two-period panel data (March 2008 and May 2009) covering 90 households in nine rural villages. They reported that income per capita, consumption per capita and non-land assets dropped substantially between 2008 and 2009. They further noted that the number of indebted households, loans, average size of loans and interest rates remained unchanged; households hit by mainly idiosyncratic shocks appeared to have adopted coping strategies; and the poverty incidence in 2009 was higher than in 2008 for a wide range of poverty lines up to around 6000 riels.

Chan and Ngo (2010) used pooled data (June 2008–July 2009) from a survey of 996 households and focus group discussions in 14 villages to assess the household impact of the crisis by examining changes in household assets, income and income sources, and the difficulties encountered and responses or coping strategies adopted by households.[2] They found that the global financial crisis had a significant impact on community households and people, particularly in poor urban, tourism dependent and cash crop villages. Using the same data set, Ngo and Chan (2010) extended their analysis to explore the effect of the crisis on women and concluded that women and female-headed households suffered the most.

Although various studies have attempted to assess the impact of the crisis on Cambodia's economy at macro, sectoral, community and household levels, little is known about the changes in incidence, depth and severity of poverty in Cambodia during the crisis. Such understanding has been largely constrained by the absence of panel data (the same households interviewed repeatedly over time) on household income and consumption covering pre-crisis, crisis and post-crisis periods. The latest data for household welfare comparison are now available from the 2011 household survey conducted by CDRI. Using this unique data set, the rest of the paper illustrates how the global financial crisis has affected poverty incidence, poverty gap and squared poverty gap.

[2] The authors surveyed 1070 households in 15 villages; 14 of these villages (996 households) were surveyed in June 2008.

3

DATA SOURCES

In 1996–97 CDRI started to collect significant information from 244 households in three villages—Ba Baong, Prek Kmeng and Trapeang Prei—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.[3] The survey data were originally intended for a study on food security (Murshid 1998) but were poorly recorded and unlikely to be of much use for other studies.

However, in order to examine the challenges to rural livelihoods (Chan & Acharya 2002; Kim *et al.* 2002), households in six more villages (Andoung Trach, Krasang, Khsach Chi Ros, Kanhchor, Dang Kdar, Kompong Tnaot) were added to the original sample in 2001, bringing the total sample to 1005 households. Since then two follow-up surveys (in 2004–05 and 2008) have been carried out in the nine villages to examine poverty dynamics (Fitzgerald & So 2007; CDRI 2012). Data were collected in two rounds in each survey year: the first round in March (dry season) and the second in September (wet season).[4] To investigate the effects of the global crisis on Cambodian households, a mini-survey (90 households) was conducted in May 2009 in the same nine villages (Tong et al. 2009). Following this initial rapid assessment, two further rounds were carried out in 2011. In addition, two villages, Prey Nob Muoy and Bos in Sihanoukville and Preah Vihear provinces, were included to gain a more comprehensive picture of rural livelihoods.[5]

Table 1: Sample Size, 2001–11

	Number of households in 2001	Sample size in 2001	Final sample in 2011 (excluding round 2)	Dropped out	Attrition %
Andoung Trach	196	85	57	28	32.94
Krasang	228	120	83	37	30.83
Khsach Chi Ros	305	120	84	36	30.00
Prek Kmeng	339	120	105	15	12.50
Ba Baong	536	127	108	19	14.96
Kanhchor	278	120	104	16	13.33
Dang Kdar	306	125	97	28	22.40
Trapeang Prei	68	68	47	21	30.88
Kompong Tnaot	348	120	108	12	10.00
All villages	2604	1005	793	212	21.09

Source: CDRI rural household survey (2001–11)

[3] Households were randomly selected from Ba Baong (100) and Prek Kmeng (80), whereas all households in Trapeang Prei were surveyed.

[4] The first round of the 2004–05 survey was done in September 2004 and the second in March 2005.

[5] The detailed descriptive statistics of the two additional villages will be published separately as *Rural Livelihood: A Perspective from 11 Villages in Cambodia* (Sry & Tong, forthcoming)

The second survey round has always excluded some questions regarding housing conditions, durable assets, livestock and land holdings; therefore, we decided to use data from the first round only for this study. During 2001–11, approximately 21 percent of the original 1005 households in the 2001 sample dropped out of the panel (Table 1). The most common reason for attrition was migration. The estimated probit model showed that attrition was a more common occurrence for households in Krasang, Andoung Trach, Khsach Chi Ros, Dang Kdar and Trapeang Prei, for households with fewer children aged 7–14, fewer livestock and less agricultural land and for households whose head had low education (Appendix 1).

