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HEALTH EXPENDITURES' COPING STRATEGIES  
A study on African low-income countries

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**Abstract**

In the absence of formal coping mechanisms in the face of health expenditures, households are forced to penalize their resources and to use one or more strategies. Those strategies include using own resources, selling assets or borrowing from others outside the household. We show that different factors influence how families in developing countries cope with health spending.

Given the data available, the study identifies the relevant factors to recognize households in financial distress due to health expenditures. Their fragile position is proven to be mainly characterized by the size of the family, educational level, location of the household and asset ownership quintile.

**Key Words:** health; expenditures; coping strategies; Africa.

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## Section 1. Introduction

Income and expenditure shocks play a key role in determining welfare in the developing world. In many developing countries, people are expected to pay on its own the cost of health care. Therefore, their ability to pay for health care has become a significant policy issue. “ The money used to pay for health care may otherwise have been used for food, agricultural development or education. Payment for health services is thus made at considerable social cost to the family and can scarcely be said to represent a “willingness” to pay in the normal sense of the word.” (Russell, 1996, p.1)

From previous literature, common household responses to payment difficulties are identified, ranging from borrowing to more serious 'distress sales' of productive assets and, eventually, abandonment of treatment.<sup>1</sup>

In designing their health systems, policy makers need to understand whether some characteristics make people more exposed to catastrophic payments.

In that sense, the aim of this work project is to identify which households are more vulnerable and to explore the impact that several factors have on influencing the choice of strategies to cope with health expenditures. The strategies adopted include not only the use of own resources but also the possibility of selling assets and borrowing from others. Factors that may influence the household behavior range from socioeconomic characteristics to the percentage of dependent members and asset ownership level.

Families' vulnerability was found to be directly related to their size, educational level and members in a poor health status. Moreover, households at the lowest quintiles

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<sup>1</sup> Mwabuet al. (1995).  
Abel-Smith et al. (1992).

tend to be more exposed to use penalizing strategies when facing health expenditures than people in the highest quintiles.

Expenditure is defined as catastrophic if a household's financial contributions to the health system exceed 40% of income remaining after subsistence needs have been met (Xu et al., 2003). High health care costs may not be reflected in catastrophic expenditures if the household does not bear the full cost because the service is provided free or at a subsidized price, or is covered by private insurance. On the other hand, for poor households even small costs can lead to financial disaster.

Thus, whereas financial protection against events of illness is increasing among the insured population, the non-insured do not have such protection and are, therefore, at a greater risk of incurring in catastrophic expenditure. If they fall ill, the related expenses have to be covered through out-of-pocket payments. The poor have very little access to formal insurance. In many surveys, questions about insurance are not even asked. When the poor come under economic stress, their form of "insurance" is often eating less or taking their children out of school. Ultimately, informal insurance relies on the willingness of the fortunate to take care of those less favored. Unfortunately governments in these countries are not very effective at providing insurance either. For example, in most countries, the government is supposed to provide free health care to the poor. Yet, health care is rarely free. (Banerjee and Duflo, 2006)

Moreover, the impact of coping mechanisms is likely to be country specific. This work project will then present a comprehensive analysis of data from various countries in order to compare differences in strategies used to finance health care and their consequences across countries and populations.

Section 1 will introduce the subject and purpose of the study, Section 2 will revise past contributions to the area, while Section 3 will enlighten about the methodology used. Sections 4 and 5 will determine which factors influence the most the probability of using each of the available strategies and the existence of health expenditures. Finally, Section 6 will point out the limitations of this study and the economic insights of the results.

## **Section 2. Literature Review**

### **Health shocks**

The economic consequences of health shocks in developing countries have been the focus of increasing attention. Health shocks are defined as unpredictable illnesses that diminish health status.

When faced with a health shock households often incur in catastrophic expenditures. A health shock can lead to financial hardship and even impoverishment. Many of those who do seek care suffer financial catastrophe and impoverishment as a result of meeting these costs, the financial consequences of paying for care (Xu et al., 2007). The term catastrophic implies that such expenditure levels are “likely to force households to cut their consumption of other minimum needs, trigger productive asset sales or high levels of debt, and lead to impoverishment” (Russell, 2004, p.147).

The ethical position here is that no one ought to spend more than a given fraction of income on health care (Wagstaff et al., 2007). Some authors focused on financial catastrophe caused by out-of-pocket payments made directly to a provider for receiving services (Xu et al., 2007).

In fact, health insurance, either public or private, is exceptional in the majority of developing countries and correspondingly, much of the borrowing and saving by households is of informal nature. The households are generally characterized by their lack of collateral that restraint them to access to credit markets.

### **Out-of-pocket payments**

Out-of-pocket health payments refer to the payments made by households at the point they receive health services. Typically these include doctor's consultation fees, purchases of medication and hospital bills. It is also important to note that out-of-pocket payments are net of any insurance reimbursement (Xu et al., 2005).

The common practice is the construction of indexes. Either capturing the intensity of catastrophe as well as its incidence and also the degree to which catastrophic payments occur disproportionately among poor households (Wagstaff et al., 2003) or even whom paid more both in absolute and relative terms (O' Donnell et al., 2005). Poverty impact of out-of-pocket payments is primarily due to poor people becoming even poorer rather than the non-poor being made poor, and that it was not expenses associated with inpatient care that increased poverty but rather non-hospital expenditures (Wagstaff et al., 2003). The tendency for the burden of health care financing to be less concentrated on the better-off in more developed economies arises, in part, from differences in the structure of financing. As an economy grows, reliance on out-of-pocket payments for health care falls and social health insurance is typically established. The latter tend to be broadly proportional because contributions are levied as a fixed percentage of earnings (O' Donnell et al., 2005).

In absence of formal health insurance, it is argued that the strategies households adopt to finance health care have important implications for the measurement and interpretation of how health payments impact on consumption and poverty (Flores et al., 2008). Although most of the variation in catastrophic spending can be explained by the triad of poverty, health-service use, and the absence of risk pooling mechanisms, important unexplained variation remains (Xu et al., 2003).

The analysis lead us to think that if out-of-pocket spending could be reduced to levels lower than a threshold level of total health spending, few households would be affected by catastrophic payments. The cross-country variation, however, often shows that other more complex strategies can protect households against catastrophic spending, such as progressive fee schedules, highly subsidized or free hospital services, and the provision of certain health services to the poor (Xu et al., 2003). Moreover, the incidence of financial catastrophe is negatively correlated with the extent to which countries fund their health systems using prepayment of some form - taxes or insurance. Conversely, catastrophe is positively correlated with the relative importance of out-of-pocket payments in total health spending (Xu et al., 2007).

### **Coping with health expenditures**

In addition, coping mechanisms provide important information on how households respond to health shocks and how payment may affect their future welfare. Financial coping strategies refer to actions intended to protect current consumption from an economic shock, such as that induced by illness (Morduch et al., 1995). The most immediate response to financial costs of illness is to use savings. The impact is often on reducing consumption, most often of food. Another strategy is to sell assets, such as

land or livestock in a rural setting, often increasing a vicious cycle of increased economic vulnerability. The most common response is, however, borrowing, from family and friends, highlighting the importance of social networks, or from a money-lender. Other strategies for dealing with the direct costs of illness include diversifying income by engaging in activities other than their normal work or households selling their labor (Sauerborn et al., 1996). The response to health shocks is extremely influenced by household relationships' structure and between the household and their social networks. Social connections end up playing an important role in the availability of loans and in the respective settlement of interest rates.

In fact, using income and savings, borrowing or selling assets are driven by different motivations and in that sense treated as separate strategies as opposed to out-of-pocket payments described in the studies mentioned above. Further in this analysis are not only presented the factors that influence coping mechanisms but also the ones that influence having health expenditures, when there is no protection towards an health shock.

### **Section 3. Methodology**

#### **3.1 Characterization of the Sample**

The sample is composed by 13 African countries classified by the World Bank as low-income countries, except for Congo, Côte d'Ivoire, Senegal and Swaziland, which are classified as low-middle income countries. The countries are geographically



spread throughout the western, central, eastern and southern parts of sub-Saharan Africa.

These countries differ in their levels of income, life expectancy and total health expenditure. In 2002, the GDP per capita varies a lot between the countries in the sample, being the lowest value attributable to Ethiopia (US\$ 113) and the highest to Zimbabwe (US\$ 1749). The life expectancy ranges from 41 years in Zimbabwe to 57 in Ghana. Total expenditure on health as a percentage of GDP was less than 6% except in Chad, Ghana, Malawi and Zimbabwe.

**Table 1.** Gross Domestic Product per capita, Life expectancy and Total expenditure on health as proportion of GDP:

Country	GDP per capita (current US\$)		Life expectancy at birth, total (years)		Total expenditure on health as % of GDP	
	2002	2009	2002	2008	2002	2008
Burkina Faso	264	517	51	53	5	5,6
Chad	220	596	49	49	6,3	4,9
Congo	950	2361	53	54	3,7	1,8
Côte d'Ivoire	636	1093	55	57	2,4	4,2
Ethiopia	113	345	52	55	4,7	3,4
Ghana	301	655	57	57	6,5	7,8
Kenya	397	759	52	54	4,5	4,5
Malawi	212	326	50	50	10	9,7
Mali	304	691	46	46	5,7	5,5
Mauritania	418	921	56	53	3,2	2,6
Senegal	511	1042	54	48	5,1	5,7
Swaziland	1066	2478	47	57	5,9	5,9
Zimbabwe	1749	NA	41	44	8,1	NA

Source: World Bank and National Health Accounts of World Health Organization, 2002.  
NA - Not available

In 2009, the lowest GDP per capita is now attributed to Malawi (US\$ 326) and the highest to Swaziland (US\$ 2478) being Ethiopia the country with the highest growth of GDP per capita during this period and Malawi with the lowest. The data available for

these countries on life expectancy and total expenditure in health as a percentage of GDP is from 2008; their relative and absolute position did not change significantly.

The health systems of these countries are generally characterized by low level of revenues coming from the government, low total health spending and few risk-pooling mechanisms. Private financing sources are generally firms, NGOs, households or other entities (predominantly funding from external resources).

Total expenditure on health aggregates both public and private spending on health. The percentage of the expenditure on health financed by the private sector is higher than the percentage financed by public contributions for the majority of the countries. Public outlays on health include tax-funded health expenditure, Social Security and External Resources. The percentage of total health expenditure that External Resources finance ranges from 2% in Zimbabwe to 44.4% in Malawi. External Resources are loans and grants for medical care and medical goods channeled through the Ministry of Health or other public agencies. Grants to non-governmental organizations are accounted for as private expenditure but, in practice, they are not always easily separated from public grants.

Social Security on Health is the premiums paid by employees and employers for compulsory schemes of medical care and medical goods for a sizeable group of population, which have no contribution almost in all countries, being Kenya and Senegal the exceptions.

Private outlays integrate health insurance and prepaid schemes, mandated enterprise health expenditure, expenditure on health through non-profit health services and direct payments or out-of-pocket expenditure in health goods which include co-payment as well as direct disbursements by uninsured individuals. Out-of-pocket

spending is direct payments of households for goods and services whose primary intent is to contribute to the restoration or to the enhancement of their health status. These include the payments made to public services, non-profit institutions or non-governmental organizations by households.

As a share of private health expenditure, out-of-pocket payments range from less than 41.1% in Swaziland to about 100% in Cote d'Ivoire and Mauritania, with an average of about 80% for the 13 countries. Some of the countries, such as Burkina Faso, Ghana and Senegal, have community health insurance, mostly working through microfinance initiatives, since social health insurance only exists in a small number of African countries.

**Table 2.** National Health Accounts 2002.

Country	General government expenditure on health (GGHE) as % of THE	Private expenditure on health (PvtHE) as % of THE	External resources on health as % of total health expenditure	GGHE as % of General government expenditure	Social security funds as % of	Private insurance as % of PvtHE	Out of pocket expenditure as % of PvtHE
Burkina Faso	43,9	56,1	14,5	11,2	0,8	1	94,3
Chad	45,4	54,6	18,2	13,8	0	0,4	96,2
Congo	27,8	72,2	7,4	5,2	0	12,2	87,8
Côte d'Ivoire	52,7	47,3	4,5	3,6	0	0	100
Ethiopia	54	46	10,4	10,2	0	1	81,3
Ghana	36,2	63,8	15,8	9	0	6,1	79,4
Kenya	42,8	57,2	16,4	8,7	9,5	6,8	78,3
Malawi	73,1	26,9	44,4	23,6	0	13	44,4
Mali	40,2	59,8	14,8	10,4	0	0,3	99,6
Mauritania	72,6	27,4	23,1	6,1	0	0	100
Senegal	39	61	15,3	10,1	7,4	8,4	90,4
Swaziland	63,1	36,9	1,7	11,4	0	19	41,1
Zimbabwe	35,8	64,2	2	9,8	0	29,2	50,9

Source: National Health Accounts of World Health Organization, 2002.

