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# Local Financial Development and Household Welfare: Microevidence from Thai Households\*

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**Abstract**

We provide new micro evidence on the relationship between financial development and welfare. Relying on the concept of local financial development our analysis focuses on two dimensions of household welfare: investment and consumption. The results show that financial development is associated with a larger volume of productive investments. Financial development is also able to improve financing of consumption, but the effect of financial development on credit as an instrument to insure consumption risk is not supported. This finding implies that consumption smoothing is just weakly improved by larger financial development.

JEL-Classification: O 16, G 21, D 12, D 24

Keywords: credit rationing, investment, consumption, consumption smoothing, growth

## 1 Introduction

A large set of studies has examined the link between financial development and economic development on the macro level. Most of the empirical studies find that financial development leads to larger economic growth.<sup>1</sup> We use this finding from the macro literature as the initial motivation of our analysis on the micro level. If financial development increases economic growth on the macro-level, then it should have some impact on the micro-level, too. In particular, we ask the following question: does financial sector development improve household welfare? Thus our aim is to see whether the relationship, which can be found on the macro level, applies also on the micro level. We expect to learn more about how household welfare is linked to financial sector development and the channel of impact. Hence we contribute to the discussion about the relationship between financial development and welfare, which is measured by household investment and consumption.

In order to conduct our analysis, we use a unique comprehensive data set. We estimate the impact of financial development on about 2200 Thai households, for which we have detailed information about their household and village characteristics. Our data set is also particularly rich of financial data, such as household lending, borrowing, denials of credit etc. To obtain a measure of financial development, we use this information in the estimation framework of Guiso et al. (2004). The approach estimates coefficients of district dummies in a regression of credit constraints on a large set of household and regional characteristics. For our baseline indicator, we follow the original approach and use a dummy for being credit rationed. For robustness checks we use the expected time to get a fixed amount of credit as an approximation of credit constraints. Both versions seem to be appropriate for the financial market in rural Thailand.

Our results on the household level confirm that financial development does contribute to higher welfare. The detailed analysis shows that financial development leads to higher investment. Household's investments is 55% larger in the financially best developed district compared to the least developed district. The profitability of investments reassuringly remains of a similar magnitude. The results on the effect of financial development on household consumption also show a positive impact but do not support the beneficial role of financial development to the same extent as they do for investment. Financial development improves consumption levels by enabling households to spend more money by credit financing. In this context financial development increases the possi-

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<sup>1</sup>For recent counterevidence see Demetriades and James (2011).

bilities of financing consumption. When it comes to the role of finance as a risk coping mechanism, financial development is not capable to substitute savings as coping instrument. The effect of financial development on consumption smoothing is throughout limited. Given our results, the main transmission channel between financial development and household welfare seems to work through investments.

Our study contributes in combining three streams of literature: (i) studies on the welfare effects of financial development on the macro level, (ii) specific studies of the welfare impacts of microfinance institutions on the micro level, (iii) works on access to credit.

The first stream of literature looks back on a long tradition. It has been a stylized fact that income growth correlates with an accumulation of financial assets (Gurley and Shaw, 1967). Proceeding papers focusing on the causal direction of finance and growth (e.g. King and Levine, 1993) tend to observe the effect running from finance to growth.<sup>2</sup> In terms of the persistence the relationship between financial development and real economic activity is rather over the long-term horizon (Darrat et al., 2006). Other studies turn the focus on the link between financial development and growth related issues, like financial system structure (for a survey see Demirgüç-Kunt and Levine, 1996), institutional settings (Demirgüç-Kunt and Maksimovic, 1998; Graff, 2003), child work (Dehejia and Gatti, 2005), and poverty (Jalilian and Kirkpatrick, 2005). Part of this stream of literature is Chantapong (2006). Since she focuses on Thailand, we share with her the Northeast of the country as the area of interest. But while she maintains the macro methodology of this literature stream and analyzes aggregate macro flows, we focus on the micro level of the household.

The second area of literature focuses on a particular part of the financial system, microfinance institutions. Those programs have attracted particular interest as ways to overcome poverty. Several studies evaluate microfinance programs (Amin et al., 2003; Burgess et al., 2005; Menkhoff and Rungruxsirivorn, 2011). But the role of financial development for household development in general, rather than microfinance in particular, has not been addressed.

Our research is also related to the works on access to credit. There are various studies on the impact of access to finance on the firm level as well as on the household level (Fafchamps and Schündeln, 2010; Beck and Demirguc-Kunt, 2008). Access to credit and the financial market in general is the basis of our indicator of financial development. As mentioned above, we follow Guiso

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<sup>2</sup>A study arguing for a negative effect is Ram (1999).

et al. (2004) by using access to credit as a financial development indicator. This is the basis for our subsequent analysis of the welfare effects on the household.

The paper is structured as follows. Section 2 presents the data set and provides some descriptive statistics. Section 3 derives our indicators of financial development. Section 4 provides the analysis of the relationship between financial development and the household welfare indicators. Section 5 deals with robustness issues and Section 6 summarizes the paper and concludes.

## **2 Data set and summary statistics**

The following sections introduce the data set (Section 2.1) and deliver some descriptive statistics on the data (Section 2.2).

### **2.1 Data collection**

The data used in this study originates from the project "Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies", funded by the German Research Foundation (DFG FOR 756). An initial cross-sectional survey was carried out in the Northeast region of Thailand between April and June 2007. The Northeast region is deliberately chosen as this region is considered to be the poorest region in Thailand. Three provinces are then selected, namely Buri Ram, Ubon Ratchatani and Nakhon Phanom.

Households are chosen following a three-stage stratified sampling procedure where provinces are constituted strata and the primary sampling units (PSU) are sub-districts. Within each of the three provinces, sub-districts are first randomly selected with probability proportional to size by a systematic sample from a list ordered by population density.<sup>3</sup> Within each sub-district, two villages are chosen at random. Finally, within each village, 10 households are randomly selected. Thus there are in total 2,186 households from 220 villages in 110 sub-districts (45 districts) of the three provinces. Details on sample selection of this survey are explained by Hardeweg et al. (2007).

The survey includes information on household demographics, occupation, health status, education, agricultural activities, off-farm employment activities, household businesses, income, expendi-

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<sup>3</sup>It is important to cover the whole range of geographical regions for our analysis of local financial development since financial services can differ drastically between rural and urban areas. Population proportional sampling ensures proportional coverage of densely (peri-urban) and less densely populated (rural) areas.

tures, assets, borrowing, lending, savings, remittances and public transfers in the one-year period of May 2006-April 2007. Detailed information on borrowing activities including loan denials and loan defaults are also covered and constitute the basis of our indicator of financial development.

Secondary data on economic development indicators at the district level, e.g. number of schools, factory plants, and others were extracted from Department of the Provincial Administration's District Statistics and the Provincial Cooperative Offices' Cooperative Statistics.