Table 2: Sample Statistics, 2001–11

	2001	2004	2008	2011
Children aged 0-6	1.01	0.87	0.74	0.64
Children aged 7-14	1.44	1.37	1.16	0.99
Adult males aged 15-64	1.48	1.59	1.73	1.81
Adult females aged 15-64	1.65	1.72	1.83	1.80
Adults aged 64+	0.23	0.26	0.30	0.32
HHH sex (1=male)	0.81	0.78	0.77	0.76
HHH age (years)	43.84	46.70	47.82	51.36
HHH marital status (1=married)	0.84	0.81	0.79	0.78
HHH education (1=primary)	0.49	0.52	0.54	0.48
HHH education (1=secondary or higher)	0.23	0.21	0.23	0.22
HHH occupation (1=agriculture)	0.42	0.36	0.33	0.28
Land dummy (1=landless)	0.14	0.13	0.18	0.18
Land dummy (1=<1ha)	0.40	0.33	0.25	0.25
Land dummy (1=1-2 ha)	0.26	0.34	0.25	0.29
Land dummy (1=2-3 ha)	0.10	0.11	0.15	0.12
Land dummy (1=3-4 ha)	0.04	0.03	0.07	0.06
Land dummy (1=>4 ha)	0.05	0.05	0.10	0.09
Durable index[6]	0.06	0.46	0.78	0.86
Livestock index	0.01	0.07	-0.09	-0.26
House dummy (1=wooden)	0.47	0.60	0.76	0.84
House dummy (1=concrete)	0.01	0.01	0.01	0.01
Toilet (1=having toilet)	0.10	0.09	0.15	0.19
Cooking fuel (1=self-collected firewood)	0.95	0.94	0.90	0.90
Shock dummy (1=individual shock)	0.61	0.28	0.11	0.07

Note: Sampling weight is applied, HHH: Household Head.
Source: CDRI Household Survey Data (2001–11)

[6] The durable asset and livestock indices are constructed by using the principal component approach proposed by Filmer and Prichett (1998). The variables that we use to obtain the durable asset index are radio, television, bicycle, motorcycle, animal cart, sewing machine, boat, plough/harrow and rice mill; cow, buffalo, pig, horse, chicken, duck and fish are the variables for the livestock index.

The descriptive statistics in Table 2 show that the number of children aged 0-14 declined gradually over the period 2001 to 2011, while the number of adults aged 15 and above increased. The majority of household heads are male and married, but the proportion of male household heads was declining over the study period, indicating that females are likely to have a broader role in Cambodian rural society. There were more single-headed households in 2011 than in 2001. In 2011, approximately 28 percent of household heads said their main occupation was agriculture compared to 42 percent in 2001, and 50 percent reported having attended primary school while only 20 percent had secondary or higher education.

The information related to household heads seems to be inconsistent over the study period. For instance, the proportion of household heads with primary school education was reportedly 49 percent in 2001, 52 percent in 2004, 54 percent in 2008 and 48 percent in 2011, and the average age of household head was 44 in 2001, 47 in 2004, 48 in 2008 and 51 in 2011. Given the average age of 44 years (minimum 20 years) in 2001, the proportion of household heads with primary education would not be expected to increase in the following surveys. That the difference between average household head age in 2004 and 2008 is only one year suggests that some sample households had a new head. These examples illustrate the critical problem of eliminating measurement error when using the recall method.

Over the past decade, the proportion of households without agricultural land has edged up from 14 percent in 2001 to 18 percent in 2011, while the proportion with agricultural landholdings of less than one hectare has declined from 40 to 25 percent. To some extent, the number of households with agricultural landholdings of more than one hectare has likely increased. The average size of agricultural landholding per household increased slowly from 1.50 hectares in 2001 to 1.58 hectares in 2004, and continued to expand to 2.19 hectares in 2008 before dropping slightly to 2.12 hectares in 2011. The sharp jump (39 percent) in agricultural landholding per household between 2004 and 2008 could reflect the combination of the property bubble in 2007–08 and increased forest land conversion due to high land prices.

Long-run welfare indicators such as the ownership of durable assets and housing characteristics (primary construction materials: thatch, wood, concrete) improved significantly over the study period. This is clear from the remarkable increase in the durable assets index from a mere 0.06 in 2001 to 0.86 in 2011, and the rise in the number of wooden houses from 47 percent in 2001 to 84 percent in 2011. It is also worth noting that the proportion of households with access to toilet facilities reached 19 percent in 2011—an increase of 9 percentage points since 2001—reflecting improved sanitation coverage in rural communities.[7] However, the majority of rural households are still heavily dependent on collecting firewood for cooking; they are also less likely to raise livestock now than 10 years earlier.

To reflect the most common short-term household welfare indicators, we use consumption rather than income. This is because income always tends to be underestimated[8]—it rises and falls over a lifetime and is subject to seasonal fluctuations, whereas consumption remains relatively stable (Haughton & Khandker 2008). Consumption per capita was calculated by dividing the value of total household expenditure on both food and non-food items by the number of household adult equivalent members.[9] All nominal values were converted to constant

[7] Using CSES 2007, Tong and Sry (2011) report that 22 percent of rural households have toilet facilities in or near their houses; this discrepancy is largely due to the sampling frame.

[8] Income was reported to be nearly half the size of consumption in 2001 (Tong 2012).

[9] The consumption of children aged 0-14 years is assumed to be half that of adults aged 15 years and over.

2001 prices using updated village price indices constructed by Albert (2009).[10] Based on these village price indices, total poverty lines were also updated using methods proposed by Albert (2009).