### 3.2 Data

The data was obtained from the World Health Survey conducted in 2002–2003, which was launched by the World Health Organization.<sup>2</sup> The World Health Survey is cross-sectional and is based on a multi-stage clustered random sample of households designed to be nationally representative. The questionnaire is standardized across countries.<sup>3</sup>

The survey collects a range of information on health service utilization, expenditures and household socioeconomic indicators. The household questionnaire is administered to the household member most knowledgeable about the household. The information used from the survey includes socioeconomic information about household members such as gender, age, level of education and occupation, as well as households assets, health expenditures and behaviors on coping with the latter.<sup>4</sup>

Particularly, household expenditures were collected for a four-week recall period and the sources that are used to pay any health expenditure were collected for a year recall period. Such sources include income, savings, payment or reimbursement from a health insurance plan, sold items, family members and friends outside the household, borrowed from someone else and other.

The households that benefited from private insurance coverage were excluded from the sample analyzed. This exclusion is justified by the fact that the households with insurance coverage were in some way protected towards a health shock and in that sense in a different process of decision making in terms of how to finance their health

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<sup>2</sup> More information can be obtained at <http://www.who.int/healthinfo/survey/whsresults/en/index.html>

<sup>3</sup> Questionnaire specific for low-income countries.

<sup>4</sup> For more details on the Survey Questions, see page 30.

expenditures. With this exclusion 2% of the observations were lost, which accounts for a total of 1110 households with insurance. Country-wise, the proportion of losses ranges from 1% in Kenya Mauritania and Swaziland to 19% in Congo.<sup>5</sup>

### 3.3 Descriptive Statistics<sup>6</sup>

On average, 79% of the household heads are male, being the country with the highest percentage of male household heads Mali (with 97%) and the country with the lowest Zimbabwe (with 69%). The average age of the household head across countries is 43 years old, being the country with the highest average age Mali (with 53 years) and the lowest Malawi (with 37 years). In terms of education, the percentage of people not completing primary school ranges from 24% in Congo to 91% in Mali, while for having completed primary and more than secondary school the distribution is similar across countries, with an average proportion of 19% and 22%, respectively.

The average size of the households across countries in the sample is around 6 members, while Mali has the highest average, around 9 members and Kenya the lowest around 4 members. Additionally, in average 37% of the households are located in urban area, being Congo the country with a higher percentage of households in the urban areas (82%) and Ethiopia with more households located in the rural areas (15%).

The values of the dependency index range from an average value of 54% in Malawi to 5% in Ethiopia, while the percentage of having had hospitalizations range from 21% in Mauritania to 4% in Ethiopia. In terms of institutionalization of members the values did not differ much across countries, being around 1%. We observe the same

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<sup>5</sup> See Table A1, page 31.

<sup>6</sup> See Table A2, page 31.

behavior for the variables long-term care, pregnant women and health worker, with average values around 4%.

In addition, all of these countries were involved in conflicts in the African continent and suffered with many civil wars along the years. Particularly in the last decade, Chad and Kenya had two civil wars, while Côte d'Ivoire, Mali and Senegal suffered with only one civil conflict, respectively.

### **3.4 Empirical Methodology**

Since each household can adopt a strategy or a combination of strategies of their choice, it is imperative to know the factors that influence not only the choice of each one of the three strategies separately but also the possible combinations. In the first case, the dependent variables analyzed include strategies that the households choose to cope with health expenditures, such as their own resources (income and savings), selling assets and borrowing.

Nevertheless, the existence of a relative importance of using a particular strategy is undeniable. Using own resources is less costly for the household than selling assets or even to be subject to a particular interest rate when borrowing from someone. As we do not have the information about in which proportions the households choose to follow each strategy, when combined, the choice of using the strategies will be also studied in ordinal terms.

For this purpose, a variable called *penalization* is created, capturing the financial hardship that households suffer when faced with health expenditures in an

ordinal scale. This variable assumes the value 1 when the household only uses its own resources to cope with health expenditure, 2 if the household uses not only the latter strategies but also sells their assets and finally 3 if the household uses all strategies available (if the household does not have savings or assets is also financial hardship if it borrows to cope with health expenditures). With *penalization*, the goal is to analyze which factors influence adoption of a coping strategy that implies a higher penalization of resources, an approach not taken in the previous literature.

Furthermore, when faced with the strategies that households can use to cope with health expenditures the importance of the existence of health expenditures arises. The reason is clear, a household without health expenditures does not face any constraint in defining which strategy to follow, being the existence of health expenditures the start of the process of decision making and the source of financial hardship for many households.

In order to study the factors that influence the existence of health expenditures the variable *HE1* is built, a binary variable that takes the value 1 when the household had in fact any health expenditure and 0 otherwise.

The latter variable does not take into consideration an important feature when analyzing health expenditures in which households incur, its amount. In consequence, it was decided to create the fifth dependent variable studied, *HE2* which assumes the values of the expenditures stated by the households in the survey.<sup>7</sup> With *HE2* we can infer which factors contribute to a greater amount of health expenditures made by the households and not only its existence.

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<sup>7</sup> The expenditures are in the 13 different currencies.

To explain the coping strategies adopted and to identify particular population groups associated with larger health expenditures, several factors are considered, described in the following table.

**Table 3.** Definition of variables:

<b>Variable</b>	<b>Description</b>
<b>Characteristics of the household head:</b>	
<i>Male</i>	A binary variable that scores 1 for male 0 for female household head
<i>Age</i>	In years
<b>Schooling:</b>	Divided into three binary variables
<i>No primary</i>	A binary variable that scores 1 for the ones who have no formal education and 0 for those who have
<i>Primary</i>	A binary variable that scores 1 for those who completed primary education and 0 otherwise
<i>Secondary or higher</i>	A binary variable that scores 1 for those who completed secondary or higher education and 0 otherwise
<i>Size</i>	Defined in the survey as the number of people living in the household
<b>Household Characteristics:</b>	
<i>Urban</i>	A binary variable that scores 1 for the households localized in an urban area and 0 otherwise
<i>Hosp</i>	A binary variable for having had at least one member hospitalized in the past year
<i>Inst</i>	A binary variable for having any member of the household institutionalized
<i>Longcare</i>	A binary variable where 1 means that some household member needs long-term care and 0 otherwise
<i>Pregnant</i>	A binary variable for having at least one household member pregnant
<i>Depindex</i>	A Dependency Index which measures the relation between the inactive population ( $\leq 5$ and $\geq 60$ years old) and the total number of household members, ranging from 1 to 0, where 1 means that all the household population is either under 5 or over 60, and 0 if all household members have ages higher than 5 but lower than 60
<i>Hworker</i>	A binary variable for having at least one member of the household working in the health sector
<i>Asset Index</i>	Indicator of a household's permanent income, divides



	the households into quintiles
<i>Quintiles</i>	Five quintiles in the form of binary variables that score 1 if the household belongs to that quintile and 0 otherwise
<i>Country dummies</i>	Thirteen binary variables that score 1 if the household belongs to that country and 0 otherwise

Since information about the household's income was not given by the survey and to allow for further comparisons within countries, an Asset Index was used as indicator of a household's permanent income. A total of 25 dummies containing the assets that the households owns were used. Such index was calculated for each household using a weighted index calculated through principal components analysis (PCA). PCA is an exploratory multivariate statistical technique for simplifying complex datasets. The defining characteristic of PCA is that it assumes that all of the variability in an item should be used in the analysis. Given  $m$  (different from country to country) observations on 25 variables, the goal of PCA is to reduce the dimensionality of the data matrix by finding  $r$  new variables, where  $r$  is less than 25. Termed principal components, these new  $r$  variables together account for as much of the variance in the original 25 variables as possible while remaining mutually uncorrelated and orthogonal. Each principal component is a linear combination of the original variables, such that researchers often ascribe meaning to what the variables represent. PCA has been applied to asset questions in household surveys under the assumption that it is long-run wealth or permanent income that is the phenomenon attributable to the linear index of variables with the largest amount of information common to all of the variables (Ferguson et al., 2003). The result of such application of PCA is an asset index for each household according to the formula:

$$A_i = \frac{f_1(a_{i1} - a_1)}{s_1} + \dots + \frac{f_{25}(a_{iA} - a_A)}{s_A}$$

where  $f_1$  is the scoring factor for the first asset as determined by the procedure,  $a_{i1}$  is the  $i$ -th household's value for the first asset and  $a_1$  and  $s_1$  are the mean and standard deviation of the first asset variable over all households. The index was then divided into equal quintiles. And five binary variables were constructed scoring 1 if the household's asset index result is from that particular quintile and 0 otherwise.

### 3.5 Regression Models

The regression models used include the regular probit model, an ordered probit and a tobit model. For the strategies estimation, firstly, an ordered probit model was estimated. The dependent variable is a latent variable illustrating the financial hardship imposed by the existence of health expenditures, *penalization*. This model additionally gives us the probability of using one of the strategies described before.

Secondly, three probit models were estimated separately for the probability of using the strategies households have available to cope with health expenditures: own resources; selling assets; and borrowing from family and others outside the household.

For the estimation of expenditures, first, a probit model was estimated for the factors that influence the probability of having health expenditures. And finally, a tobit model was estimated to evaluate the linear relationship between variables when there is a left-censoring (having expenditures higher than 0) in the dependent variable *HE2*.

Despite the analysis of the coefficients signs and significance, to interpret the effect of the exogenous factors on the dependent variable the marginal effects will also be analyzed. The marginal effects measure the expected instantaneous change in the dependent variable as a function of a change in a certain explanatory variable while

keeping all the other covariates constant. This analysis is conducted when in the presence of a latent dependent variable.

The models were run separately for each of the thirteen countries using the same set of independent variables and together including specific dummies for the countries.

The reference category for education is no primary, the reference category for the asset index is the first quintile and the reference category for the countries dummies is country 1 (Burkina Faso).

## **Section 4. Results**

The models were run first country-by-country and then to the full sample of countries. Including in the second case a dummy variable for each country.

### **4.1 The choice of coping strategies**

Table A3<sup>8</sup> reports the ordered probit estimated for the penalization index. We first report on the country-by-country estimates.

The factors that influence significantly penalization of household resources are: a greater size of the household (for 6 countries) and having hospitalized members (for 7 countries) increase the penalization of households' resources, while being localized in an urban area decreases the penalization (for 8 countries).

Other factors influence significantly, positive and negatively the penalization of resources, but in a smaller number of countries. Factors that also increase penalization are increasing age, having members who need long-term care, having

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<sup>8</sup> Table A3, page 32.

pregnant women in the household, and being in quintile 2. Factors that decrease penalization include having a male household head, a greater dependency index and being in quintile 3 and 4. The rest of the variables increase significantly the dependent variable in some countries and decrease in others.

By regressing the model with the full sample of countries together (Table A4, page 33), allowing for country-specific effects, penalization of resources seem to be significantly increased by a higher age of the household head, greater household size, having hospitalized and institutionalized members or even members who need long-term care, as well as having members working in the health sector. On the other hand, penalization is significantly decreased by having a household head who completed primary and secondary or a higher educational level, by households localized in an urban area, by a higher dependency index and being in the 5<sup>th</sup> quintile. Analysing the quintiles coefficients, they clearly illustrate the common belief that households at a lower quintile are subject to a higher penalization and this effect would decrease across quintiles. That is, families at the lowest quintiles have to use penalizing strategies.

Additionally, living in all countries decreases the penalization of resources relatively to living in Burkina Faso, while living in Mali and Mauritania increases it. In fact, in moving from Mauritania to Swaziland we assist to a higher ability in coping with unexpected expenditures. Looking simultaneously to the GDP per capita level present in Table 1., the latter effect is consistent with an increase in the GDP per capita level from Mauritania to Swaziland.

## 4.2 Individual strategy choice

Table A5<sup>9</sup> reports the results of the estimated probit for the first strategy analyzed, use of own resources.