## 2.2 Descriptive statistics

Table 1 gives summary statistics of the key variables for the households of our sample.

(Table 1 about here)

Panel A covers main demographic figures. The average family size is 3.98 persons or 2.23 in adult equivalent units.<sup>4</sup> About 1.3 children live in each household. The majority of the households are male-headed but female-headed households are not uncommon. About 27 percent of the Thai households are governed by a female head. 78% of the household heads are married. The average household head is senior but still economically active. The average age of the household head is 55 years. The educational level of these households is low. The average year of schooling for the head of household is only 5 years. The monthly consumption expenditure for the average household is 6,552 THB, which is about 400 US-Dollars in purchasing power. More than half of the households had to cut their consumption due to the consequences of a shock.

Household business and finance statistics are captured in Panel B. Household occupations are classified into six groups according to the main occupation of the head of household. These groups are farm households, wage earners in the informal sector, wage earners in the formal sector, government officials, business owners and the group of the economically inactive, which includes unemployed and retired. The most common occupation is farming, followed by the "economically inactive" group - of which a large proportion of about 70% is found to be the elderly. The average monthly income of a household is nearly 7,400 THB (445 PP-USD) during the period covered by the survey. As households of different size and composition have different needs, we use equivalence

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<sup>4</sup>We use the OECD-modified scale by Haagenars et al. (1994) which treats the household head with full weight, each additional adult with 0.5 weight and each child with 0.3 weight.

scales to adjust household income. Household income per adult equivalent is about 3,400 THB (205 PP-USD). We note that household income is composed of income from four sources: net income from farming, net income from household business, wage labor income and other non-labor income such as land rent but exclude remittances and transfers. We exclude the latter two because we aim for an income aggregate before any coping strategy is taken. The value of assets which is owned by the average household amounts to 1,000,000 Baht (61,000 PP-USD). As to the type of assets, land and housing constitute the main assets of rural households, accounting for about 70 percent of household assets. Next in importance to land are household durable assets, e.g. motor vehicles or equipment, which are used in agricultural production and households' businesses. Savings, livestock and stored crops are included in the aggregate but are negligible of size. The significance of land and housing is confirmed by the large fraction of land owners, which is about 90%. Turning the attention to the major income source, farming, we find that the average area used for crop production is about 3 hectare. Average expenditures for farming sum up to 18,500 THB (1,100 PP-USD). These investments yield revenues of 48,500 THB (3,000 PP-USD). Moving to the incidence of credit rationing about 10 percent of the households report credit rationing. The observed default rate is low as only 2 percent of the households state that they have defaulted on loans during the reference period. The incidence of late repayment is somewhat higher. About 6 percent of the households report arrears on loan payments.

Thailand is geographically divided into six regions and 76 provinces. Each province is divided into districts, which in turn are divided into sub-districts and then villages. Each province has one capital district which is the most developed area in the province. Panel C of Table 1 presents the basic characteristics of the sample districts. Clearly these districts are heterogeneous, consisting of both economically more and less developed regions. Around a quarter of the districts are municipal districts. There are about four schools and one university on average in the district a household is living in. Of course, schools are relatively equally distributed whereas universities are clustered in particular districts and most districts do not host a university. The average district a household lives in provides about one shopping mall and about 17 factory plants.



### 3 Indicator of financial development

Starting from household and financial data on the household and village level, we estimate an indicator of *local* financial development in 45 districts from the northeastern region of Thailand. This approach is used by Guiso et al. (2004); they estimate local financial development in developed Italy. They propose that a region is financially less developed if ceteris paribus credit denials in the same region are large. Following their approach we employ a linear probability model and regress a dummy for being credit rationed (CR) on household and village characteristics (X) as well as on regional dummy variables for each district (Z):

$$CR = X\beta + Z\gamma + \varepsilon \quad (1)$$

We measure credit rationing via a survey item which asks the households to memorize any credit application without getting the credit or without getting the full amount they applied for. We retrieve both, the amount which was initially asked for ( $C_{Demand}$ ) as well as the allocated amount ( $C_{Supply}$ ). From this information we create a dummy variable (CR) if a household does not get the full amount.<sup>5</sup>

$$CR = \begin{cases} 0 & \text{if } C_{Demand} = C_{Supply} > 0 \\ 1 & \text{if } C_{Demand} < C_{Supply} = 0 \end{cases} \quad (2)$$

The coefficient of the regional dummies represents the probability that a household in a certain district faces ceteris paribus more credit constraints. To get an estimate of the ability of the financial market to provide credit, we control in two dimensions. First, we control for various household characteristics which possibly influence the ability of a household to successfully apply for a credit. Second, we account for differing credit demands in different districts. To rule out such distortions, we focus on a sub-sample which captures credit demand, i.e. all households who have ever borrowed or with outstanding loans or ever have experienced credit denials.

For robustness checks we estimate a second local financial development indicator with a different

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<sup>5</sup>With this definition we follow the methodology of Guiso et al. (2004). Since we retrieve the information retrospectively from the demand side we do not consider the actual percentage share but we use original dummy variable approach.

approximation for credit constraints, which is credit processing. This indicator is represented by the self judgment of a household about how long she needs to obtain a credit of a standardized amount of 5,000 THB, which corresponds to 300 US-dollar in purchasing power. The days needed to retrieve the money, given all other characteristics constant, shows the efficiency and performance of the financial sector in accomplishing its function of credit provision.

For our further analysis of investment and consumption we will use a normalization of the dummy coefficient  $\gamma$  of region  $k$ . The normalized indicator is:

$$findev_k = 1 - \frac{\gamma_k}{\max[\gamma]} \quad (3)$$

*Findev* lies in between 0 and 1. The larger *findev* is, the more financially developed is the district.

This local approach is suitable for the financial situation of rural Thai households as the Thai financial market in general has not been fully integrated. Particularly households in rural areas might face difficulties to borrow when they do not have a branch in their district. This argument is supported by several specific features of the Thai financial market. First, the subject of our study are small rural households whose major lending institutions are the BAAC<sup>6</sup> and the village funds<sup>7</sup>. Both financial institutions operate inside every district. There is a branch of the BAAC in nearly every district capital and the village funds program provides finance on the village level and holds money stock at the BAAC. Second, beyond this Thailand specific evidence several studies find that distance to banking institutions still matters even for developed financial markets (e.g. Petersen and Rajan, 2002; Haselmann et al., 2009). These studies find that regionalism matters especially for small firms (who are not able to borrow at different branches) and public banks. Following these arguments we address the local differences in supply and demand for credit in rural Thailand.