Table 3: Daily per Capita Consumption by Village

	Consumption per capita at 2001 prices (riels)				Growth Rate (%)		
Village	2001	2004	2008	2011	2004	2008	2011
Krasang	2387.2	2123.9	3136.2	2694.5	-11.0	47.7	-14.1
Andoung Trach	1520.0	1716.7	2063.7	2428.2	12.9	20.2	17.7
Trapeang Prei	1047.7	1584.8	2983.6	1739.3	51.3	88.3	-41.7
Khsach Chi Ros	1930.4	1651.1	1896.5	1344.1	-14.5	14.9	-29.1
Dang Kdar	1638.1	1433.4	2942.6	2038.7	-12.5	105.3	-30.7
Kompong Tnaot	2687.4	2102.8	3038.8	2402.5	-21.8	44.5	-20.9
Prek Kmeng	2411.3	2808.0	3639.4	2398.5	16.5	29.6	-34.1
Kanhchor	1867.9	2199.6	2313.6	1889.7	17.8	5.2	-18.3
Ba Baong	1916.0	2000.4	2782.2	2146.7	4.4	39.1	-22.8
Total	2057.1	2035.3	2802.1	2146.8	-1.1	37.7	-23.4

Note: Sampling weight is applied.
Source: CDRI Household Survey Data (2001–11)

Consumption per capita in five of the study villages rose over a wide range of 4 to 51 percent between 2001 and 2004/05 (Table 3). All the study villages experienced an increase in consumption per capita during 2004–08, indicating overall improvement in the living standards of the rural populace. Conversely, most of the study villages including those that maintained positive consumption per capita growth in both 2004/5 and 2008 (Trapeang Prei, Prek Kmeng, Kanhchor and Ba Baong) experienced a considerable decline in consumption per capita in 2011, which mainly reflects idiosyncratic shocks and the economic slowdown resulting from the food and oil prices hike and the global financial crisis. Trapeang Prei seems to have suffered the most, followed by Prek Kmeng, Dang Kdar, Khsach Chi Ros, Ba Baong, Kompong Tnaot, Kanhchor and Krasang. Nonetheless, households in Trapeang Prei, Dang Kdar, Ba Baong and Krasang still enjoyed higher per capita consumption in 2011 than in 2001. Consumption per capita declined in Khsach Chi Ros and Kompong Tnaot between 2001 and 2011, but remained constant in Prek Kmeng and Kanhchor. On average, household welfare in the study villages improved slightly (4 percent in relative terms or 90 riels per capita per day in absolute terms) during 2001–11.

[10] Albert (2009) adopts the Laspeyres approach to construct village price indices for 2001-08. CDRI started to collect information on the prices of 106 food and non-food items to construct a village price index in 2004–05 (Tong 2012). The lack of data on commodity prices in 2001 therefore requires assumptions regarding the inflation rate from 2001 to 2004/05. Fitzgerald and So (2007) and Tong (2012) assume that the inflation rate for all villages was 18 percent in 2001 and 17 percent in 2004/05.

4

ECONOMETRIC APPROACH

The determinants of household welfare can be written as

$$Y_{it} = \alpha + \beta X_{it} + a_i + \varepsilon_{it} \quad (1)$$

where Y_{it} is per capita consumption, X_{it} is a vector of explanatory variables, a_i is unobserved household factors affecting per capita consumption that do not change over time, α and β is a vector of parameters to be estimated, ε_{it} is an error term and the subscripts i and t index household and time, respectively. The vector X_{it} is expected to capture household size, which was decomposed into: the numbers of children aged 0-6 and 7-14, adult males aged 15-64, adult females aged 15-64 and elderly members older than 64; household head characteristics represented by gender, age, marital status, educational level and main occupation; and household agricultural landholding, durable assets, livestock and housing conditions.

To investigate the impact of the global financial crisis on poverty, which takes the value of 1 if household i is defined as poor and 0 if otherwise, equation (1) can be rewritten as

$$P_{it} = \alpha + \beta X_{it} + \theta year2011 + a_i + \varepsilon_{it} \quad (2)$$

where, holding other factors constant, *year*2011 is a dummy variable to measure the effect of the global financial crisis on poverty. Poverty is a complex and multidimensional social phenomenon rooted in a wide range of factors including hunger, malnutrition, disease vulnerability, voicelessness and powerlessness. To take the effect of household shocks into account, we also include a dummy variable to reflect crop and other damage due to flood or drought.

Given our four-period panel data, it is not appropriate to assume that the observations are independently distributed across time. For example, unobserved factors (such as ability) that affected a household's welfare in 2001 would also affect that household's welfare in 2011. Failing to take unobserved effects into account may lead to incorrect standard errors and inefficient estimates (e.g. Greene 2007; Wooldridge 2002). The two main approaches to interpreting panel data with unobserved effects are known as fixed-effects and random-effects modelling. In empirical work, it is necessary to decide whether a fixed- or random-effects estimator is more efficient. This largely depends on the assumption of a_i. If a_i is uncorrelated with the variables in X_{it}, the random-effects estimator is appropriate. But if a_i is correlated with the variables in X_{it}, the fixed-effects estimator is appropriate. To verify this assumption, the Hausman specification test is commonly used (Greene 2007; Wooldridge 2002). Because the poverty headcount ratio is discrete (0, 1), there is no Stata command for a conditional fixed-effects probit model (StataCorp 2010). For this reason, random-effects and population-averaged estimators were applied.

5

EMPIRICAL FINDINGS

5.1. Descriptive Results

Table 4 presents the three most common poverty measures of the Foster-Greer-Thorbecke (1984) model: the poverty headcount, the poverty gap and squared poverty gap.[11] The poverty headcount represents the proportion of the population living below the poverty line, the poverty gap measures the extent to which individuals fall below the poverty line as a proportion of the poverty line, and the squared poverty gap averages the squares of the poverty gaps relative to the poverty line.