Having a male household head (for 5 countries) and that completed secondary or a higher educational level (for 4 countries) increases the probability of using income and savings to cope with health expenditures, as well as having a greater household size (for 5 countries) or a household localized in an urban area (for 6 countries). While having hospitalized members (for 5 countries) in the household decreases the probability of using income and savings. This effect enlighten us about the higher costs of hospitalization to the households.

Table A6<sup>10</sup> reports the results of the estimated probit for the second strategy, selling assets. The vulnerability of the households to the use of this strategy increases with a greater household size (for 8 countries) and by having hospitalized members (for 7 countries), contrary to the precious strategy. Whereas living in an urban area (for 10 countries) and having a household head who completed secondary or a higher educational degree (for 7 countries) decreases the probability of selling assets to cope with the existence of health expenditures, which is consistent with the effect found on using own resources.

Table A7<sup>11</sup> reports the results of the estimated probit for the last strategy, borrow from family or others who do not belong to the household. Households exposed to the use of this strategy are characterized by a greater age of the household head (for 6 countries), having hospitalized members (for 9 countries) and female household head (for 7 countries).

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<sup>9</sup> See Table A5, page 34.

<sup>10</sup> See Table A6, page 35.

<sup>11</sup> See Table A7, page 36.

Table A8<sup>12</sup> combines the results the probit models for the whole sample, including dummies for each country. The vulnerability of families towards using own resources, is increased by having a male household head, a household head who completed primary and secondary or a higher educational level, by a greater household size, by the location of the household being located in an urban area and in the 2<sup>nd</sup> quintile.

Additionally, households with a greater number of members use more the strategy of selling assets, as well as the ones having some of them hospitalized and institutionalized, members who need long-term care, pregnant women or even members who work in the health sector, as being in 2<sup>nd</sup> and 3<sup>rd</sup> quintiles. The probability of selling assets is on the other side decreased by having a household head who completed secondary or a higher degree of education, by a household localized in an urban area, a higher dependency index and being in the 5<sup>th</sup> quintile.

At last, the overall probability of borrowing to cope with health expenditures is decreased by having a male household head, although being increased by its age, the size of the household, the dependency index, having hospitalized members and who need long-term care, having members working in the health sector and by the household belonging to the 3<sup>rd</sup> quintile.

### **4.3 Marginal Effects<sup>13</sup>**

In this sense, each set of dependent variables will be analyzed separately. Firstly, in terms of household-head characteristics being a male has the higher effect on the probability of using own resources, while its age has almost no impact. Secondly, in

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<sup>12</sup> See Table A8, page 37.

<sup>13</sup> See Table A9, page 38.

terms of broad household variables, being located in an urban area has a higher effect on the probability using own resources, while having some member who needs long-term care has the highest negative impact, followed by having an hospitalized member. Thirdly, in terms of quintiles distribution being at the first three quintiles has a higher impact on the probability of using own resources than being in the last two quintiles. Finally, in terms of countries, being in Ethiopia and Ghana increases slightly the probability of using own resources to cope with health expenditures, while for the rest of the countries the impact is negative and the highest in Zimbabwe.

In terms of marginal effects of the probability of selling assets to cope with health expenditures, in the household-head characteristics having completed secondary school or a higher educational level has the highest impact, while once again age has almost no effect. At the whole household level, having an hospitalized and institutionalizes member have the highest positive impact, a household located in an urban area seems to have the highest negative impact the probability of selling assets to cope with health expenditures. In terms of quintiles distribution being at the first three quintiles has a higher positive impact on the probability of selling assets than being in the last two quintiles. In fact, being at the 4<sup>th</sup> quintile has almost no effect and being at the 5<sup>th</sup> quintile decreases the probability of selling assets to cope with health expenditures In terms of countries, while being in Mali and Mauritania slightly increases the probability, for the rest of the countries the effect is negative, being the highest Ghana. Note that for the probability of using own resources living in Ghana actually had a positive impact.

In the scope of marginal effects on the probability of borrowing from others to cope with health expenditures, being a male has the highest negative effect of the

household head characteristics. In terms of household variables, having some member who works in the health sector has the highest positive impact, followed by having an hospitalized member. Analyzing quintiles distribution being at the first four quintiles has a positive low effect on the probability of borrowing, being the highest impact of quintile 3, while being at the 5<sup>th</sup> quintile has almost no effect. Living in Mali decreases the probability of borrowing to cope with health expenditures, while for the rest of the countries the impact although negative is much lower.

#### **4.4 Discussion**

On the one hand, across countries we have a higher financial penalization on households with an older household head, illustrating the fact that when the household head attains a higher age threshold the household is more exposed to financial hardship. This effect can arise due to the fact that when the household head attains a certain age threshold, the contributions to the household income diminish, as does the disposable income to face health expenditures. A numerous family, as well as having members in a fragile health status (either hospitalized, institutionalized or in need for long-term care) contributes to the vulnerability of the household and puts them at risk of having to use more than their own resources to cope with health expenditures.

On the other hand, investing in education is proven to be beneficial for the probability of having to penalize the household resources, as well as living in an urban area, often more capable in terms of infrastructures to answer people's needs.

While for the probability of using own resources, education and being located in an urban area have the same effect described before, in what concerns selling assets the effect is the opposite. This negative effect enlightens that more educated households



tend to find selling assets a less preferable strategy. Living in an urban area makes it difficult to sell assets what contradicts the intuition that in the face of a broad market selling assets would be a valuable strategy. A possible reason remains in the fact that households still have sufficient income and savings and so a lower probability of selling assets to cope with health expenditures. Can also be the case that the nature of assets in urban and rural areas is different, being easier to sell live stock for instance than a house or a car.

Additionally, having a bigger family indicates a higher probability of selling assets as a strategy to cope with health expenditures. A family with more members could mean less assets to sell, indicating that the marginal cost of selling an asset is lower than in the case of a larger family.

All in all, borrowing seems to be the more penalizing strategy for the overall sample of households.

## **Section 5. Determinants of Health Expenditure**

Table A10<sup>14</sup> reports the probit model estimated for the probability of having Health Expenditures. In the majority of countries the probability of having health expenditures is positively influenced by the household head having a primary (for 6 countries) and secondary educational level (for 8 countries), the increase in the size of the household (all 13 countries), having hospitalized members (for 11 countries), those who need long-term care (for 11 countries) and pregnant women (for 6 countries) and being in the 3<sup>rd</sup> (for 7 countries), 4<sup>th</sup> (for 8 countries) and 5<sup>th</sup> (for 8 countries) quintiles.

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<sup>14</sup> See Table A10, page 39.

The overall probability<sup>15</sup> of having health expenditures is significantly increased by all variables, except for age, urban and dependency index. The latter significantly decreases the probability of having health expenditures.

To evaluate the effect and the strength of the coefficients on the probability of having health expenditures we use marginal effects<sup>16</sup>, mentioned earlier in this section.

Firstly, in terms of household head characteristics completing primary and secondary or a higher educational degree has the highest impact on the probability having health expenditures. Secondly, a higher dependency index, that is, having a higher number of dependent members, strongly decreases the probability having health expenditures, while having an hospitalized member increases it. Thirdly, along the quintiles the impact on the probability of having health expenditures increases. And finally, in terms of countries, living in Ghana and Kenya increases the probability of having health expenditures, while for the rest of the countries the impact is negative and the highest for Ethiopia.

Table A13<sup>17</sup> reports the tobit model results. The probability of having health expenditures greater than 0<sup>18</sup> is positively influenced by the household head having a primary (for 7 countries) and secondary educational level (for 8 countries), the increase in the size of the household (for 13 countries), the household being localized in an urban area (for 6 countries), having hospitalized (for 12 countries) and institutionalized members (for 9 countries), those who need long-term care (for 8 countries) and being in the 4<sup>th</sup> (for 8 countries) and 5<sup>th</sup> (for 10 countries) quintiles.

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<sup>15</sup> See Table A11, page 40.

<sup>16</sup> See Table A12, page 41.

<sup>17</sup> See Table A13, page 42.

<sup>18</sup> The expenditures are in the currency of each country.

## **Section 6. Concluding remarks**

The vulnerability of families was found to be reflected mainly by their size, educational level and members in a poor health status. Educational level of the household was proven to be a greater drive for incurring in health expenditures. This fact illustrates that a more educated household do not spare on the essential in terms of health care. Nevertheless, for all strategies households at the lowest quintiles tend exploit them while facing health expenditures than people in the highest quintiles..

The choice of coping strategies also depends on the ability of households to borrow and the availability of assets. The former is linked not only to the financial capacity to repay a loan but also to the availability of social capital. The amounts needed may also differ from quintile to quintile. This could be a possible explanation to why there is no significant difference in the use of these coping strategies between lower quintiles in the majority of countries. Another reason is that the set of countries includes countries where the population is very poor and in that sense there is no large difference between the first quintiles.

Moreover, while we have searched for patterns in behavior among countries, it is also reasonable to believe that the precise mechanisms underlying coping strategies are likely to be context-specific both within and across countries. For instance, living in Mali was found to increase the vulnerability of a higher penalization of resources and in terms of individual strategies it had a positive impact in the probability of selling assets at the same time that decreases the probability of borrowing. For the majority of countries the effect in any choice of strategy is negative.

In interpreting the results, it is imperative to recognize the limitations of this study. First, in the absence of panel data there is no way to follow household choices

across time. In that sense, the study only captures the responses to an health shock in 2002 and not its consequences till today. Second, information on the amount of its own resources each household used, borrowed or the assets sold would be helpful for more perceptive analysis of the coping mechanisms used by households to finance health care.

Furthermore, in order to promote progress of the coping strategies these countries used for health spending, achieving a simple policy is probably enough to prevent the more severe financial consequences caused by lack of health. Creating a formal prepayment scheme and risk-pooling mechanisms to protect the more vulnerable households characterized by this study.

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## ANNEXES

### Survey Questions

#### Section 0100. Sampling Information

**Q104.** Setting:

1. Urban
2. Peri-urban/semi-urban
3. Rural
4. Other

#### Section 0400. Household Roster

C. Household member age

D. Household member education

#### Section 0500. Household Questionnaire

**Q0500.** Who is the person who provides the main economic support for the household?

#### Section 0560. Malaria Prevention: Use of (bed) nets

**Q0563.** Can you please tell me how many children aged under 5 years live in this household?

**Q0565.** Can you please tell me how many women who live in this household are currently pregnant?

#### Section 0570. Household Care

**Q0570.** Is there anyone in your house who is in an institution (hospital, after care home, home for the aged, hospice etc.) due to their health condition?

**Q0571.** Is there anyone in your home, a child or adult, who needs care because of a long-term physical or mental illness or disability, or is getting old and weak?

#### Section 0700. Permanent Income Indicators (Lower Income Countries)

**Q0700.** Can you please tell me how many rooms there are in your home?

**Q0701.** How many chairs are there in your home?

**Q0702.** How many tables are there in your home?

**Q0703.** How many cars are there in your household?

**Q0704.** Does your home have electricity?

Does anyone in your household have:

**Q0704.** A bicycle?

**Q0706.** A clock?

**Q0707.** A bucket?

**Q0708.** A washing machine for clothes?

**Q0709.** A washing machine for dishes?

**Q0710.** A refrigerator?

**Q0711.** A fixed line telephone?

**Q0712.** A mobile / cellular telephone?

**Q0713.** A television?

**Q0714.** A computer ?

### Section 0800. Household Expenditure

**Q0804.** Health care costs, excluding any insurance reimbursements

**Q0815.** In the last 12 months, how many times did members of your household go to a hospital and stay overnight?

In the last 12 months, which of the following financial sources did your household use to pay for any health expenditures?