Following the local concept of financial markets the next step is to define the market, i.e. the regional entity in which borrowers and lenders of the same market are located. We assume that the 45 districts in our 3 provinces constitute separate financial markets. This seems to be the most

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<sup>6</sup>The Bank of Agriculture and Agricultural Cooperatives (BAAC) is a state-owned bank established in 1966 and remains one of the main suppliers of household loans in Thailand. Among all banks, public and private banks, BAAC has the largest number of branches.

<sup>7</sup>In 2001, the Thai government introduced a microfinance program called "Village Funds." Following the spirit of other microfinance programs, the main objective of the village funds is to improve access to credit for the poor and for this reason exhibits a large outreach.

feasible approximation of the real financial markets because of four reasons. First, as mentioned above the major lending institutions are the BAAC and the village funds. The BAAC has one branch per district. For the majority of districts the branch is located in the district capital. This is the result of the BAAC's business ongoing policy to expand and decentralize its banking operations from the provincial to the district level (BAAC, 2004). Credit allocation is predominantly within the branch's district. Executives of different branches are eligible to set up own credit policies within the BAAC policy framework. The village fund is set up in every village and the fund is exclusively available for residents of a given village and not for residents living in other villages. As the funds are settled via the BAAC branch network having an account at the local BAAC is mandatory in many cases. Second, we ask households how long they have to travel to get to the next banking institution. Their average answer is 22 minutes. This journey time is typically not sufficient to travel out of a common district, even by car or motorcycle. Third, next larger and smaller regional entities are provinces and sub-districts. Since our sample spans solely on three provinces and on more than 100 sub-districts, it is obvious that taking these entities as the local market is economically and statistically not feasible. An alternative approach would involve an aggregation of districts to artificial regional entities. We refrain from aggregating districts, since this decision is ultimately an arbitrary decision. We tried several rigorous algorithms to combine districts but no one was unique. Our results show that districts are indeed relatively heterogeneous (cf. Figure 1 and Figure 2). Fourthly, whether districts span a local financial market, is a matter of empirical results. If this procedure works well the district dummy variables in our regression are significant and can substantially explain credit denial.

Table 2 presents the regression results.

(Table 2 about here)

Household characteristics correlate in the expected direction with credit constraints. Two aspects are worth to be highlighted. First, asset endowment shows up to be a major determinant for facing credit constraints which is plausible due to its role as collateral. Second, the past credit history matters for new credit applications. Increasing the fraction of late payments by 10% raises the probability to be rejected for a credit application by 1.5%. For a 20% larger percentage of defaulted loans to total loans the time to get a credit increases by about one day. These results fit the business practice of progressive lending, i.e. releasing funds gradually in increasing amounts

after due payment (Karlan and Morduch, 2010). Besides the result emphasizes the importance to control for rational reasons for credit constraints and overlending.

The normalized financial development indicators range from 0 to 1. We employ a Wald test to challenge the hypothesis of joint zero influence of all district dummy variables. The null is rejected on the 1% significance level for both credit constraint indicators. Out of 45 of the district dummies, 28 district dummies are individually significantly different from zero at least on the 10% level for the indicator of credit rationing. For the indicator of credit processing, even 43 of the 45 district dummies turn out to be significant on the 10% level. Figure 1 and Figure 2 show the maps of the survey areas and the pattern of financial development across the survey areas. As noted above, neighboring regions rarely exhibit the same degree of financial development, which makes us confident that districts are the appropriate regional entities. Both measures, evaluate the degree of financial development of equal districts qualitatively the same. The highly significant correlation of 0.65 supports the strong relationship further.

(Figures 1 and 2 about here)

We end with two indicators of local financial development in Thailand. These indicators are based on the degree of credit rationing and efficiency of credit processing. The former will be used in the upcoming analysis and the latter will be used for robustness checks.

#### **4 The relation between financial development and household welfare**

Financial development means that the financial sector improves in accomplishing its functions. Consequently, financial development can affect household welfare in various ways and in many outcomes. We want to address two aspects of household welfare which can be affected by financial development: investment and consumption, the first affecting households' welfare ex ante of income generation, the latter ex post.

From the theoretical point of view, the aggregate effect of financial development on households is not clear cut. A higher amount of credit increases also the risk of failing, which is well known from corporate finance as the leverage risk (e.g. Castanias, 1983). But on the other side there are potential benefits from the development of the financial sector due to better accomplishing its functions.

One function of the financial sector is providing access to savings and credit markets and thereby allocating capital more efficiently (e.g. Mishkin, 2009). Hence on the household level financial development could allow the poor to take advantage of profitable investment opportunities (Eswaran and Kotwal, 1990). These investment opportunities tend to be indivisible and may be difficult to finance out of current household income but could provide a higher income in the future. Better access to financial services could endow the poor with sufficient funds to invest in these productive assets. If the additional funds are effectively used the productivity of the household should remain the same. If financial development leads to an excess of funds non-efficient investment decisions could be financed, which again would lead to higher financial risk and instability.

Households in developing economies use credit also for consumption purposes and to increase their transient expenditures (e.g. Johnston and Morduch, 2008). Increased consumption levels mean higher household welfare. Furthermore, not only the level but also the variation in consumption is relevant for household welfare. Smoothing the variation in consumption is desired by households (Townsend, 1995). The consequence of large variations in consumption can be a fall in consumption levels below the poverty line which could lead to other detrimental outcomes, such as uncured hunger, diseases, early school leaving and others. Thus credit has the potential to help insuring consumption streams against shocks and is able to enhance household welfare in this respect (Townsend, 1995). This refers to the function of credit as risk coping mechanism. Thus financial development is able to reduce households' vulnerability and increase consumption levels. Summing it up, we test two theories behind the link between financial development and consumption, the financing consumption argument and the risk coping argument. We will differentiate in our analysis between both arguments and test them separately by distinguishing between credit users and non-users. If financial development impacts the level of consumption only for users of credit, we take this as a signal for the financing consumption argument. These households use credit to finance their consumption via credits. If financial development affects consumption levels also for non-users the risk-coping argument might be supported. Households in financially developed districts do not need to save *ex ante* since they can rely on credits as a risk coping strategy (as a substitute to savings). If they are hit by a shock they have sufficient access to funds from the financial sector. *Ex ante* of a shock this is equivalent to an option value of access to finance. This argument is further examined by a direct analysis of consumption smoothing, i.e. whether a household in a financially developed district is able to smooth consumption better by using credit.

We are aware of the potential endogeneity bias from reverse causality in a regression of financial development and economic welfare as it is addressed in the literature (for a survey see Beck, 2009). Unlike the situation of cross-country studies, we cannot fall back on a large time series for instruments as King and Levine (1993) are able to. Our data set is particularly rich in the cross-section but restricts us to using a single wave. The consequences of the cross sectional nature of the data is that past values are not available as instruments. Other instruments like in Guiso et al. (2004) are also not available. The problem of endogeneity cannot be fully resolved but is mitigated by the following approach. First, we directly control for the usually unobserved variables which might cause endogeneity bias. Since we analyze welfare on the household level and financial development, we can use indicators for economic development as controls. These variables include average income per capita of the district, a dummy for municipal districts, as well as the number of schools, universities, shopping malls, and factory plants in the district. Second, these controls for economic development are from the year previous to the survey. As long as these variables are time-variant, individual investment and consumption should not matter for the aggregate economic indicators. Third, it is quite unlikely that a single household's welfare is able to affect financial development on the local level.