Although the headcount ratio is the most popular index because it is easy to understand and measure, it does not indicate how poor the poor are, i.e. the depth of poverty. For example, consider two distributions of four persons' consumption; distribution A is 100,100,150,150 and distribution B is 124,124,150,150. For poverty line z=125, A and B have the same poverty headcount ratio of 50 percent, but it is obvious that poverty is greater in distribution A. Although the poverty gap gives a better indication of the depth of poverty, it does not reflect differences in inequality among the poor, i.e. the severity of poverty. The following example illustrates this issue: distribution C is 99,101,150,150 and distribution D is 79,121,150,150. For poverty line z=125, the poverty gap for both distributions is 0.10 (poverty headcount ratio is also the same (50 percent)), but distribution D has more serious poverty than C because it has an extremely poor member. To construct a measure of poverty that takes inequality among the poor into account, the squared poverty gap has been proposed.

On average, the poverty headcount ratio was 43.9 percent in 2001, remained almost unchanged in 2004 at 43.8 percent before dropping significantly to 27 percent in 2008.[12] The poverty rate in 2011 was 41.2 percent—52.6 percent higher than in 2008 and only 6.2 percent lower than in 2001. The sharp increase in poverty rate between 2008 and 2011 is largely due to economic contraction and idiosyncratic shocks. The combination of covariate and idiosyncratic shocks not only pushed a certain number of the rural population into poverty but also made the poor poorer, though their poverty tends to be less severe than in 2001 and 2004.

As illustrated in Table 4, Khsach Chi Ros seems to have been the poorest of the nine sample villages over the study period, given that all poverty measures have an upward trend and remain high. Krasang, Prek Kmeng and Ba Baong rank among the least poor villages, depending on the year and measure. Krasang tends to have a more stable poverty status by all measures than Prek Kmeng and Ba Baong. Kompong Tnaot, Kanhchor, Trapeang Prei and Dang Kdar lie between the two extremes but poverty reduction in the latter two is greater during 2001–08. Andoung Trach appears to be the only village where poverty headcount, depth and severity of poverty decline continuously over the study period, particularly during the financial and economic crisis.

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[11] Other useful measures include the Sen index, Sen-Shorrocks-Thon index and Watts index (Haughton & Khandker 2008).

[12] Our result is higher than the data released by the government (RGC 2006) and the World Bank (2009) owing to the sampling frame, sample size, defined poverty line and price deflator, but the overall poverty reduction trend in 2001-2008 is in line with nationally representative data.

Table 4: Poverty by Villages 2001–11 (%)

Poverty measures	Village	2001	2004	2008	2011
Poverty headcount	Krasang	29.1	18.1	9.8	11.8
	Andoung Trach	70.9	67.3	64.1	30.3
	Trapeang Prei	91.6	58.0	19.6	50.0
	Khsach Chi Ros	63.4	71.6	67.9	84.4
	Dang Kdar	69.0	77.3	23.5	37.7
	Kompong Tnaot	17.4	48.9	22.1	40.2
	Prek Kmeng	32.3	12.3	8.6	32.6
	Kanhchor	58.1	50.6	42.6	62.6
	Ba Baong	32.9	27.2	11.0	27.8
Poverty gap	Krasang	6.3	2.8	1.9	2.9
	Andoung Trach	27.6	19.5	13.4	6.1
	Trapeang Prei	36.1	12.2	3.7	13.3
	Khsach Chi Ros	21.5	20.9	24.2	33.0
	Dang Kdar	20.9	23.0	5.1	8.2
	Kompong Tnaot	2.5	8.8	3.1	5.6
	Prek Kmeng	6.6	2.3	1.1	4.8
	Kanhchor	13.5	13.8	9.4	16.2
	Ba Baong	7.7	3.9	1.6	4.5
Squared poverty gap	Krasang	1.9	0.7	0.6	0.9
	Andoung Trach	12.4	7.2	4.2	1.8
	Trapeang Prei	17.3	3.6	0.9	4.5
	Khsach Chi Ros	9.7	8.4	10.6	15.6
	Dang Kdar	8.4	9.1	1.6	2.7
	Kompong Tnaot	0.5	2.3	0.7	1.3
	Prek Kmeng	2.1	0.6	0.2	1.3
	Kanhchor	4.3	5.0	3.0	5.7
	Ba Baong	2.4	0.8	0.3	1.1
Poverty headcount	All villages	43.9	43.8	27.0	41.2
Poverty gap	All villages	12.1	10.6	6.4	9.8
Squared poverty gap	All villages	4.7	3.7	2.2	3.6

Note: Population weight is applied
Source: CDRI Household Survey Data (2001–11)

Poverty status also differed by household head characteristics, as shown in Table 5. Poverty headcount among agricultural households is likely to be higher than in non-agricultural households in all years. Female-headed households tend to be poorer than male-headed households. As expected, households with a head educated at secondary school or higher are less poor than those with a non-educated head or head educated at primary school only. In line with the poverty headcount, poverty gap and squared poverty gap are also higher among the two latter groups. The likelihood of female-headed households falling into poverty is higher than for male-headed households, and the poverty of female-headed households tends to be

more severe. There is barely any change in the occupation of household heads between 2008 and 2011.