**Q0817** Current income of any household members

**Q0818** Savings (e.g. bank account)

**Q0820** Sold items (e.g. furniture, animals, jewellery, furniture)

**Q0821** Family members or friends from outside the household

**Q0822** Borrowed from someone other than a friend or family

### Section 0900. Health Occupations

**Q0900.** Identification of member of the household who has ever worked or been trained in a Health-Related field.

**Table A1.** Insurance

	Burkina	Chad	Congo	CdIvoire	Ethiopia	Ghana	Kenya	Malawi	Mali	Mauritania	Senegal	Swaziland	Zimbabwe
<b>Insurance</b>	6	0	553	0	4	90	37	1	0	18	13	27	361
<b>Total</b>	4745	4561	2924	3210	4987	3965	4326	5128	4862	3315	3323	2801	3982
<b>% of Total</b>	0	0	19	0	0	2	1	0	0	1	0	1	9

**Table A2.** Descriptive Statistics

Variable	Burkina Faso		Chad		Congo		Côte d'Ivoire		Ethiopia		Ghana		Kenya		Malawi		Mali		Mauritania		Senegal		Swaziland		Zimbabwe				
	n=		n=		n=		n=		n=		n=		n=		n=		n=		n=		n=		n=		n=				
<b>Household Head Characteristics:</b>	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	
Male	0,89	0,31	0,80	0,40	0,79	0,40	0,83	0,37	0,86	0,35	0,74	0,44	0,68	0,47	0,78	0,41	0,97	0,16	0,72	0,45	0,81	0,39	0,75	0,43	0,69	0,46	0,69	0,46	
Age	42,37	16,24	40,59	16,88	40,89	14,46	41,18	15,30	42,31	16,09	43,47	17,47	39,66	17,80	37,18	16,82	53,11	15,96	42,91	17,28	48,78	15,85	42,97	17,00	39,05	18,35	39,05	18,35	
Education:																													
No primary	0,84	0,36	0,82	0,39	0,24	0,43	0,53	0,50	0,63	0,48	0,50	0,50	0,42	0,49	0,67	0,47	0,91	0,29	0,70	0,46	0,67	0,47	0,44	0,50	0,30	0,46	0,30	0,46	
Primary	0,08	0,27	0,10	0,29	0,29	0,45	0,21	0,40	0,00	0,00	0,35	0,48	0,26	0,44	0,22	0,42	0,05	0,21	0,13	0,34	0,17	0,37	0,24	0,43	0,38	0,48	0,38	0,48	
Secondary or higher	0,08	0,27	0,09	0,28	0,47	0,50	0,27	0,44	0,37	0,48	0,15	0,36	0,31	0,46	0,10	0,31	0,05	0,21	0,17	0,38	0,16	0,37	0,31	0,46	0,33	0,47	0,33	0,47	
<b>Household Characteristics:</b>																													
Size	5,81	3,14	5,09	2,92	5,06	2,89	5,31	3,36	5,58	2,37	5,21	2,92	4,27	2,54	4,38	2,25	8,91	3,61	5,75	2,80	7,97	3,41	5,56	3,19	4,97	2,40	4,97	2,40	
Urban	0,41	0,49	0,24	0,43	0,82	0,38	0,61	0,49	0,15	0,36	0,39	0,49	0,32	0,47	0,16	0,36	0,25	0,43	0,43	0,50	0,48	0,50	0,24	0,43	0,32	0,47	0,32	0,47	
Dependency Index	0,11	0,19	0,11	0,22	0,13	0,20	0,07	0,18	0,05	0,15	0,09	0,21	0,10	0,23	0,54	0,47	0,17	0,19	0,10	0,19	0,07	0,13	0,06	0,17	0,06	0,16	0,06	0,16	
Hospitalization	0,15	0,35	0,11	0,31	0,15	0,35	0,13	0,34	0,04	0,20	0,21	0,41	0,15	0,35	0,20	0,40	0,08	0,27	0,21	0,41	0,13	0,33	0,08	0,28	0,11	0,31	0,11	0,31	
Institutionalization	0,01	0,08	0,01	0,11	0,01	0,11	0,01	0,08	0,003	0,05	0,01	0,10	0,00	0,06	0,004	0,07	0,01	0,11	0,01	0,09	0,01	0,11	0,01	0,11	0,01	0,09	0,01	0,09	
Long-term care	0,05	0,21	0,04	0,19	0,08	0,28	0,03	0,17	0,04	0,21	0,03	0,16	0,05	0,22	0,03	0,18	0,05	0,22	0,04	0,18	0,10	0,30	0,04	0,20	0,09	0,29	0,09	0,29	
Pregnants	0,04	0,20	0,19	0,20	0,06	0,24	0,02	0,12	0,002	0,04	0,01	0,11	0,02	0,14	0,03	0,17	0,15	0,36	0,04	0,19	0,03	0,16	0,001	0,03	0,09	0,29	0,09	0,29	
Health worker	0,11	0,31	0,01	0,09	0,05	0,21	0,02	0,14	0,01	0,09	0,02	0,15	0,03	0,16	0,02	0,16	0,04	0,19	0,01	0,11	0,04	0,19	0,04	0,20	0,00	0,06	0,00	0,06	



Table A3. Ordered probit results for the penalization index:

Penalization	Burkina Faso	Chad	Congo	Côte d'Ivoire	Ethiopia	Ghana	Kenya	Malawi	Mali	Mauritania	Senegal	Swaziland	Zimbabwe
<b>Household Head Characteristics:</b>													
Male	-0.0947 (0.0856)	-0.2370 * (0.1347)	-0.0087 (0.1909)	-0.1977 (0.1651)	0.1890 (0.1384)	-0.0129 (0.1125)	-0.2132 ** (0.0844)	0.0167 (0.1183)	-0.7010 (1.0896)	0.1074 (0.1726)	-0.2506 * (0.1445)	0.0961 (0.1670)	-0.1684 (0.1482)
Age	-0.0438 *** (0.0091)	-0.0231 (0.0142)	-0.0091 (0.0269)	0.0331 (0.0230)	-0.0153 (0.0134)	-0.0006 (0.0107)	0.0098 (0.0097)	-0.0072 (0.0156)	0.0688 (0.1213)	0.0053 (0.0205)	0.0194 (0.0175)	-0.0272 (0.0194)	-0.0201 (0.0181)
Age <sup>2</sup>	0.0005 *** (0.0001)	0.0003 ** (0.0002)	0.0001 (0.0003)	-0.0004 (0.0003)	0.0002 (0.0001)	0.0001 (0.0001)	-0.0001 (0.0001)	0.0002 (0.0002)	-0.0006 (0.0011)	0.0000 (0.0002)	-0.0002 (0.0002)	0.0004 ** (0.0002)	0.0003 (0.0002)
<b>Education:</b>													
Primary	-0.2029 * (0.1056)	0.0650 (0.1412)	-0.1299 (0.1877)	-0.0267 (0.1425)	d	-0.0912 (0.0876)	-0.0688 (0.0866)	0.1039 (0.0857)	0.0196 (0.6418)	0.4969 *** (0.1820)	-0.3557 ** (0.1533)	-0.0714 (0.1512)	-0.0218 (0.1714)
Secondary or higher	-1.0045 *** (0.1401)	-0.2331 (0.1542)	-0.1747 (0.1847)	0.0634 (0.1302)	-0.1740 ** (0.0808)	-0.5384 *** (0.1466)	-0.3781 *** (0.0876)	0.1559 (0.1144)	-0.1524 (0.6480)	0.5158 *** (0.1678)	-0.2113 (0.1488)	-0.2110 (0.1566)	-0.0871 (0.1814)
<b>Household Characteristics:</b>													
Size	0.0350 *** (0.0096)	0.0127 (0.0166)	0.0296 (0.0245)	0.0332 ** (0.0161)	0.0614 *** (0.0173)	0.0249 * (0.0137)	0.0634 *** (0.0139)	0.0250 (0.0170)	-0.0127 (0.0031)	0.0545 ** (0.0224)	0.0022 (0.0149)	0.0261 (0.0219)	0.0227 (0.0256)
Urban	-0.4693 *** (0.0684)	-0.5497 *** (0.1089)	0.1578 (0.2056)	0.1471 (0.1180)	-0.6744 *** (0.1422)	-0.2912 *** (0.0888)	-0.6604 *** (0.0865)	-0.3993 *** (0.1048)	-1.5406 *** (0.4705)	0.0700 (0.1769)	-0.1761 (0.1100)	-0.2396 (0.1783)	-0.2913 ** (0.1219)
Dependency Index	-0.3102 * (0.1750)	-0.5276 * (0.2727)	-0.4003 (0.4531)	0.4915 (0.3615)	-0.5267 (0.4529)	-0.4233 (0.2840)	-0.1226 (0.2175)	-0.2262 (0.2304)	-0.4496 (1.3316)	0.1762 (0.4542)	0.1901 (0.4181)	-0.4818 (0.7223)	-0.0292 (0.5550)
Hospitalization	0.1253 * (0.0723)	0.4784 *** (0.1015)	0.7832 *** (0.1653)	0.2027 (0.1317)	0.6289 *** (0.1194)	0.6578 *** (0.0871)	-0.4610 *** (0.0869)	0.2140 *** (0.0768)	-0.5520 (0.7668)	0.0651 (0.1498)	0.1700 (0.1206)	0.1690 (0.1595)	-0.1133 (0.1360)
Institutionalization	0.3859 (0.2644)	-1.0153 * (0.5680)	1.2371 *** (0.3852)	0.2254 (0.4307)	0.4664 (0.4412)	0.6318 ** (0.2703)	-0.3643 (0.5728)	0.0606 (0.4712)	6.3892 (0.5288)	-0.1371 (0.6181)	0.1297 (0.3719)	0.0566 (0.3591)	-0.7413 (0.5531)
Long-term care	0.2480 * (0.1328)	0.1765 (0.2269)	-0.0667 (0.2424)	-0.2311 (0.2795)	0.0493 (0.1631)	0.1508 (0.2383)	0.5520 *** (0.1387)	0.3420 (0.1991)	-1.0202 (0.8820)	0.2159 (0.2303)	0.1053 (0.1466)	0.1247 (0.2460)	0.5011 *** (0.1660)
Pregnants	0.0423 (0.1200)	-0.1758 (0.1883)	0.6137 ** (0.2376)	-0.2041 (0.3913)	-0.1884 (0.6758)	-0.0882 (0.3176)	-0.1245 (0.2458)	0.1131 (0.1923)	0.2349 (0.5806)	0.0850 (0.2982)	0.2402 (0.2284)	d	1.1622 (1.1017)
Health worker	10.4563 (412.514)	0.4159 (0.3853)	-0.2966 (0.3753)	0.0176 (0.4072)	0.2066 (0.5230)	-0.5891 * (0.3286)	-0.4887 (0.3359)	0.8817 *** (0.1908)	-1.5816 ** (0.6615)	0.4563 (0.3802)	-0.4102 (0.2952)	0.2378 (0.2956)	-0.5397 * (0.3272)
Income quintile													
2	0.0256 (0.0915)	-0.0661 (0.1820)	-0.2473 (0.2044)	0.0928 (0.1896)	-0.0368 (0.1098)	0.0309 (0.1214)	-0.0609 (0.1025)	0.2133 * (0.1098)	-0.4784 (0.8473)	0.7039 (0.4295)	0.0870 (0.1362)	-0.0616 (0.2121)	0.2265 (0.1859)
3	0.0735 (0.0905)	0.1105 (0.1665)	-0.5168 ** (0.2127)	0.2666 (0.1803)	-0.2141 * (0.1193)	0.1657 (0.1225)	-0.1393 (0.1053)	0.0343 (0.1124)	-1.5088 ** (0.7562)	0.6364 (0.4259)	-0.1847 (0.1562)	0.1719 (0.2043)	0.0295 (0.1902)
4	-0.0599 (0.2150)	0.1166 (0.1646)	0.6255 * (0.2206)	0.0518 (0.1871)	0.0087 (0.1171)	0.0873 (0.1223)	-0.2020 ** (0.0473)	0.0751 (0.1145)	-1.4237 (0.7935)	0.6769 (0.4285)	-0.3771 ** (0.1634)	0.1616 (0.1891)	-0.0242 (0.1887)
5	-0.3780 *** (0.1097)	-0.1115 (0.1725)	-0.2829 (0.2081)	0.0240 (0.1847)	-0.0881 (0.1220)	0.2554 ** (0.1197)	-0.2687 ** (0.1080)	0.0723 (0.1180)	-1.1617 (0.6744)	0.8976 ** (0.4284)	-0.2253 (0.1618)	-0.0733 (0.1988)	-0.1416 (0.1898)

\*P&lt;0.10. \*\*P&lt;0.05. \*\*\*P&lt;0.01. SE, standard error. d for dropped variable