We start by analyzing investment (Chapter 4.1) and proceed with consumption in Chapter 4.2.

## 4.1 Investment

In this section we analyze the relation between the households' investments and financial development. As a measure of investment activity, we focus on the expenses for agricultural machines and inputs. Most of these expenditures are in the forms of machines, fertilizers, pesticides and seedlings. Expenses for agricultural production are risky. Outcomes are not known at the time when the investment decisions have to be made. A well developed financial market would be able to provide sufficient funds to enable these productive investments. Using households' expenditures on crop production is a particularly good indicator. First, agriculture is the most important source of income for our sample households; nearly 85% of the households are performing arable agriculture. Second, returns are received within one-year period. As we have to rely on a single wave of data economic significance of a long-run variable like household assets is doubtful.

Table 3 shows four specifications for the OLS regression of crop expenditures on financial devel-

opment plus control variables for household and business characteristics and economic development indicators in three enhanced specifications. Standard errors are adjusted for the cluster level of districts to allow an unbiased estimate of the standard error of the financial development indicator (cf. Moulton, 1986).

(Table 3 about here)

The variable of major interest is the financial development indicator. We include the indicator as well as an interaction effect with a dummy for credit demand, i.e. the dummy equals one if a household ever borrowed or ever got rejected for a credit. The reason to analyze the interaction effect is to differentiate between the effect of financial development on households who do actually use the better financial environment and those who do not. The latter could already benefit from the option value of a better financial system. If credit is known to be sufficiently available in states of bad outcomes households are not forced to withhold funds for adverse effects.

The results show that our financial development indicator does not provide such an option value as the coefficient of financial development is not significantly different from zero. But financial development does help firms to increase their investments if they actually make use of the better financial development. Moving from the least to the best developed district increases investments for credit users of about 60%.

When we use further controls for household characteristics the effect remains stable. Further inclusion of business characteristics comes along with a dramatically increase in the  $R^2$  from 5% to 30% but we maintain the same magnitude of the effect of financial development. In specification 4 we also include proxys for the economic development on the local level. Consideration of these variables is important to observe an unbiased effect of financial development on investment. In fact we find no large increase in the explained variation of investment. The  $R^2$  remains at the same level, at about 36%. The reported coefficient on financial development suffers a minor drop to 55%. Eventually the investment levels between the financially most developed district and the least developed district is about 55%, which is economically significant.

A further issue is then whether these investments are productively used (shown for example by Rizov, 2004). In contrast Hovakimian (2011) shows that firms are more efficient when facing larger financial constraints. To scrutinize this hypothesis we consider two tests. We repeat our regressions

for the investment revenues (Table 4) and the investment profitability (Table 5).

(Tables 4 and 5 about here)

The effect of financial development on investment revenues is significantly different from zero for those households who do actually use credit. This finding corresponds to the former findings for investment expenditures. Turning straight to specification 4 which includes all controls we find that investment revenues differ between the financially most and least developed districts by about 47%. This is somewhat smaller than the effect on investment expenditures, which is 55%. One might speculate that this validates the finding of Hovakimian (2011). Farmers living in financially better developed districts are less effective in their activities. The results of the investment profitability regressions do not support this finding further. Neither the coefficient on financial development itself nor the effect of the interaction effect with credit demand is significantly different from zero.

In the end we show that financial development significantly increases investment to an economically meaningful extent. The results on revenues and profitability direct to the conclusion that productivity does not change with financial development.

## 4.2 Consumption

Consumption is an important factor of household welfare. Both, the level and variability of consumption affect the welfare of the household. In the following chapter we scrutinize the effect of financial development on consumption expenditures (level effect) and consumption smoothing (volatility effect). This focuses on the ex post transmission channel of financial development on household welfare.

The data set for the consumption level includes detailed information on items of consumption expenditures, like rice, durables, alcohol and so forth. We combine those in an overall aggregate of consumption expenditures.

Table 6 presents four specifications for the OLS regression of (log) consumption expenditures on financial development plus control variables for household and business characteristics and economic development indicators in three enhanced specifications. We use standard errors clustered on the district.



(Table 6 about here)

The regression results predict consumption in the expected way. Consumption levels are the highest for large households and households with high income.

The effect of financial development supports the hypothesis of financing consumption and rejects the hypothesis of financial development as an instrument of consumption insurance.

The effect of financial development on consumption levels for a non-user of credit is statistically and economically significant and *negative*. Living in the financially most developed district rather than the least developed causes 70% less consumption in specification 1. Using more controls and gaining more explanatory power this effect decreases to about 25%, but it is still individually significant. Hence financial market development seems to be a potential source of adverse shocks which might decrease households' consumption level. Financially well developed regions are likely to be more prone to shocks than less developed regions, holding economic development constant. This evidently negates the hypothesis that financial development is an instrument for risk coping.

In contrast, financial development is able to finance consumption. If the household actually uses credit, the consumption level is about 15% larger. Households who do borrow, use their credit to increase their consumption level as it is observed by Johnston and Morduch (2008). The overall effect is somewhat unclear. Reducing the number of controls (and losing explanatory power therewith) turns the effect to negative values. Eventually, it is not clear whether households can increase their consumption levels by better access to credit.

To scrutinize this question we turn the discussion to the variability of consumption, i.e. consumption smoothing. We have detailed information about the shock history of the households. Hence we are able to measure consumption smoothing directly. Given a past shock, a household can better cope with shocks if it does not have to cut consumption afterwards. The effect of financial markets seems to be of potential relevance. Better access to credit could help households to remain their consumption levels after a shock, i.e. ensure low consumption variability or put differently smooth consumption.

Table 7 presents the four specifications of the Probit model for a cut in consumption on financial development. Reported standard errors are clustered on district level.

(Table 6 about here)

We find a significant negative effect for financial development on the probability to cut consumption after a shock. Moving from the financially least to the best developed district decreases the probability of cutting consumption by 25%.<sup>8</sup> Hence we find a positive option value of financial development for consumption smoothing. This positive effect is blurred if a household needs to use credit as a shock coping mechanism. The probability to cut consumption if a household uses credit and moves from the financially least to the best developed district decreases to about 8%. The burden of debt might be the driving force which causes the adverse effect.