Table 5: Poverty Status by Household Head Characteristics (%)

		2001	2004	2008	2011
Poverty headcount					
Gender	Female	48.0	52.2	30.2	50.1
	Male	43.1	42.0	26.3	39.2
Occupation	Non-agriculture	41.2	43.2	25.6	40.4
	Agriculture	47.1	44.8	29.4	43.1
Education	No school	52.1	55.2	30.3	41.8
	Primary	44.8	45.1	30.8	45.8
	Secondary/higher	32.0	24.6	13.8	29.8
Poverty gap					
Gender	Female	16.0	13.4	6.5	13.2
	Male	11.3	10.0	6.3	9.1
Occupation	Non-agriculture	11.6	10.6	6.1	9.6
	Agriculture	12.7	10.6	6.9	10.3
Education	No school	14.7	13.4	6.5	10.5
	Primary	12.6	10.9	7.6	11.1
	Secondary/higher	7.7	6.1	2.8	6.2
Squared poverty gap					
Gender	Female	7.0	5.1	2.1	4.9
	Male	4.2	3.4	2.3	3.3
Occupation	Non-agriculture	4.4	3.7	2.2	3.5
	Agriculture	4.9	3.7	2.4	3.9
Education	No school	5.6	4.9	2.0	4.0
	Primary	5.0	3.7	2.7	4.1
	Secondary/higher	2.8	2.2	1.0	2.1

Note: Population weight is applied.
Source: CDRI Household Survey Data (2001–11)

To examine the sensitivity of our results to the choice of poverty line, poverty incidence curves were drawn for each of the four years. If the poverty incidence curve of one year lies completely above another, the incidence of poverty is higher regardless of the choice of poverty line or poverty measure.[13] Figure 1 shows that the poverty incidence curves for 2001 and 2004 are extremely close together and cross each other at several points, but the poverty incidence curve for 2008 lies well below these, implying that the poverty rate in 2008 was lower than in 2001 and 2004 and that the result is robust in the choice of poverty line, poverty measurement and price deflator. The poverty incidence curve for 2011 is close to those for 2001 and 2004, and above that for 2008. This confirms that the poverty headcount ratio in the nine villages in 2011 had definitely increased compared to 2008. The sub-sample data (90 households) further reveals that the poverty headcount ratio in 2011 is lower than in 2009. This suggests that food and oil price increases and the global financial crisis hit Cambodia's economy the hardest in 2009, and the economy has since started to recover slowly. Therefore, the lack of household

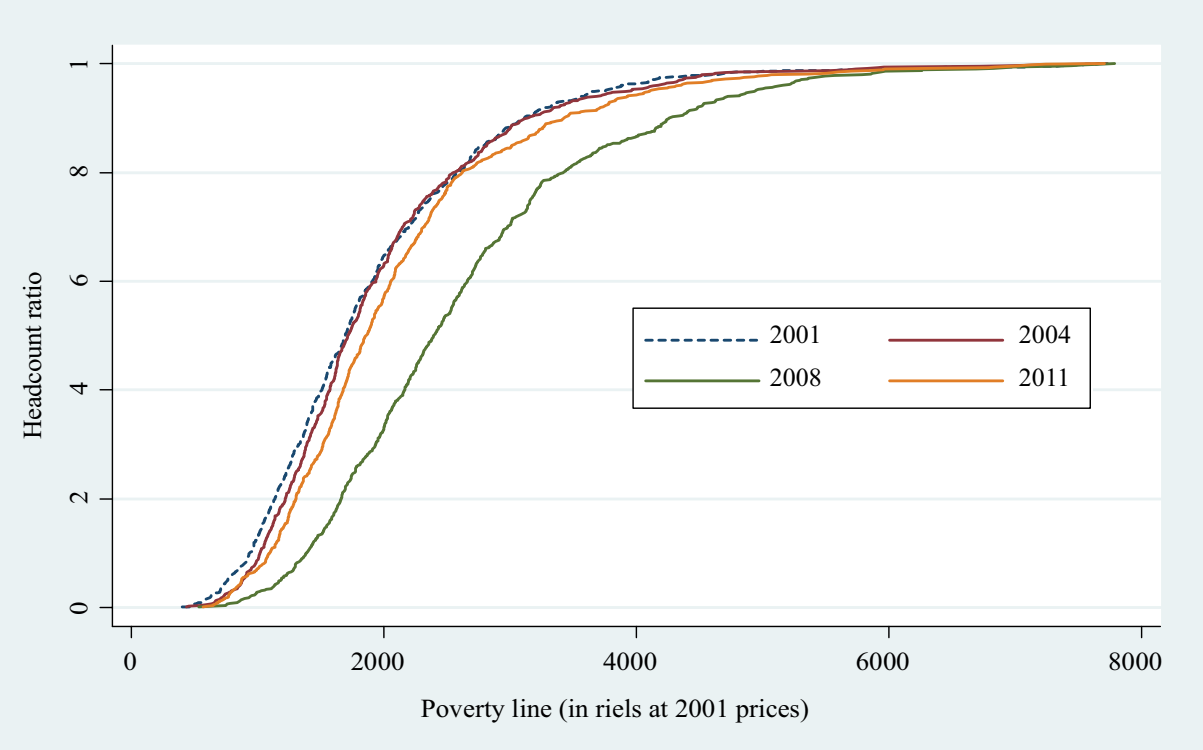
[13] This property is widely known as the first order stochastic dominance (Madden & Smith 2000).

data in 2009 and 2010 could underestimate the effects of the two crises on household welfare in rural Cambodia.