**Table A4.** Ordered probit results for full sample:

Penalization	Full Sample	
<b>Household Head Characteristics:</b>		
Male	-0,0337	
(SE)	(0,0316)	
Age	-0,0087	**
(SE)	(0,0034)	
Age <sup>2</sup>	0,0001	***
(SE)	(0,0000)	
Education:		
Primary	-0,0567	*
(SE)	(0,0320)	
Secondary or higher	-0,1980	***
(SE)	(0,0322)	
<b>Household Characteristics:</b>		
Size	0,0336	***
(SE)	(0,0041)	
Urban	-0,3815	***
(SE)	(0,0271)	
Dependency Index	-0,2296	***
(SE)	(0,0776)	
Hospitalization	0,2917	
(SE)	(0,0277)	
Institutionalization	0,2214	**
(SE)	(0,1013)	
Long-term care	0,2169	***
(SE)	(0,0475)	
Pregnants	0,0539	
(SE)	(0,0614)	
Health worker	0,6934	***
(SE)	(0,0559)	
Income quintile		
2	0,0217	
(SE)	(0,0363)	
3	-0,0153	
(SE)	(0,0364)	
4	-0,0317	
(SE)	(0,0366)	
5	-0,1246	***
(SE)	(0,0380)	
<b>Countries:</b>		
Chad	-0,4537	***
(SE)	(0,0493)	
Congo	-1,0778	***
(SE)	(0,0693)	
Côte d'Ivoire	-1,2377	***
(SE)	(0,0581)	
Ethiopia	-0,7564	***
(SE)	(0,0453)	
Ghana	-1,3937	***
(SE)	(0,0455)	
Kenya	-0,8002	***
(SE)	(0,0434)	
Malawi	-0,9728	***
(SE)	(0,0443)	
Mali	1,7992	***
(SE)	(0,1364)	
Mauritania	0,5068	***
(SE)	(0,0446)	
Senegal	-1,1813	***
(SE)	(0,0533)	
Swaziland	-1,2219	***
(SE)	(0,0665)	
Zimbabwe	-0,4610	***
(SE)	(0,0634)	
*P<0.10, **P<0.05,***P<0.01, SE, standard error		

Table A5. Probit results for own resources strategy:

Own Resources	Burkina Faso	Chad	Congo	Côte d'Ivoire	Ethiopia	Ghana	Kenya	Malawi	Mali	Mauritania	Senegal	Swaziland	Zimbabwe
<b>Household Head Characteristics:</b>													
Male	0.1389 (0.0902)	-0.1791 ** (0.0894)	0.1059 (0.0944)	0.1023 (0.0946)	0.2345 (0.1884)	0.3300 *** (0.0700)	0.3866 *** (0.0633)	0.2821 *** (0.0758)	0.0859 (0.1919)	-0.1062 (0.0987)	0.2688 *** (0.0873)	0.0742 (0.0902)	0.1997 ** (0.0976)
Age	0.0115 (0.0094)	0.0153 * (0.0092)	0.0189 (0.0130)	0.0185 * (0.0109)	-0.3867 * (0.0217)	-0.0015 (0.0073)	-0.0023 (0.0075)	0.0131 (0.0091)	-0.0084 (0.0096)	0.0081 (0.0114)	-0.0030 (0.0104)	-0.0136 (0.0114)	0.0027 (0.0108)
Age <sup>2</sup>	-0.0001 (0.0001)	-0.0002 * (0.0001)	-0.0002 * (0.0001)	-0.0002 * (0.0001)	0.0004 * (0.0002)	0.0000 (0.0001)	0.0000 (0.0001)	-0.0002 * (0.0001)	0.0001 (0.0001)	-0.0001 (0.0001)	0.0000 (0.0001)	0.0001 (0.0001)	-0.0001 (0.0001)
Education:													
Primary	0.3386 (0.1059)	-0.0256 (0.0943)	0.0512 (0.1017)	0.1067 (0.0827)	d	-0.1037 (0.0661)	0.0968 (0.1797)	0.0751 *** (0.0633)	0.4262 *** (0.1330)	0.0379 (0.1187)	0.1540 * (0.0901)	0.1253 (0.0918)	-0.0061 (0.1006)
Secondary or higher	-0.1772 * (0.1017)	0.1814 * (0.1015)	0.0884 (0.1011)	0.2070 ** (0.0799)	-0.0307 (0.1337)	0.0991 (0.0940)	0.2702 *** (0.0711)	0.5454 (0.1016)	0.1882 (0.1292)	-0.0675 (0.1089)	0.0324 (0.0881)	0.0485 (0.0897)	0.3012 *** (0.1129)
<b>Household Characteristics:</b>													
Size	0.0216 ** (0.0109)	0.0381 *** (0.0113)	0.0526 *** (0.0130)	0.0155 (0.0099)	0.0008 (0.0268)	0.0274 ** (0.0110)	0.0056 (0.0115)	0.0114 (0.0122)	0.0377 *** (0.0079)	-0.0143 (0.0139)	0.0160 (0.0098)	0.0105 (0.0123)	-0.0514 *** (0.0163)
Urban	-0.3866 *** (0.7409)	0.1778 ** (0.0724)	0.5616 *** (0.0958)	0.0192 (0.0686)	0.0312 (0.1805)	-0.0106 (0.0625)	0.3845 *** (0.0673)	0.4510 *** (0.0826)	0.1922 *** (0.0651)	0.1027 (0.0139)	0.0870 (0.0687)	0.0292 (0.0958)	0.6657 *** (0.0823)
Dependency Index	0.2907 (0.1985)	0.2798 (0.1741)	0.0573 (0.2026)	0.4536 * (0.2365)	-0.5785 (0.4927)	-0.3595 ** (0.1644)	-0.0557 (0.1561)	0.0542 (0.1600)	0.1002 (0.1505)	-0.1068 (0.2375)	0.1888 (0.2899)	-0.1641 (0.3635)	-0.1226 (0.3353)
Hospitalization	-0.0428 (0.0749)	0.1572 ** (0.0727)	-0.3514 *** (0.0882)	0.1362 * (0.0825)	-0.3775 *** (0.1726)	-0.4235 *** (0.0661)	-0.1705 ** (0.0712)	-0.0658 (0.0584)	-0.1818 ** (0.0794)	0.0329 (0.0924)	0.0590 (0.0834)	0.1657 (0.1018)	0.2761 (0.0921)
Institutionalization	-0.0119 (0.2919)	-0.5420 *** (0.1988)	0.1299 (0.2772)	0.6067 (0.4049)	d	-0.4527 ** (0.2172)	0.0638 (0.3912)	-0.0191 (0.3368)	0.2260 (0.2139)	0.7730 (0.5122)	-0.0634 (0.2558)	0.1704 (0.2604)	0.4842 (0.3428)
Long-term care	-0.2891 ** (0.1171)	-0.0967 (0.1539)	-0.3928 *** (0.1139)	0.3182 * (0.1744)	-0.4510 ** (0.2107)	-0.1485 (0.1545)	-0.0931 (0.1092)	-0.2097 (0.1356)	-0.0018 (0.1068)	0.2186 (0.1717)	-0.2024 ** (0.0932)	0.0993 (0.1581)	-0.0412 (0.1096)
Pregnants	0.0326 (0.1467)	0.1874 (0.1371)	-0.1390 (0.1396)	0.0495 (0.2374)	d	-0.1260 (0.2443)	-0.0305 (0.1855)	0.1258 (0.1583)	0.0934 (0.0727)	0.1299 (0.2077)	0.0397 (0.1756)	d	-0.7096 (0.7261)
Health worker	-0.2909 *** (0.0860)	-0.0046 (0.2818)	0.1417 (0.1636)	-0.4555 *** (0.2119)	d	-0.2581 (0.1786)	0.0076 (0.1952)	-0.3284 *** (0.1440)	0.1152 (0.1406)	-0.1280 (0.3228)	-0.0953 (0.1476)	-0.0076 (0.1772)	0.5354 ** (0.2070)
Income quintile													
2	0.6495 (0.1136)	0.0840 (0.1153)	0.0889 (0.1138)	0.0552 (0.1038)	-0.2328 (0.2020)	-0.1319 (0.0924)	-0.0457 (0.0856)	0.0386 (0.0825)	d	0.5009 *** (0.1366)	-0.0043 (0.1006)	0.0595 (0.1162)	-0.0983 (0.1197)
3	0.0854 (0.1112)	0.2643 ** (0.1083)	0.1051 (0.1137)	0.0329 (0.1010)	-0.0168 (0.2219)	-0.1262 (0.0932)	-0.1084 (0.0850)	0.0124 (0.0818)	d	0.4885 *** (0.1324)	-0.0541 (0.1053)	0.1167 (0.1191)	-0.0827 (0.1207)
4	0.0578 (0.1115)	0.1531 *** (0.1057)	0.0739 (0.1140)	0.0319 (0.1030)	-0.3336 (0.2059)	0.0086 (0.0961)	0.2918 (0.0858)	-0.1438 * (0.0811)	d	0.3244 ** (0.1368)	-0.0846 (0.1034)	0.2107 ** (0.1122)	-0.0534 (0.1201)
5	-0.0959 (0.1209)	0.3861 (0.1109)	-0.0229 (0.1143)	0.1588 (0.1333)	-0.1697 (0.2153)	-0.2163 ** (0.0925)	-0.0168 (0.0875)	-0.1701 ** (0.0849)	d	0.5747 *** (0.1452)	-0.0608 (0.1065)	0.3283 *** (0.1135)	-0.0539 (0.1196)

\*P&lt;0.10, \*\*P&lt;0.05, \*\*\*P&lt;0.01, SE, standard error, d for dropped variable

Table A6. Probit results for selling assets strategy:

Sell	Burkina Faso	Chad	Congo	Côte d'Ivoire	Ethiopia	Ghana	Kenya	Malawi	Mali	Mauritania	Senegal	Swaziland	Zimbabwe
<b>Household Head Characteristics:</b>													
Male	-0.0278 (0.0798)	-0.1024 (0.0924)	0.1187 (0.1359)	-0.0886 (0.1144)	0.1671 (0.1331)	0.1200 (0.0906)	-0.1144 * (0.0664)	-0.0017 (0.0794)	0.0529 (0.1914)	-0.1153 (0.0967)	0.0326 (0.1160)	-0.0967 (0.1140)	-0.2843 *** (0.0963)
Age	-0.0032 (0.0082)	-0.0078 (0.0094)	-0.0099 (0.0176)	0.0378 ** (0.0151)	-0.0005 (0.0133)	-0.0020 (0.0087)	0.0075 (0.0077)	0.0047 (0.0094)	-0.0075 (0.0096)	0.0065 (0.0112)	0.0059 (0.0129)	-0.0090 (0.0140)	0.0154 (0.0104)
Age <sup>2</sup>	0.0000 (0.0001)	0.0001 (0.0001)	0.0001 (0.0002)	-0.0005 *** (0.0002)	0.0000 (0.0001)	0.0001 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)	0.0001 (0.0001)	-0.0009 (0.0001)	-0.0001 (0.0001)	0.0002 (0.0002)	-0.0002 (0.0001)
Education:													
Primary	-0.1931 *** (0.0934)	-0.0327 (0.0984)	0.1156 (0.1336)	-0.0579 (0.0958)	d	-0.0730 (0.0749)	-0.1463 ** (0.0723)	0.0955 (0.0641)	0.2896 ** (0.1294)	0.0598 (0.1163)	-0.5415 *** (0.1137)	-0.1158 (0.1152)	0.0565 (0.0971)
Secondary or higher	-0.8753 *** (0.1206)	-0.2381 ** (0.1108)	-0.2000 (0.1392)	-0.2762 *** (0.0961)	-0.1573 * (0.0811)	-0.4372 *** (0.1238)	-0.3481 *** (0.0720)	-0.1015 (0.0956)	0.1644 (0.1285)	-0.0892 (0.1066)	-0.2738 ** (0.1188)	-0.0434 (0.1126)	-0.1698 (0.1108)
<b>Household Characteristics:</b>													
Size	0.0473 *** (0.0092)	0.1160 (0.1173)	0.0248 (0.0175)	0.0199 * (0.0115)	0.0698 *** (0.0172)	0.0219 * (0.0119)	0.0534 *** (0.0114)	0.0237 * (0.0123)	0.0416 *** (0.0079)	-0.0145 (0.0136)	0.0003 (0.0122)	0.0209 (0.0152)	0.0483 *** (0.0159)
Urban	-0.7820 *** (0.0617)	-0.3558 *** (0.0770)	-0.0428 (0.1288)	-0.2737 *** (0.0799)	-0.8855 *** (0.1403)	-0.2899 *** (0.0757)	-0.6929 *** (0.0728)	-0.4174 *** (0.0827)	0.2024 *** (0.0648)	0.0804 (0.0933)	-0.1841 ** (0.0887)	-0.3264 *** (0.1349)	-0.3379 *** (0.0823)
Dependency Index	-0.0070 (0.1655)	-0.1304 (0.1801)	0.0730 (0.2870)	-0.1451 (0.2946)	-0.2750 (0.4142)	-0.3804 * (0.2229)	-0.2934 * (0.1665)	-0.2667 (0.1639)	0.0794 (0.1504)	0.2097 (0.2347)	0.2097 (0.3457)	-0.5346 (0.4853)	0.3551 (0.3321)
Hospitalization	0.0281 (0.0658)	0.4131 *** (0.0732)	0.2354 ** (0.1160)	-0.0951 (0.0984)	0.5492 *** (0.1186)	0.4409 *** (0.0733)	0.3720 *** (0.0699)	0.1416 ** (0.0586)	-0.1746 ** (0.0793)	0.0842 (0.0912)	0.3345 *** (0.0969)	0.1740 (0.1205)	0.0106 (0.0913)
Institutionalization	0.2253 (0.2672)	-0.0377 (0.1997)	0.7604 *** (0.2848)	0.0250 (0.3699)	0.5301 (0.4761)	0.3738 (0.2307)	-0.3949 (0.4014)	0.1215 (0.3351)	0.2962 (0.2136)	0.4741 (0.4285)	-0.0234 (0.3351)	0.0791 (0.2884)	-0.4877 (0.3420)
Long-term care	-0.0387 (0.1123)	0.2456 (0.1570)	-0.1191 (0.1619)	0.1271 (0.1855)	0.0108 (0.1623)	0.3102 * (0.1727)	0.2344 ** (0.1086)	-0.1069 (0.1401)	-0.0262 (0.1064)	0.2337 (0.1678)	0.0735 (0.1163)	0.1878 (0.1746)	0.2580 ** (0.1064)
Pregnants	0.1858 (0.1209)	0.1470 (0.1394)	0.5922 *** (0.1648)	-0.2275 (0.2906)	-0.4540 (0.6269)	-0.0718 (0.2812)	-0.0345 (0.2024)	-0.0179 (0.1545)	0.1158 (0.0725)	-0.0373 (0.1964)	0.2009 (0.1888)	d	-0.3594 (0.6898)
Health worker	0.2219 *** (0.0787)	0.2998 (0.2883)	-0.4100 (0.2833)	-0.0204 (0.2684)	-0.0710 (0.5212)	-0.5840 ** (0.2912)	-0.3305 (0.2736)	0.7842 *** (0.1470)	0.1327 (0.1403)	-0.1385 (0.3120)	-0.4592 * (0.2523)	0.0417 (0.2198)	-0.7826 *** (0.2342)
Income quintile													
2	0.0457 (0.0891)	0.1028 (0.1181)	-0.3218 ** (0.1524)	-0.0155 (0.1250)	-0.1223 (0.1112)	0.1119 (0.1033)	-0.0601 (0.0853)	0.1386 (0.0841)	d	0.4555 *** (0.1348)	-0.0525 (0.1118)	-0.1065 (0.1448)	0.2117 * (0.1165)
3	0.0978 (0.0880)	0.1449 (0.1114)	-0.2314 (0.1487)	0.0982 (0.1194)	-0.2684 ** (0.1201)	0.0747 (0.1069)	-0.0946 (0.0856)	0.0654 (0.0842)	d	0.5346 *** (0.1316)	-0.3069 ** (0.1270)	0.0296 (0.1453)	0.2385 ** (0.1183)
4	-0.0316 (0.0898)	0.1571 (0.1090)	-0.4978 *** (0.1631)	0.1136 (0.1219)	-0.0116 (0.1175)	0.0034 (0.1091)	-0.1879 ** (0.0857)	0.1803 *** (0.0832)	d	0.3633 *** (0.1357)	-0.4067 *** (0.1294)	0.0738 (0.1353)	-0.0092 (0.1178)
5	-0.2423 *** (0.1026)	-0.0003 (0.1152)	-0.2007 (0.1507)	0.0592 (0.1235)	-0.1031 (0.1226)	0.2555 ** (0.1046)	-0.2019 ** (0.0889)	0.1697 * (0.0870)	d	0.5417 *** (0.1429)	-0.3108 ** (0.1310)	-0.1615 (0.1440)	-0.0172 (0.1179)

\*P&lt;0.10, \*\*P&lt;0.05, \*\*\*P&lt;0.01, SE, standard error, d for dropped variable

Table A7. Probit results for the borrowing strategy:

Borrow	Burkina Faso	Chad	Congo	Côte d'Ivoire	Ethiopia	Ghana	Kenya	Malawi	Mali	Mauritania	Senegal	Swaziland	Zimbabwe
<b>Household Head Characteristics:</b>													
Male	-0.0684 (0.0910)	-0.4846 *** (0.1029)	-0.2076 ** (0.0976)	-0.4084 *** (0.1019)	-0.2996 *** (0.1304)	-0.5098 *** (0.0636)	0.2304 *** (0.0619)	-0.3653 *** (0.0804)	0.4203 (0.4345)	0.0820 (0.1364)	-0.3853 *** (0.0882)	-0.0100 (0.1017)	-0.1259 (0.1019)
Age	-0.0611 *** (0.0090)	-0.0189 * (0.0106)	-0.0158 (0.0133)	-0.0303 *** (0.0117)	-0.0095 (0.0139)	-0.0171 *** (0.0065)	-0.0023 (0.0074)	-0.0237 ** (0.0097)	0.0035 (0.0205)	0.0094 (0.0163)	-0.0231 ** (0.0104)	-0.0126 (0.0124)	-0.0081 (0.0110)
Age <sup>2</sup>	0.0007 *** (0.0001)	0.0002 ** (0.0001)	0.0002 (0.0001)	0.0004 *** (0.0001)	0.0001 (0.0001)	0.0002 *** (0.0001)	0.0001 (0.0001)	0.0003 *** (0.0001)	0.0000 (0.0002)	-0.0001 (0.0002)	0.0003 *** (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
Education:													
Primary	0.0078 (0.1046)	0.1996 * (0.1102)	-0.1260 (0.1076)	0.1739 * (0.0937)	d	0.0547 (0.0594)	-0.1746 ** (0.0702)	0.0143 (0.0705)	0.4542 ** (0.1921)	0.2245 (0.1495)	-0.1499 (0.0921)	0.1154 (0.1013)	-0.0647 (0.1041)
Secondary or higher	-0.1001 (0.1118)	0.1477 (0.1217)	0.0649 (0.1054)	0.1624 * (0.0909)	-0.1266 (0.0970)	-0.0744 (0.0823)	-0.2480 *** (0.0679)	0.0676 (0.0992)	0.0288 (0.2418)	0.2848 ** (0.1362)	-0.1050 (0.0910)	-0.0177 (0.1017)	-0.0688 (0.1180)
<b>Household Characteristics:</b>													
Size	-0.0081 (0.0103)	0.0140 (0.0137)	0.0303 ** (0.0133)	0.0179 (0.0111)	-0.0075 (0.0198)	0.0014 (0.0096)	-0.0062 (0.0111)	0.0073 (0.0132)	-0.0096 (0.0154)	0.0416 *** (0.0180)	0.0006 (0.0099)	-0.0007 (0.0138)	-0.0144 (0.0171)
Urban	0.2340 *** (0.0706)	-0.1259 (0.0896)	0.5792 *** (0.1112)	-0.1006 (0.0778)	0.4051 *** (0.1216)	0.0316 (0.0556)	-0.1193 * (0.0622)	-0.0497 (0.0840)	-0.1798 (0.1300)	0.1657 (0.1381)	0.0268 (0.0699)	-0.1734 (0.1105)	-0.0628 (0.0887)
Dependency Index	-0.3704 ** (0.1844)	0.0233 (0.2081)	0.3281 (0.2123)	-0.0876 (0.2629)	-0.0931 (0.4089)	0.2806 * (0.1534)	0.2455 (0.1505)	0.1079 (0.1701)	0.1528 (0.2849)	0.0994 (0.3522)	-0.0698 (0.2941)	0.2387 (0.3868)	0.4734 (0.3331)
Hospitalization	0.1317 * (0.0732)	0.6851 *** (0.0798)	0.7006 *** (0.0892)	0.3687 *** (0.0866)	0.6443 *** (0.1257)	0.7024 *** (0.0594)	0.4687 *** (0.0669)	0.2761 *** (0.0623)	-0.0441 (0.1626)	-0.0163 (0.1237)	0.1108 (0.0832)	0.2054 ** (0.1086)	-0.0786 (0.0986)
Institutionalization	0.3680 (0.2523)	-0.4316 * (0.2444)	0.4315 (0.2686)	0.2391 (0.3267)	-0.6232 (0.6286)	0.1038 (0.2177)	0.4579 (0.3600)	-0.0748 (0.3736)	-0.0796 (0.4367)	-0.0201 (0.4806)	-0.1093 (0.2688)	-0.4000 (0.3143)	-0.0841 (0.3610)
Long-term care	0.2821 ** (0.1217)	0.1623 (0.1816)	-0.0847 (0.1202)	0.0412 (0.1757)	0.1532 (0.1699)	0.3470 ** (0.1449)	0.3672 *** (0.1038)	0.4744 *** (0.1350)	-0.0503 (0.2150)	0.2054 (0.1959)	0.0989 (0.0953)	0.1272 (0.1697)	0.3120 *** (0.1109)
Pregnants	-0.0678 (0.1382)	-0.1524 (0.1746)	0.2657 * (0.1441)	0.0682 (0.2524)	0.5445 (0.5889)	-0.1573 (0.2334)	-0.0079 (0.1769)	0.3463 ** (0.1531)	-0.1385 (0.1486)	0.2572 (0.2304)	0.1869 (0.1714)	d	0.0137 (0.6995)
Health worker	d	0.0659 (0.3281)	0.1644 (0.1603)	0.0111 (0.2526)	0.3453 (0.3678)	-0.4354 ** (0.2000)	-0.4287 ** (0.2012)	0.4064 *** (0.1522)	-0.4526 (0.3104)	0.3944 (0.3220)	-0.1628 (0.1571)	0.0739 (0.1992)	0.3911 ** (0.1952)
Income quintile													
2	-0.0235 (0.1026)	-0.0034 (0.1483)	-0.0140 (0.1189)	-0.0780 (0.1178)	0.1458 (0.1356)	0.1500 * (0.0833)	-0.0801 (0.0822)	-0.1057 (0.0918)	2.5650 *** (0.4183)	0.2512 (0.2175)	0.0324 (0.1024)	0.0328 (0.1296)	0.0242 (0.1241)
3	0.0192 (0.1001)	0.2706 ** (0.1355)	-0.1519 (0.1209)	0.0314 (0.1138)	-0.0927 (0.1509)	0.3568 *** (0.0825)	-0.0212 (0.0817)	-0.0690 (0.0899)	2.0621 *** (0.3599)	0.0400 (0.2205)	0.1193 (0.1066)	0.0541 (0.1325)	0.0977 (0.1254)
4	-0.0837 (0.1037)	0.2147 (0.1334)	-0.2070 * (0.1209)	-0.0968 (0.1181)	0.1226 (0.1446)	0.1711 ** (0.0840)	-0.0636 (0.0811)	-0.0161 (0.0895)	1.7617 *** (0.3632)	0.0896 (0.2238)	0.0526 (0.1052)	-0.0194 (0.1258)	-0.0636 (0.1262)
5	-0.2215 * (0.1164)	0.1598 (0.1398)	-0.0420 (0.1189)	-0.1629 (0.1181)	0.1077 (0.1479)	0.1671 ** (0.0848)	-0.2131 ** (0.0847)	-0.0264 (0.0926)	1.8268 *** (0.2873)	0.3527 (0.2225)	0.0246 (0.1088)	-0.1460 (0.1292)	-0.1435 (0.1272)

\*P&lt;0.10, \*\*P&lt;0.05, \*\*\*P&lt;0.01, SE, standard error, d for dropped variable