Summarizing the effect of financial development on consumption, the results tend to support the importance of financial development but not to the same degree as they do for investment. Financial development helps to transitorily increase consumption levels. The role of financial development as a risk coping instrument is ambiguous. There is no option value of financial development on the level of consumption. Consumption smoothing gains from a positive option value of financial development, which is (partially) offset by the debt burden households have to carry when actually taking a credit.

## 5 Robustness

To provide robustness to our results we include several specifications and control for a large range of variables, in particular for economic development. In this section we want to replace the financial development indicator of credit rationing by the formerly mentioned indicator of efficient credit processing. As described above the indicator is based on a regression which explains the duration to get a standardized amount of credit. The coefficients on the district dummies serve as input for the Guiso-type indicator (compare Section 3). Using the complementary indicator, our main story remains robust.

Financial development significantly increases investment to an economically meaningful extent (Table A.2). Also revenues benefit to a significant extent from financial development (Table A.3). Even though the effect on revenues is larger than the effect on expenditures we maintain the result from before. Profitability does not change significantly for changes in the financial development (Table A.4). Referring to the results of Hovakimian (2011) this is good news. Profitability does not

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<sup>8</sup>Marginal effect of a discrete change calculated at the sample mean. For computation issues of marginal effects with interaction effects refer to Greene (2008).

drop even for less financial constraints.

Our results on consumption remain stable. Consumption can be increased by taking credit in a financially developed district. We find a no option value of financial development on the consumption level, which supports the non-finding of the risk coping argument. For our robustness check the overall effect on consumption level even tends to be negative (Table A.5). The negative impression of the effect on consumption is underlined by the results on consumption smoothing (Table A.6). The former positive option value on consumption smoothing drops by one half and is therewith not significant anymore. Using credit increases debt service and leads to a higher probability to cut consumption after a shock.

## 6 Conclusion

In recent years, many studies have examined the effect of financial development on economic growth, financial system structure and other issues on the macro level. We turn the discussion on the household level by measuring the relationship between financial development and two indicators of household welfare: investment and consumption.

Using a new micro-household survey for Thailand we contribute to a more holistic understanding of the link between financial development and economic welfare. Hence our study bridges the gap between three streams of literature, studies of the welfare effects of financial development on the macro level, the program evaluations of microfinance programs, and the literature on access to finance.

Applying the method of Guiso et al. (2004) we derive a measure of local financial development. The framework runs a regression of credit constraints on a large set of household and regional characteristics, including district dummies. We derive a normalized financial development indicator from these coefficients. Like Guiso et al. (2004) we use a dummy for households which are credit rationed. Additionally we check the robustness of our results by using an alternative measure of efficient credit processing, i.e. the time to get a fixed amount of credit. Both indicators turn out to be quite feasible for the financial market in rural Thailand.

Overall we find a generally positive effect of financial development on investment. Especially when households actually use credits they can increase their investment to a meaningful extent.

Reassuringly this does not come along with a decrease in profitability which could be expected. Profitability remains constant. The results for consumption tend to be ambiguous. Financial development can transitorily increase consumption. But there is no clear evidence on a better risk coping effect. The positive effects of financial development on consumption are (partially) offset by the burden of debt and the structural vulnerability of the sector. The main transmission channel between financial development and household welfare seems to work through investments.

Regarding the policy agenda our results suggest that financial development is beneficial to increase household welfare *ex ante*. Households can increase their welfare in a financially developed environment due to larger amounts of investments and transitorily increase in consumption levels. As the effect of financial development on consumption smoothing is ambiguous, complimentary instruments need to be taken into account for welfare enhancement *ex post*, i.e. as shock coping instruments.

Given the current emphasis on financial development and poverty reduction on policy agendas of many developing countries, our results serve to provide evidence of positive effects of financial development on household welfare. Such evidence provides a basis to undertake more detailed investigations of which specific financial development measures can be set up as effective instruments for achieving reduction of poverty and vulnerability.