5.2. Econometric Results

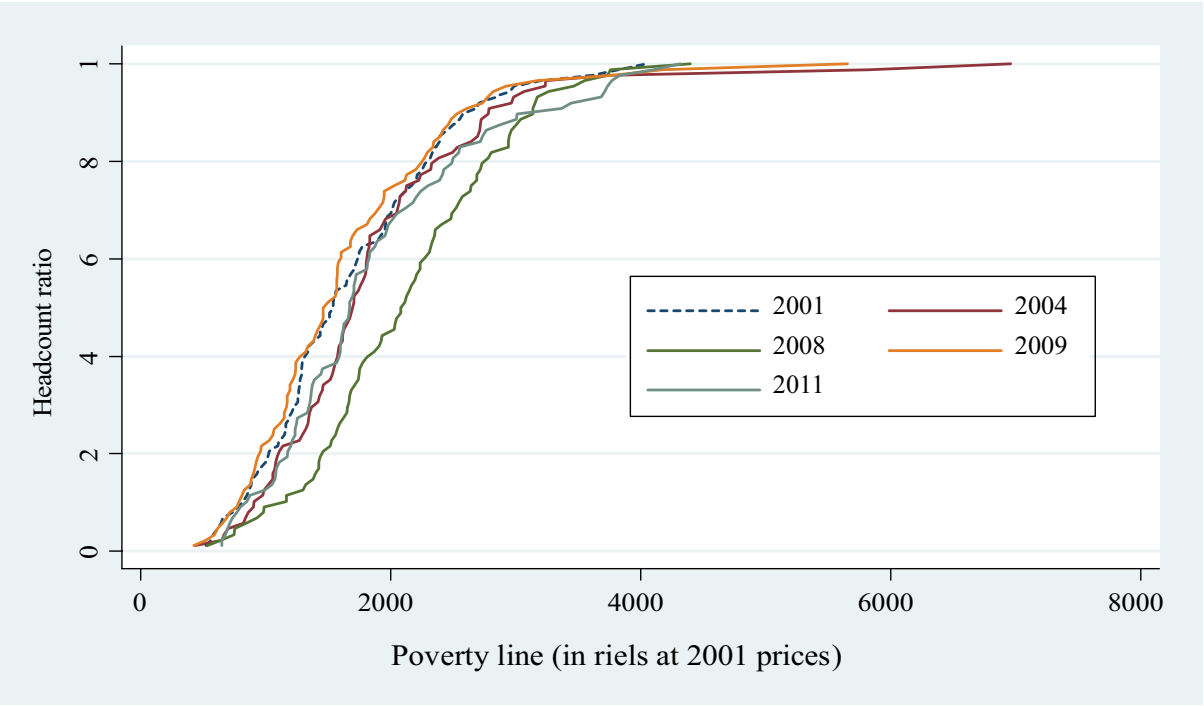
The descriptive analysis provides an overview of household welfare changes in our sample, but it does not completely fulfil our main objective of understanding the effects of external shocks on consumption and poverty, because rural households are frequently hit by individual-specific shocks that push them into severe hardship. To complement our descriptive analysis, econometric modelling is used to derive the exact welfare change caused by external shocks. The empirical findings from random-effects and population-average probit models are reported in Table 6. Results generated from the four-period panel data set are recorded in the second and third columns, and results of the two-period panel dataset (2008 and 2011) in the fourth and fifth columns.[14] Holding other factors constant, the probit model of the two-period panel data set indicates that the global financial and economic crisis is likely to have increased the poverty headcount ratio by 37-44 percent. Given that the two external shocks hit Cambodia's economy hardest in 2009, the increase in poverty rate could be even higher.

Figure 1: Poverty Incidence Curve (full sample of 793 households, 2001–11)



[14] The empirical results of the three-period panel data (2001, 2004/05, 2008) excluding the post-crisis period are similar to those of the four-period panel data except for two variables, household head gender and land dummy (1=2-3 ha), which are no longer statistically significant at the 10 percent level.

Figure 2: Poverty Incidence Curve (sub-sample of 90 households, 2001–11)



Source: CDRI Household Survey Data (2001–11)

The probit model for the four-period panel data set gives a general view of the long-run key determinants of poverty in rural Cambodia. It shows that households with more members are likely to fall into poverty. Male-headed households seem to be less poor than female-headed households. Households with a head educated at secondary school or higher,[15] more than two hectares of agricultural land and more durable assets are negatively associated with poverty headcount.

During the post-crisis period, three interesting points have been observed. First, the number of children aged 7-14 is no longer positively correlated with the poverty headcount; in other words, children aged 7-14 could be engaged in economic activities. Second, livestock has become an important factor in preventing households from falling into poverty. This finding is consistent with Tong (2010) and Kurosaki (1995), who note that livestock are sometimes seen as important assets to help smooth consumption during the lean season or common shock. Third, households with a married head are more vulnerable to poverty.

[15] This finding is in line with other studies throughout the world that find that the chance of finding employment rises with higher levels of education, and that earnings are higher for people with higher levels of education. In other words, a better educated household is less likely to be poor (Orazem, Glewwe & Patrinos 2007).