**Table A8.** Probit results for the full sample by coping strategy:

Full Sample	Own Resources	Sell	Borrow
<b>Household Head Characteristics:</b>			
Male	0,1931 ***	-0,0417	-0,2614 ***
(SE)	(0,0238)	(0,0255)	(0,024)
Age	0,0012	0,0029	-0,0181 ***
(SE)	(0,0025)	(0,0026)	(0,003)
Age <sup>2</sup>	0,0000 *	0,0000	0,0002 ***
(SE)	(0,0000)	(0,0000)	(0,000)
<b>Education:</b>			
Primary	0,0496 **	-0,0331	0,0166
(SE)	(0,0240)	(0,0255)	(0,025)
Secondary or higher	0,1619 ***	-0,2262 ***	-0,0279
(SE)	(0,0254)	(0,0267)	(0,026)
<b>Household Characteristics:</b>			
Size	0,0235 ***	0,0324 ***	0,0056 *
(SE)	(0,0003)	(0,0032)	(0,003)
Urban	0,1780 ***	-0,3655 ***	0,0148
(SE)	(0,0203)	(0,0214)	(0,0214)
Dependency Index	0,0296	-0,1206 **	0,1130 *
(SE)	(0,0541)	(0,0576)	(0,0581)
Hospitalization	-0,0808 ***	0,1751 ***	0,3536 ***
(SE)	(0,0218)	(0,0223)	(0,0222)
Institutionalization	0,0248	0,1695 **	0,0299
(SE)	(0,0772)	(0,0783)	(0,0814)
Long-term care	-0,1448 ***	0,0881 **	0,2230 ***
(SE)	(0,0349)	(0,0362)	(0,0361)
Pregnants	0,1020 **	0,1210 ***	0,0322
(SE)	(0,0430)	(0,0430)	(0,0502)
Health worker	-0,0422	0,1054 **	0,6942 ***
(SE)	(0,0445)	(0,0457)	(0,0429)
<b>Income quintile</b>			
2	0,0512 *	0,0688 **	0,0421
(SE)	(0,0299)	(0,0306)	(0,0307)
3	0,0458	0,0602 **	0,0955 ***
(SE)	(0,0297)	(0,0305)	(0,0304)
4	0,0134	0,0144	0,0468
(SE)	(0,0293)	(0,0304)	(0,0303)
5	0,0130	-0,0619 **	0,0179
(SE)	(0,0298)	(0,0313)	(0,0309)
<b>Countries:</b>			
Chad	-1,0046 ***	-0,3846 ***	-0,4288 ***
(SE)	(0,0417)	(0,0395)	(0,0439)
Congo	-0,6912 ***	-0,8425 ***	-0,3428 ***
(SE)	(0,0435)	(0,0451)	(0,0446)
Côte d'Ivoire	-0,7324 ***	-1,0657 ***	-0,0915 *
(SE)	(0,0474)	(0,0557)	(0,0467)
Ethiopia	0,6796 ***	-0,5270 ***	-0,4923 ***
(SE)	(0,0646)	(0,0442)	(0,0498)
Ghana	0,0845 **	-1,2852 ***	-0,1929 ***
(SE)	(0,0419)	(0,0420)	(0,0375)
Kenya	-0,2288 ***	-0,6031 ***	-0,1229 ***
(SE)	(0,0413)	(0,0384)	(0,0386)
Malawi	-0,5005 ***	-0,5367 ***	-0,3360 ***
(SE)	(0,0401)	(0,0373)	(0,0396)
Mali	-0,8689 ***	0,0256	-1,2168 ***
(SE)	(0,0455)	(0,0429)	(0,0583)
Mauritania	-0,4777 ***	0,6256 ***	-0,8467 ***
(SE)	(0,0478)	(0,0447)	(0,0562)
Senegal	-0,5642 ***	-1,1505 ***	-0,0985 **
(SE)	(0,0436)	(0,0465)	(0,0420)
Swaziland	-0,7815 ***	-1,0569 ***	-0,2930 ***
(SE)	(0,0476)	(0,0523)	(0,0493)
Zimbabwe	-1,1497 ***	-0,0520	-0,2329 ***
(SE)	(0,0476)	(0,0455)	(0,0484)
*P<0.10, **P<0.05,***P<0.01, SE, standard error			

**Table A9. Marginal Effects by coping strategy:**

Marginal Effects	Own Resources	Sell	Borrow
<b>Household Head Characteristics :</b>			
Male	0,0664	-0,0137	-0,0757
(SE)	(0,0084)	(0,0085)	(0,007)
Age	0,0004	0,0009	-0,0049
(SE)	(0,0008)	(0,0009)	(0,001)
Age <sup>2</sup>	0,0000	0,0000	0,0001
(SE)	(0,0000)	(0,0000)	(0,000)
<b>Education:</b>			
Primary	0,0163	-0,0107	0,0045
(SE)	(0,0078)	(0,0082)	(0,007)
Secondary or higher	0,0523	-0,0706	-0,0075
(SE)	(0,0080)	(0,0079)	(0,007)
<b>Household Characteristics:</b>			
Size	0,0078	0,0106	0,0015
(SE)	(0,0010)	(0,0010)	(0,001)
Urban	0,0583	-0,1153	0,0040
(SE)	(0,0066)	(0,0065)	(0,0058)
Dependency Index	0,0099	-0,0394	0,0306
(SE)	(0,0180)	(0,0188)	(0,0157)
Hospitalization	-0,0273	0,0590	0,1046
(SE)	(0,0075)	(0,0077)	(0,0071)
Institutionalization	0,0082	0,0581	0,0082
(SE)	(0,0253)	(0,0280)	(0,0226)
Long-term care	-0,0499	0,0294	0,0655
(SE)	(0,1241)	(0,0124)	(0,0114)
Pregnants	0,0329	0,0408	0,0088
(SE)	(0,0135)	(0,0150)	(0,0140)
Health worker	-0,0142	0,0354	0,2336
(SE)	(0,0152)	(0,0158)	(0,0165)
<b>Income quintile</b>			
2	0,0168	0,0228	0,0115
(SE)	(0,0097)	(0,0103)	(0,0085)
3	0,0151	0,0199	0,0266
(SE)	(0,0097)	(0,0102)	(0,0087)
4	0,0045	0,0047	0,0128
(SE)	(0,0097)	(0,0100)	(0,0084)
5	0,0043	-0,0200	0,0049
(SE)	(0,0099)	(0,0100)	(0,0085)
<b>Countries:</b>			
Chad	-0,3792	-0,1113	-0,0974
(SE)	(0,0155)	(0,0099)	(0,0081)
Congo	-0,2587	-0,2040	-0,0806
(SE)	(0,0171)	(0,0073)	(0,0089)
Côte d'Ivoire	-0,2756	-0,2319	-0,0239
(SE)	(0,0186)	(0,0066)	(0,0118)
Ethiopia	0,1797	-0,1441	-0,1078
(SE)	(0,0123)	(0,0097)	(0,0084)
Ghana	0,0275	-0,2763	-0,0488
(SE)	(0,0134)	(0,0051)	(0,0088)
Kenya	-0,0799	-0,1641	-0,0319
(SE)	(0,0150)	(0,0083)	(0,0096)
Malawi	-0,1825	-0,1490	-0,0802
(SE)	(0,0155)	(0,0085)	(0,0082)
Mali	-0,3263	0,0084	-0,1986
(SE)	(0,0175)	(0,0142)	(0,0047)
Mauritania	-0,1753	0,2313	-0,1550
(SE)	(0,0187)	(0,0177)	(0,0060)
Senegal	-0,2085	-0,2460	-0,0257
(SE)	(0,0171)	(0,0054)	(0,0105)
Swaziland	-0,2951	-0,2297	-0,0701
(SE)	(0,0186)	(0,0063)	(0,0102)
Zimbabwe	0,4332	-0,0167	-0,0572
(SE)	(0,0168)	(0,0144)	(0,0107)
SE, standard error			

Table A10. Probit results for the *HEI*:

HEI	Burkina Faso	Chad	Congo	Côte d'Ivoire	Ethiopia	Ghana	Kenya	Malawi	Mali	Mauritania	Senegal	Swaziland	Zimbabwe
<b>Household Head Characteristics:</b>													
Male	-0.0977 (0.0609)	0.1009 (0.0553)	0.0475 (0.0703)	0.0612 (0.0637)	0.0849 (0.0611)	0.0348 (0.0655)	-0.1220 ** (0.0481)	0.2247 *** (0.0505)	0.1230 (0.1203)	-0.1132 * (0.0589)	-0.0333 (0.0657)	-0.0302 (0.0620)	0.0328 (0.0583)
Age	0.0029 (0.0058)	0.0063 (0.0058)	0.0141 (0.0101)	-0.0025 * (0.0014)	0.0010 (0.0046)	-0.0130 * (0.0071)	0.0136 ** (0.0056)	0.0011 (0.0059)	0.0085 (0.0065)	0.0019 (0.0068)	0.0068 (0.0076)	0.0036 (0.0075)	0.0089 (0.0062)
Age <sup>2</sup>	0.0000 (0.0001)	-0.0001 * (0.0001)	-0.0001 (0.0001)	0.0000 (0.0000)	-0.0001 (0.0001)	0.0002 ** (0.0001)	-0.0002 *** (0.0001)	0.0000 (0.0001)	-0.0001 (0.0001)	0.0000 (0.0001)	-0.0001 (0.0001)	0.0000 (0.0001)	-0.0001 (0.0001)
Education:													
Primary	0.1302 * (0.0764)	0.1757 ** (0.0679)	0.0245 (0.0795)	2548112 *** (0.0629)	d -	-0.0118 (0.0599)	-0.0146 (0.0533)	0.0418 (0.0465)	0.1432 (0.0905)	0.1061 (0.0732)	0.1821 *** (0.0648)	0.1380 ** (0.0639)	0.1492 ** (0.0582)
Secondary or higher	0.3175 *** (0.0857)	0.1900 *** (0.0730)	-0.0991 (0.0763)	0.2172 *** (0.0593)	0.0746 * (0.0440)	-0.1738 ** (0.0797)	0.0843 (0.0527)	0.0956 (0.0653)	0.1909 ** (0.0918)	0.0368 (0.0668)	0.3612 *** (0.0677)	0.0748 (0.0621)	0.2722 *** (0.0671)
<b>Household Characteristics:</b>													
Size	0.0407 *** (0.0069)	0.0395 *** (0.0077)	0.0434 *** (0.0099)	0.0525 *** (0.0075)	0.0683 *** (0.0090)	0.0406 *** (0.0096)	0.0936 *** (0.0089)	0.0509 *** (0.0087)	0.0389 *** (0.0054)	0.0403 *** (0.0085)	0.0434 *** (0.0070)	0.0506 *** (0.0087)	0.0668 *** (0.0099)
Urban	0.0626 (0.0469)	0.1094 ** (0.0505)	-0.0576 (0.0756)	-0.1786 *** (0.0515)	-0.1405 ** (0.0618)	-0.2565 *** (0.0558)	0.0619 (0.0475)	0.1826 *** (0.0551)	-0.0202 (0.0456)	0.2046 *** (0.0548)	-0.0276 (0.0489)	-0.0612 (0.0631)	0.2079 *** (0.0517)
Dependency Index	0.0789 (0.1147)	0.0686 (0.1082)	0.0261 (0.1470)	-0.0884 (0.1520)	0.3497 * (0.1840)	0.1603 (0.1571)	0.3086 *** (0.1161)	-0.6955 *** (0.0418)	0.2052 * (0.1075)	0.3567 ** (0.1445)	0.3354 (0.2108)	-0.2970 (0.2208)	0.1056 (0.1878)
Hospitalization	0.5536 *** (0.0592)	1.0958 (0.0705)	0.7031 *** (0.0853)	0.6807 *** (0.0759)	0.8283 *** (0.0923)	0.3214 *** (0.0692)	0.2940 *** (0.0608)	0.5514 *** (0.0482)	0.7919 *** (0.0752)	-0.0258 (0.0555)	0.5559 *** (0.0733)	1.0375 *** (0.1001)	0.7956 *** (0.0712)
Institutionalization	0.7193 *** (0.2976)	0.6092 (0.2086)	0.4253 (0.2768)	0.2244 (0.3144)	0.2235 (0.3378)	0.8106 * (0.4701)	-0.1521 (0.3325)	0.1424 (0.2935)	0.3037 (0.1881)	0.0671 (0.2772)	0.0367 (0.2135)	0.6460 ** (0.2577)	0.1247 (0.2375)
Long-term care	0.3819 *** (0.0993)	-0.0051 (0.1044)	0.4495 *** (0.1097)	0.3757 ** (0.1479)	0.2098 ** (0.0922)	0.5847 *** (0.2142)	0.4288 *** (0.1050)	0.1236 (0.1043)	0.2291 *** (0.0852)	0.6649 *** (0.1305)	0.3711 *** (0.0802)	0.3806 *** (0.1337)	0.4106 *** (0.0768)
Pregnants	0.2015 ** (0.0956)	0.0310 (0.0992)	0.2855 ** (0.1162)	0.0613 (0.1962)	1.0472 ** (0.5034)	-0.1451 (0.2301)	0.4068 ** (0.1578)	0.0531 (0.1071)	0.1367 ** (0.0542)	-0.0229 (0.1249)	0.4747 *** (0.1546)	0.1127 (0.0804)	-0.0424 (0.3698)
Health worker	0.0790 (0.0612)	0.1743 (0.2176)	0.2678 ** (0.1344)	0.3825 ** (0.1737)	0.0454 (0.2065)	-0.4365 *** (0.1654)	0.0825 (0.1248)	-0.0054 (0.1195)	0.0912 (0.1007)	-0.1402 (0.2115)	0.3710 *** (0.1270)	0.1083 (0.1260)	0.1970 (0.1345)
Income quintile													
2	0.2670 *** (0.0591)	-0.0499 (0.0654)	-0.0208 (0.0873)	0.0200 (0.0737)	0.2398 *** (0.0603)	0.0865 (0.0613)	-0.0847 (0.0634)	-0.0119 (0.0588)	0.5516 (0.3611)	0.2172 *** (0.0741)	-0.0347 (0.0708)	-0.0259 (0.0785)	0.1783 ** (0.0693)
3	0.4092 *** (0.0603)	0.1710 *** (0.0652)	-0.0646 (0.0859)	0.2425 *** (0.0751)	0.1090 * (0.0619)	0.7140 *** (0.0725)	-0.0409 (0.0639)	-0.0674 (0.0583)	0.0902 (0.2686)	0.3843 *** (0.0737)	-0.1469 ** (0.0727)	-0.0173 (0.0795)	0.1634 ** (0.0699)
4	0.4591 *** (0.0634)	0.3978 *** (0.0659)	-0.0319 (0.0863)	0.1888 ** (0.0754)	0.1058 * (0.0625)	1.3675 *** (0.0963)	0.0053 (0.0641)	-0.0787 (0.0584)	-0.0803 (0.2566)	0.3982 *** (0.0774)	0.0673 (0.0746)	0.1878 ** (0.0782)	0.1975 *** (0.0699)
5	0.6300 *** (0.0751)	0.4911 *** (0.0706)	-0.0208 (0.0867)	0.1673 ** (0.0756)	0.2651 *** (0.0672)	2.3686 *** (0.2085)	-0.1052 (0.0639)	-0.0963 (0.0607)	0.1761 (0.2089)	0.5970 *** (0.0835)	-0.0340 (0.0758)	0.1830 ** (0.0778)	0.2301 *** (0.0709)