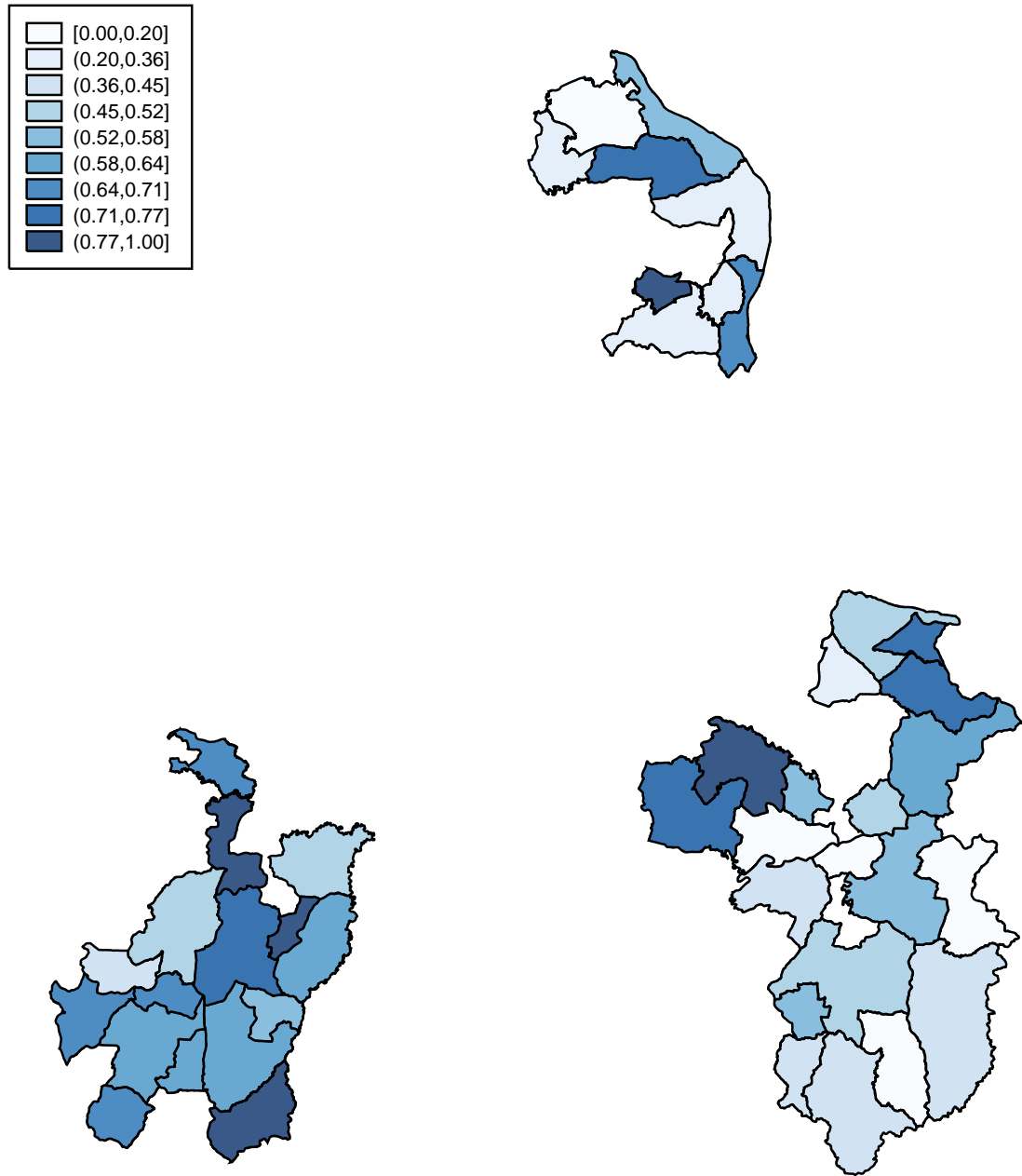
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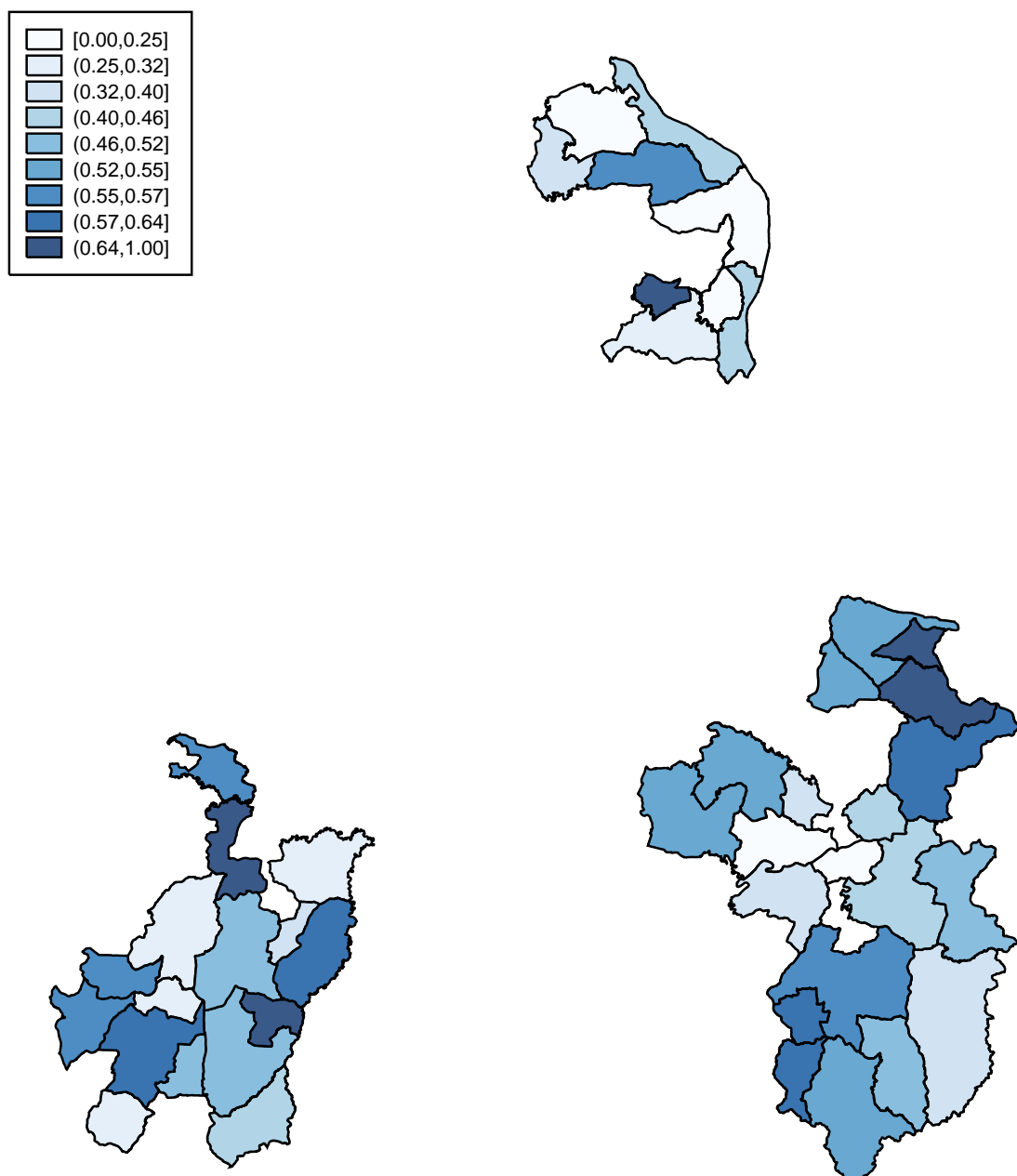
Figure 1: Map of financial development indicator (credit rationing)



The above figure pictures a map of the three sample provinces, Buri Ram, Ubon Ratchathani, Nakhon Phanom. Coloring is accordingly to nine quintiles of the financial development indicator (credit rationing).



Figure 2: Map of financial development indicator (credit processing)



The above figure pictures a map of the three sample provinces, Buri Ram, Ubon Ratchathani, Nakhon Phanom. Coloring is accordingly to nine quintiles of the financial development indicator (credit processing).

Table 1: Descriptive statistics

Variable	Observations	Mean	SD	Minimum	Maximum
Panel A: Household					
Household size	2186	3.98	1.73	0	17
Household size (in adult equivalents)	2186	2.230787	0.7191713	1	7.2
Number of children	2186	1.30	1.11	0	9
Female <sup>†</sup>	2186	0.27	0.44	0	1
Married <sup>†</sup>	2186	0.78	0.42	0	1
Age of household head	2186	54.64	13.36	23	104
Years of schooling of household head	2186	4.96	2.41	1	18
Consumption (monthly)	2186	6552.23	7212.56	111.5	201003.3
Cut consumption after shock <sup>†</sup>	708	0.53	0.50	0	1
Panel B: Business and household finance					
Unemployed <sup>†</sup>	2186	0.15	0.36	0	1
Farmer <sup>†</sup>	2186	0.62	0.49	0	1
Informal worker <sup>†</sup>	2186	0.09	0.28	0	1
Formal worker <sup>†</sup>	2186	0.03	0.18	0	1
Government official <sup>†</sup>	2186	0.04	0.19	0	1
Business/store owner <sup>†</sup>	2186	0.08	0.26	0	1
Earned net income	2186	7418.81	16215.28	-40061.72	305342.6
Earned net income per adult equivalent	2186	3412.13	7614.53	-21129.95	145401.2
Household assets (in 100,000 THB)	2186	10.15	16.46	0.0094899	412.0102
Land owner <sup>†</sup>	2186	0.87	0.34	0	1
Land (agr. purpose, in ha)	1806	2.88	2.57	0.00039	23.2
Input cost of crops	1806	18619.71	31099.87	0	464000
Revenues from crops	1806	48737.53	101191.6	0	2440000
Return on investment (in %)	1746	219.13	264.56	-99.30	2300
Credit rationing <sup>†</sup>	2186	0.096	0.29	0	1
Defaulted loans/loans outstanding	2186	0.019	0.12	0	1
Late loan payment/loans outstanding	2186	0.06	0.20	0	1
Panel C: Economy					
Municipal district <sup>†</sup>	2186	0.26	0.44	0	1
Number of schools	2166	3.99	2.34	1	9
Number of universities	2166	0.87	2.01	0	8
Number of shopping malls	2166	1.28	2.37	0	10
Number of factory plants	2166	17.02	72.17	0	352
Panel D: Financial Development					
Financial development indicator (credit rationing)	2186	0.53	0.21	0	1
Financial development indicator (credit processing)	2186	0.46	0.16	0	1