Table 6: Determinants of Poverty: Probit Model

	2001-2011		2008-2011	
	Random effects model (RE)	Population averaged model (PA)	Random effects model (RE)	Population averaged model (PA)
Children aged 0-6	0.113***	0.105***	0.119**	0.101**
Children aged 7-14	0.073***	0.066***	0.067	0.060
Adult males aged 15-64	0.092***	0.083***	0.128***	0.107***
Adult females aged 15-64	0.173***	0.160***	0.115**	0.097**
Adults aged 64+	0.312***	0.208***	0.385***	0.325***
HHH sex (1=male)	-0.235**	-0.213**	-0.495***	-0.417***
HHH age (years)	0.004	0.003	0.006	0.005
HHH marital status (1=married)	0.150	0.139	0.388**	0.320**
HHH education (1=primary)	0.004	0.005	-0.006	-0.003
HHH education (1=secondary or higher)	-0.198**	-0.176**	-0.183	-0.138
HHH occupation (1=agriculture)	0.001	0.001	0.041	0.027
Land dummy (1=<1ha)	0.036	0.029	-0.029	-0.033
Land dummy (1=1-2 ha)	-0.074	-0.069	-0.083	-0.068
Land dummy (1=2-3 ha)	-0.210*	-0.194*	-0.427**	-0.365**
Land dummy (1=3-4 ha)	-0.487***	-0.447***	-0.536**	-0.475**
Land dummy (1=>4 ha)	-0.472***	-0.434***	-0.485**	-0.399**
Durable index	-0.172***	-0.157***	-0.179***	-0.151***
Livestock index	0.004	0.002	-0.106**	-0.088**
House dummy (1=wooden house)	-0.413***	-0.380***	-0.498***	-0.410***
House dummy (1=concrete)	-0.634	-0.576	-0.755	-0.603
Toilet (1=have toilet)	-0.293***	-0.262***	-0.271*	-0.233*
Cooking fuel (1=self-collected firewood)	0.519***	0.475***	0.650***	0.534***
Shock dummy (1=individual shock)	0.081	0.072	0.029	0.028
Crisis dummy (1=2011)	0.274***	0.249***	0.440***	0.370***
Constant	-1.951***	-1.797***	-2.557***	-2.133***

Note: Village dummies are also included; * significant at 10%, ** significant at 5%, *** significant at 1%.
Source: Author's calculation

6

CONCLUSION

This paper has investigated the impact of the global financial and economic crisis on Cambodia's rural households, mainly focussing on trends in household consumption and poverty, i.e. poverty headcount ratio, poverty gap and squared poverty gap. Households from the nine selected villages are the primary source of information for this study.

Descriptive statistics reveal that all study villages except Andoung Trach experienced a sharp drop in consumption per capita between 2008 and 2011. As a result, the 2011 poverty headcount ratio shot up by 52.4 percent compared to 2008. Female-headed and non-agricultural households seem to have been more affected by the crisis than male-headed and agricultural households. We also note that educational attainment of the household head was unlikely to reduce poverty during the crisis.

Since poverty analysis is largely dependent on the poverty line selected, we employed the stochastic dominance approach to verify the observed changes in the poverty index. Our result confirms that the poverty headcount ratio in the nine study villages in 2011 has definitely increased compared to 2008. The sub-sample data (90 households) further reveal that the poverty headcount ratio in 2009 was higher than in 2011. This suggests that food and oil price increases and the global financial crisis hit Cambodia's economy hardest in 2009, after which the economy started to recover slowly. Therefore, the lack of household data in 2009 and 2010 could underestimate the effects of the two crises on rural household welfare.

Random-effects and population-average probit models confirm that the global financial and economic crisis is likely to have increased the poverty headcount ratio by 37 to 44 percent. However, taking into account the fact that food and oil price increases and the global financial crisis hit Cambodia's economy hardest in 2009, the increase in the poverty rate could be even higher.

APPENDICES

Appendix 1: Attrition Probit

	Coefficients	Standard Error	Z	P>z
Agricultural land (log)	-0.059***	0.014	-4.31	0.00
Non-land assets (log)	-0.019	0.013	-1.53	0.13
Livestock (log)	-0.023**	0.011	-2.19	0.03
Children aged 0-6	0.052	0.047	1.10	0.27
Children aged 7-14	-0.090**	0.041	-2.21	0.03
Male adults aged 15-64	-0.072	0.057	-1.26	0.21
Female adults aged 15-64	-0.070	0.059	-1.18	0.24
Adults over 64	-0.073	0.124	-0.59	0.55
HHH gender (1=male)	0.318	0.218	1.46	0.14
HHH age	0.007	0.005	1.45	0.15
HHH marital status (1=married)	-0.196	0.215	-0.91	0.36
HHH education	-0.031*	0.019	-1.70	0.09
HHH occupation (1=agriculture)	-0.109	0.110	-0.99	0.32
Village 1	0.558***	0.210	2.66	0.01
Village 2	0.721***	0.223	3.24	0.00
Village 3	0.655***	0.224	2.92	0.00
Village 4	0.900**	0.205	4.40	0.00
Village 5	0.484**	0.208	2.33	0.02
Village 7	-0.060	0.231	-0.26	0.80
Village 8	-0.013	0.225	-0.06	0.95
Village 9	0.298	0.215	1.38	0.17
Constant	-0.325	0.320	-1.01	0.31
Number of observations	1005			
Wald chi2(21)	108.81			
Prob> chi2	0.0000			
Pseudo R2	0.1215			

Note: * significant at 10%, ** significant at 5%, *** significant at 1%.