\*P&lt;0.10, \*\*P&lt;0.05, \*\*\*P&lt;0.01, SE, standard error, d for dropped variable



**Table A11.** Probit results for the full sample:

HE1	Full Sample
<b>Household Head Characteristics:</b>	
Male	0,0348 **
(SE)	(0,0155)
Age	-0,0005
(SE)	(0,0009)
Age <sup>2</sup>	0,0000
(SE)	(0,0000)
Education:	
Primary	0,1054 ***
(SE)	(0,0173)
Secondary or higher	0,1131 ***
(SE)	(0,0170)
<b>Household Characteristics:</b>	
Size	0,0474 ***
(SE)	(0,0021)
Urban	0,0180
(SE)	(0,0139)
Dependency Index	-0,2688 **
(SE)	(0,0276)
Hospitalization	0,5789 ***
(SE)	(0,0183)
Institutionalization	0,3826 ***
(SE)	(0,0702)
Long-term care	0,3276 ***
(SE)	(0,0279)
Pregnants	0,1941 ***
(SE)	(0,0320)
Health worker	0,1211 ***
(SE)	(0,0332)
Income quintile	
2	0,0568 ***
(SE)	(0,0191)
3	0,1485 ***
(SE)	(0,0193)
4	0,2375 ***
(SE)	(0,0195)
5	0,2972 ***
(SE)	(0,0201)
<b>Countries:</b>	
Chad	-0,3801 ***
(SE)	(0,0272)
Congo	-0,0543 *
(SE)	(0,0303)
Côte d'Ivoire	-0,0235
(SE)	(0,0339)
Ethiopia	-0,6797 ***
(SE)	(0,0277)
Ghana	0,6422 ***
(SE)	(0,0308)
Kenya	0,2277 ***
(SE)	(0,0285)
Malawi	-0,0149
(SE)	(0,0294)
Mali	-0,1581 ***
(SE)	(0,0300)
Mauritania	-0,5506 ***
(SE)	(0,0297)
Senegal	-0,2006 ***
(SE)	(0,0299)
Swaziland	-0,3139 ***
(SE)	(0,0316)
Zimbabwe	-0,5870 ***
(SE)	(0,0302)

\*P&lt;0.10, \*\*P&lt;0.05,\*\*\*P&lt;0.01, SE, standard error

**Table A12.** Marginal effects on *HEI*:

<b>HEI</b>	<b>Marginal Effects</b>
<b>Household Head Characteristics:</b>	
Male	0,0139
(SE)	(0,0062)
Age	-0,0002
(SE)	(0,0004)
Age <sup>2</sup>	0,0000
(SE)	(0,0000)
<b>Education:</b>	
Primary	0,0419
(SE)	(0,0068)
Secondary or higher	0,0450
(SE)	(0,0067)
<b>Household Characteristics:</b>	
Size	0,0189
(SE)	(0,0008)
Urban	0,0072
(SE)	(0,0056)
Dependency Index	-0,1071
(SE)	(0,0110)
Hospitalization	0,2209
(SE)	(0,0065)
Institutionalization	0,1479
(SE)	(0,0257)
Long-term care	0,1279
(SE)	(0,0105)
Pregnants	0,0767
(SE)	(0,0124)
Health worker	0,0481
(SE)	(0,0131)
<b>Income quintile</b>	
2	0,0226
(SE)	(0,0076)
3	0,0590
(SE)	(0,0076)
4	0,0939
(SE)	(0,0076)
5	0,1171
(SE)	(0,0078)
<b>Countries:</b>	
Chad	0,1497
(SE)	(0,0104)
Congo	-0,0217
(SE)	(0,0121)
Côte d'Ivoire	-0,0094
(SE)	(0,0135)
Ethiopia	-0,2590
(SE)	(0,0095)
Ghana	0,2404
(SE)	(0,0102)
Kenya	0,0898
(SE)	(0,0111)
Malawi	-0,0059
(SE)	(0,0117)
Mali	-0,0620
(SE)	(0,0119)
Mauritania	-0,2126
(SE)	(0,0107)
Senegal	-0,0798
(SE)	(0,0118)
Swaziland	-0,1241
(SE)	(0,0122)
Zimbabwe	-0,2258
(SE)	(0,0107)
SE, standard error	

Table A13. Tobit results for HE2:

HE2	Burkina Faso	Chad	Congo	Côte d'Ivoire	Ethiopia	Ghana	Kenya	Malawi	Mali	Mauritania	Senegal	Swaziland	Zimbabwe
<b>Household Head Characteristics:</b>													
Male	-1349 (1.414)	3999 (4.195)	4636 (4.521)	-688 (9.154)	21 (18)	-3478083 (263)	-530 (405)	98 ** (45)	998 (6.340)	-6567 ** (2.679)	-6972 (6.895)	-5.83 (27)	-5600 (3.971)
Age	75 (139)	384 (446)	-58 (638)	-158 (204)	-0.08 (1.27)	72 (48)	72 (48)	7.36 (5.30)	140 (336)	-70 (310)	525 (809)	2.50 (3.29)	934 ** (427)
Age <sup>2</sup>	-0.14 (1.45)	-5.11 (4.82)	1.70 (7.07)	8.68 *** (2.92)	-0.01 (0.01)	-0.69 (0.54)	-0.69 (0.54)	-0.08 (0.06)	-0.46 (3.04)	0.75 (3.45)	525 (809)	0.00 (0.04)	-7.23 (4.80)
Education:													
Primary	4566 *** (1.702)	24385 *** (4.844)	2266 (5.002)	22726 *** (8.773)	d	42502 *** (15.177)	426 (451)	61 (40)	10487 ** (4.509)	4020 (3.291)	17868 *** (6.841)	31 (28)	13897 *** (4.026)
Secondary or higher	9332 *** (1.803)	17512 *** (5.231)	-2459 (4.868)	21029 *** (83.330)	8.75 (12)	22241 (20.435)	806 ** (438)	177 *** (55)	14256 *** (4.581)	2381 (2.006)	33779 *** (6.937)	36 (27)	23356 *** (4.619)
<b>Household Characteristics:</b>													
Size	859 *** (1.61)	-943 * (5.69)	3808 *** (6.16)	5257 *** (1.033)	16 *** (3)	12144 *** (2.430)	402 *** (72)	34 *** (7)	2202 *** (380)	2361 *** (384)	3541 *** (744)	16 *** (4)	3550 *** (671)
Urban	4470 *** (1.110)	7607 ** (3.718)	7174 (4.782)	-11855 (7.208)	1.15 (17)	9759 (14.231)	1325 *** (395)	197 *** (48)	81 (2.319)	9204 *** (2.526)	-2915 (5.224)	-35 (28)	13269 *** (3.499)
Dependency Index	-1567 (2.792)	5785 (8.040)	-6498 (9.612)	-25386 (22.189)	54 (53)	12598 (40.655)	2346 *** (976)	-326 *** (37)	7675 (5.449)	14189 ** (6.575)	-3791 (22.412)	-196 * (100)	24128 * (12.662)
Hospitalization	16554 *** (1.223)	32391 *** (4.427)	38465 *** (4.662)	99933 *** (9.228)	305 *** (23)	184473 *** (16.174)	3129 *** (468)	472 *** (38)	38529 *** (3.199)	-3778 (2.540)	68426 *** (6.839)	358 *** (35)	46243 *** (4.360)
Institutionalization	20997 *** (4.979)	7352 (12.401)	42322 *** (14.178)	21435 (36.891)	532 *** (83)	387595 *** (62.447)	11442 *** (2.485)	301 (227)	20913 ** (8.328)	39115 *** (11.242)	150859 *** (20.170)	290 *** (90)	15663 (15.242)
Long-term care	9617 *** (2.066)	-4573 (8.065)	41175 *** (6.004)	45663 ** (18.222)	33 (26)	56346 (41.278)	2055 *** (762)	151 * (87)	4757 (4.065)	25227 *** (5.175)	32343 *** (7.766)	62 (52)	14945 *** (4.968)
Pregnants	4408 ** (2.156)	-8961 (7.515)	20502 *** (7.022)	-18395 (25.682)	86 (113)	-18536 (58.682)	1142 (1.159)	54 (923)	10424 *** (2.667)	-798 (5.599)	26804 * (14.381)	112 (385)	17325 (24.949)
Health worker	5124 *** (1.404)	15625 (15.045)	8494 (7.997)	21255 (23.632)	175 *** (54)	-2947 (43.913)	-223 (1.057)	104 (98)	5296 (4.982)	14826 (9.059)	23773 * (12.279)	24 (54)	15010 * (8.612)
Income quintile													
2	3793 ** (1.506)	-1741 (5.091)	161 (5.526)	2238 (10.695)	60 *** (17)	-826 (19.388)	-299 (534)	-3.44 (51)	9488 (15.757)	9497 *** (3.513)	3023 (7.627)	20 (35)	9059 * (4.793)
3	6378 *** (1.504)	9781 * (5.032)	4308 (5.468)	27164 *** (10.640)	25 (18)	75881 *** (20.343)	251 (535)	-7.29 (51)	20138 (12.882)	16005 *** (3.473)	-6457 (7.893)	34 (35)	6601 (4.854)
4	8715 *** (1.554)	23271 *** (5.042)	-845 (5.504)	1631 ** (10.760)	28 (18)	169066 *** (20.818)	271 (533)	-9 (51)	153 (12.969)	14197 *** (3.638)	15249 * (7.923)	70 ** (34)	13062 *** (4.815)
5	15879 *** (1.779)	23637 *** (5.352)	1366 (5.522)	28549 *** (10.755)	82 *** (19)	181723 *** (21.161)	1077 ** (538)	71 (52)	6752 (10.024)	22964 *** (3.859)	18280 *** (8.077)	74 ** (34)	15840 *** (4.855)

\*P&lt;0.10, \*\*P&lt;0.05, \*\*\*P&lt;0.01, SE, s standard error, d for dropped variable