Note: All currencies are in Thai Baht if not specified else. <sup>†</sup> denotes dummy variables.

Table 2: Estimation of financial development

Financial development indicator	Credit rationing (1)	Credit processing (2)
Household size (in adult equivalents)	7.51e-05 (0.0140)	0.172 (0.322)
Number of children	0.000201 (0.00815)	-0.151 (0.215)
Female <sup>†</sup>	-0.00644 (0.0233)	-0.476 (0.436)
Married <sup>†</sup>	-0.0229 (0.0235)	0.185 (0.594)
Age of household head	-0.000417 (0.000841)	0.00326 (0.0156)
Years of schooling of household head	0.000168 (0.00359)	-0.0121 (0.0649)
Farmer <sup>†</sup>	0.00256 (0.0290)	-0.302 (0.585)
Informal worker <sup>†</sup>	0.0715 (0.0460)	-0.534 (0.727)
Formal worker <sup>†</sup>	-0.00433 (0.0536)	-0.990 (1.008)
Government official <sup>†</sup>	-0.0228 (0.0473)	-0.317 (1.067)
Business/store owner <sup>†</sup>	0.0409 (0.0371)	-1.081 (0.705)
Earned net income per adult equivalent	-1.18e-06 (9.51e-07)	-3.26e-05 (2.77e-05)
Household assets per adult equivalent	-0.00348** (0.00137)	-0.0798* (0.0420)
Household assets per adult equivalent squared	1.71e-05** (7.47e-06)	0.000629* (0.000368)
Defaulted loans/loans outstanding	0.112 (0.0807)	4.927** (1.934)
Late loan payment/loans outstanding	0.152*** (0.0476)	-0.955 (0.650)
Number of households in village	0.000160 (0.000101)	0.000148 (0.00224)
Number of self-employed activities in village	-0.00624** (0.00299)	0.0276 (0.0663)
District dummies	Yes	Yes
$H_0$ : All district dummies = 0	4.433	4.461
Prob > F	4.00e-08	3.55e-08
Observations	2,186	2,185
Observations sub-sample	1778	1777
R-squared	0.179	0.303

Note: We regress a credit rationing dummy (credit rationing) and the time a household needs to get a loan of 5000 THB (credit processing) on a range of household characteristics and district dummies. Equations were estimated by a least squares model acknowledging the survey design. The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table 3: Impact of financial development on log investment expenditures

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit rationing)	0.154 (0.329)	0.200 (0.315)	0.334 (0.250)	0.195 (0.211)
Interaction: credit demand <sup>†</sup> * financial development	0.438*** (0.153)	0.440*** (0.153)	0.305** (0.146)	0.360*** (0.128)
Household size (in adult equivalents)		0.315*** (0.0512)	0.0962** (0.0362)	0.0816** (0.0373)
Number of children		-0.118*** (0.0334)	-0.0542** (0.0243)	-0.0523** (0.0245)
Female <sup>†</sup>		-0.188** (0.0924)	-0.0860 (0.0828)	-0.0974 (0.0825)
Married <sup>†</sup>		0.00853 (0.108)	-0.0312 (0.0932)	-0.0351 (0.0932)
Age of household head		0.00166 (0.00285)	0.000228 (0.00240)	0.000562 (0.00238)
Years of schooling of household head		0.00140 (0.0127)	0.00289 (0.0133)	0.00618 (0.0123)
Farmer <sup>†</sup>			0.106 (0.0834)	0.0970 (0.0815)
Informal worker <sup>†</sup>			-0.336* (0.194)	-0.375* (0.194)
Formal worker <sup>†</sup>			0.0437 (0.154)	0.0200 (0.157)
Government official <sup>†</sup>			-0.00459 (0.151)	-0.0118 (0.147)
Business/store owner <sup>†</sup>			-0.172 (0.158)	-0.177 (0.160)
Log earned net income (monthly)			2.25e-07 (2.50e-06)	6.03e-08 (2.50e-06)
Household assets (in 100,000 THB)			0.00267 (0.00264)	0.00234 (0.00258)
Land owner <sup>†</sup>			-0.0355 (0.0648)	-0.0203 (0.0658)
Land (agr. purpose, in ha)			0.228*** (0.0148)	0.230*** (0.0153)
Defaulted loans/loans outstanding			-0.0448 (0.276)	-0.0408 (0.278)
Late loan payment/loans outstanding			0.0377 (0.122)	0.0512 (0.121)
Municipal district <sup>†</sup>				0.00255 (0.0953)
Number of schools				0.0116 (0.0177)
Number of universities				0.0501*** (0.0145)
Number of shopping malls				0.0139 (0.0331)
Number of factory plants				-0.00126* (0.000667)
Constant	9.039*** (0.159)	8.387*** (0.251)	8.159*** (0.257)	8.120*** (0.251)
Observations	1,757	1,757	1,757	1,740
R2 adjusted	0.0158	0.0502	0.354	0.360

Note: Regression of input cost of crops on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table 4: Impact of financial development on log investment revenues