Appendix 2: Consumption per Capita by Quintile

	Consumption per capita at 2001 prices (riels)				Growth rate (%)			
Quintile	2001	2004	2008	2011	2004	2008	2011	2001-2011
1	897.4	985.8	1343.7	1049.0	9.9	36.3	-21.9	16.9
2	1328.2	1400.0	1928.7	1510.1	5.4	37.8	-21.7	13.7
3	1701.7	1731.3	2431.5	1867.2	1.7	40.4	-23.2	9.7
4	2226.9	2202.1	3050.0	2329.1	-1.1	38.5	-23.6	4.6
5	3942.3	3734.6	5220.8	3936.1	-5.3	39.8	-24.6	-0.2
Total	2017.3	2008.9	2792.3	2136.4	-0.4	39.0	-23.5	5.9

Source: Author's calculation

Appendix 3: Village Poverty Line (riels)

Village	2001	2004	2008	2011
Krasang	1454	1596	2345	2665
Andoung Trach	1686	1851	2756	3031
Trapeang Prei	1574	1728	2753	2869
Khsach Chi Ros	1788	1963	2973	3725
Dang Kdar	1621	1780	2808	3156
Kompong Tnaot	1853	2033	2838	3509
Prek Kmeng	1593	1748	2765	3180
Kanhchor	1680	1845	3205	3726
Ba Baong	1376	1510	2460	2780
Total	1625	1784	2773	3214

Source: Author's calculation

Appendix 4: Household Demographics by Poverty Status

	2001		2004		2008		2011	
	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor
Children aged 0-6	1.11	0.94	0.99	0.78	0.82	0.71	0.78	0.56
Children aged 7-14	1.51	1.40	1.31	1.41	1.20	1.14	1.07	0.94
Adult males aged 15-64	1.46	1.50	1.57	1.60	1.68	1.76	1.81	1.81
Adult females aged 15-64	1.79	1.56	1.85	1.62	1.78	1.85	1.81	1.80
Adults aged 64+	0.24	0.21	0.29	0.24	0.31	0.30	0.37	0.29
HHH sex (1=male)	0.79	0.82	0.75	0.80	0.72	0.79	0.71	0.80
HHH age (years)	43.41	44.15	47.14	46.37	48.73	47.48	52.05	50.90
HHH marital status (1=married)	0.83	0.84	0.79	0.83	0.76	0.80	0.75	0.79
HHH education (1=primary)	0.51	0.47	0.55	0.49	0.63	0.51	0.51	0.46
HHH education (1=secondary or higher)	0.16	0.28	0.11	0.28	0.11	0.27	0.15	0.26
HHH occupation (1=agriculture)	0.46	0.40	0.37	0.35	0.34	0.32	0.29	0.27
Land dummy (1=landless)	0.16	0.13	0.13	0.14	0.24	0.17	0.20	0.18
Land (agricultural land ha)	1.32	1.63	1.46	1.67	1.66	2.37	1.88	2.29
Durable index	-0.22	0.27	0.20	0.66	0.31	0.95	0.42	1.14
Livestock index	-0.11	0.10	0.21	-0.02	-0.22	-0.04	-0.34	-0.20
House dummy (1=wooden house)	0.34	0.56	0.50	0.67	0.64	0.81	0.73	0.90
House dummy (1=concrete)	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01
Toilet (1=have toilet)	0.07	0.12	0.05	0.12	0.08	0.17	0.08	0.26
Cooking fuel (1=self-collected firewood)	0.99	0.91	0.98	0.92	0.95	0.88	0.98	0.85
Shock dummy (1=individual shock)	0.65	0.58	0.29	0.27	0.12	0.11	0.11	0.05

Note: Sampling weight is applied.
Source: CDRI Household Survey Data (2001–11)

Appendix 5: Determinants of Poverty: Probit Model (Marginal Effects)

Variable	Determinants of Poverty: Probit Model			
	2001-2011		2008-2011	
	Random effects	Population average	Random effects	Population average
Children aged 0-6	0.113***	0.032***	0.119**	0.028**
Children aged 7-14	0.073***	0.020***	0.068	0.017
Adult males aged 15-64	0.092***	0.025***	0.128***	0.030***
Adult females aged 15-64	0.173***	0.049***	0.115**	0.027**
Adults aged 64+	0.312***	0.087***	0.385***	0.092***
HHH sex (1=male)	-0.235**	-0.065**	-0.495***	-0.118***
HHH age (years)	0.004	0.001	0.006	0.001
HHH marital status (1=married)	0.151	0.043	0.388**	0.090**
HHH education (1=primary)	0.004	0.002	-0.007	-0.001
HHH education (1=secondary and higher)	-0.198**	-0.054**	-0.184	-0.039
HHH occupation (1=agriculture)	-0.001	0.000	0.042	0.008
Land dummy (1=<1ha)	0.036	0.009	-0.029	-0.010
Land dummy (1=1-2 ha)	-0.074	-0.021	-0.084	-0.019
Land dummy (1=2-3 ha)	-0.210*	-0.059*	-0.427**	-0.103**
Land dummy (1=3-4 ha)	-0.487***	-0.137***	-0.536**	-0.134**
Land dummy (1=>4 ha)	-0.472***	-0.133***	-0.485**	-0.113**
Durable index	-0.172***	-0.048***	-0.179***	-0.042***
Livestock index	0.005	0.001	-0.106**	-0.025**
House dummy (1=wooden house)	-0.413***	-0.116***	-0.498***	-0.116***
House dummy (1=concrete)	-0.634	-0.177	-0.756	-0.171
Toilet (1=have toilet)	-0.293***	-0.080***	-0.271*	-0.066*
Cooking fuel (1=self-collected firewood)	0.519***	0.145***	0.650***	0.151***
Shock dummy (1=individual shock)	0.082	0.022	0.029	0.008
Crisis dummy (1=2011)	0.274***	0.076***	0.440***	0.105***

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