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit rationing)	-0.198 (0.331)	-0.0692 (0.298)	0.0592 (0.199)	0.00886 (0.216)
Interaction: credit demand <sup>†</sup> * financial development	0.586*** (0.138)	0.538*** (0.128)	0.450*** (0.120)	0.462*** (0.118)
Household size (in adult equivalents)		0.458*** (0.0622)	0.200*** (0.0385)	0.200*** (0.0407)
Number of children		-0.164*** (0.0360)	-0.0799*** (0.0235)	-0.0795*** (0.0236)
Female <sup>†</sup>		-0.274*** (0.0881)	-0.153** (0.0696)	-0.154** (0.0702)
Married <sup>†</sup>		0.0995 (0.0999)	0.0453 (0.0761)	0.0421 (0.0775)
Age of household head		-0.00247 (0.00280)	-0.00354 (0.00262)	-0.00329 (0.00264)
Years of schooling of household head		-0.00198 (0.0141)	-0.00788 (0.0149)	-0.00698 (0.0151)
Farmer <sup>†</sup>			0.215** (0.0997)	0.225** (0.101)
Informal worker <sup>†</sup>			-0.473** (0.180)	-0.470** (0.182)
Formal worker <sup>†</sup>			-0.161 (0.164)	-0.144 (0.170)
Government official <sup>†</sup>			0.216 (0.173)	0.233 (0.171)
Business/store owner <sup>†</sup>			-0.405** (0.169)	-0.383** (0.172)
Log earned net income (monthly)			1.04e-05*** (3.54e-06)	1.04e-05*** (3.63e-06)
Household assets (in 100,000 THB)			-0.000526 (0.00201)	-0.000453 (0.00208)
Land owner <sup>†</sup>			0.0423 (0.0802)	0.0469 (0.0816)
Land (agr. purpose, in ha)			0.230*** (0.0176)	0.230*** (0.0185)
Defaulted loans/loans outstanding			-0.307 (0.228)	-0.296 (0.228)
Late loan payment/loans outstanding			-0.121 (0.117)	-0.112 (0.119)
Municipal district <sup>†</sup>				0.0208 (0.113)
Number of schools				-0.00460 (0.0178)
Number of universities				0.0240* (0.0122)
Number of shopping malls				-0.0137 (0.0251)
Number of factory plants				-0.000218 (0.000487)
Constant	10.05*** (0.188)	9.297*** (0.293)	8.976*** (0.300)	8.979*** (0.310)
Observations	1,775	1,775	1,775	1,757
R2 adjusted	0.0128	0.0782	0.406	0.404

Note: Regression of revenues from crop production on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table 5: Impact of financial development on investment profitability

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit rationing)	-86.80 (56.26)	-78.60 (57.83)	-81.66 (58.08)	-51.92 (55.92)
Interaction: credit demand <sup>†</sup> * financial development	9.008 (36.19)	3.965 (36.35)	10.22 (35.33)	-4.487 (31.48)
Household size (in adult equivalents)		25.49* (13.54)	14.26 (12.72)	18.21 (12.27)
Number of children		-13.83 (9.228)	-9.685 (8.418)	-10.14 (8.446)
Female <sup>†</sup>		-13.64 (22.26)	-14.41 (21.76)	-12.29 (21.17)
Married <sup>†</sup>		10.57 (25.98)	18.60 (25.82)	18.06 (25.86)
Age of household head		-0.696 (0.653)	-0.813 (0.720)	-0.869 (0.703)
Years of schooling of household head		2.033 (3.727)	-1.596 (3.528)	-2.391 (3.473)
Farmer <sup>†</sup>			-28.64 (25.53)	-24.06 (25.67)
Informal worker <sup>†</sup>			-70.42 (44.43)	-57.20 (43.78)
Formal worker <sup>†</sup>			-51.86 (44.32)	-41.86 (43.56)
Government official <sup>†</sup>			20.65 (42.51)	26.30 (42.56)
Business/store owner <sup>†</sup>			-91.37** (42.95)	-86.00** (42.60)
Log earned net income (monthly)			0.00319*** (0.000878)	0.00322*** (0.000861)
Household assets (in 100,000 THB)			-0.684 (0.619)	-0.570 (0.600)
Land owner <sup>†</sup>			-4.582 (27.17)	-9.282 (27.61)
Land (agr. purpose, in ha)			-0.136 (3.050)	-0.886 (3.078)
Defaulted loans/loans outstanding			-60.56 (68.55)	-60.73 (69.54)
Late loan payment/loans outstanding			1.973 (48.82)	-0.162 (48.42)
Municipal district <sup>†</sup>				-6.385 (32.35)
Number of schools				-5.189 (4.717)
Number of universities				-8.262* (4.883)
Number of shopping malls				-5.278 (10.85)
Number of factory plants				0.283 (0.215)
Constant	261.6*** (27.07)	241.5*** (59.90)	298.8*** (81.71)	318.5*** (79.42)
Observations	1,746	1,746	1,746	1,729
R2 adjusted	0.00241	0.00441	0.0308	0.0372

Note: Regression of return of investment of crop production on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table 6: Impact of financial development on log consumption expenditures

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit rationing)	-0.695*** (0.208)	-0.432** (0.179)	-0.257* (0.146)	-0.249* (0.135)
Interaction: credit demand <sup>†</sup> * financial development	0.573*** (0.0958)	0.385*** (0.0787)	0.376*** (0.0935)	0.398*** (0.0877)
Household size (in adult equivalents)		0.380*** (0.0224)	0.254*** (0.0255)	0.246*** (0.0278)
Number of children		-0.0555*** (0.0146)	-0.0221 (0.0160)	-0.0223 (0.0165)
Female <sup>†</sup>		0.00797 (0.0439)	-0.0209 (0.0438)	-0.0349 (0.0431)
Married <sup>†</sup>		0.0406 (0.0484)	0.00157 (0.0510)	-0.00712 (0.0510)
Age of household head		-0.00652*** (0.00158)	-0.00812*** (0.00161)	-0.00856*** (0.00156)
Years of schooling of household head		0.0687*** (0.00705)	0.0217*** (0.00794)	0.0206** (0.00818)
Farmer <sup>†</sup>			-0.108** (0.0506)	-0.124** (0.0503)
Informal worker <sup>†</sup>			-0.0867 (0.0645)	-0.122* (0.0664)
Formal worker <sup>†</sup>			0.136* (0.0795)	0.0985 (0.0757)
Government official <sup>†</sup>			0.185* (0.0931)	0.176* (0.0968)
Business/store owner <sup>†</sup>			0.159** (0.0786)	0.146* (0.0808)
Log earned net income (monthly)			5.20e-06*** (1.36e-06)	5.17e-06*** (1.37e-06)
Household assets (in 100,000 THB)			0.0103** (0.00391)	0.00981** (0.00381)
Land owner <sup>†</sup>			0.0205 (0.0422)	0.0187 (0.0397)
Land (agr. purpose, in ha)			0.0246*** (0.00850)	0.0266*** (0.00866)
Defaulted loans/loans outstanding			0.198 (0.173)	0.192 (0.172)
Late loan payment/loans outstanding			0.138* (0.0816)	0.139* (0.0825)
Municipal district <sup>†</sup>				-0.0430 (0.0689)
Number of schools				0.0156 (0.0111)
Number of universities				0.00866 (0.0101)
Number of shopping malls				0.0206 (0.0162)
Number of factory plants				-5.73e-05 (0.000314)
Constant	8.600*** (0.104)	7.749*** (0.155)	8.057*** (0.172)	8.040*** (0.172)
Observations	2,186	2,186	1,806	1,788
R2 adjusted	0.0270	0.169	0.206	0.208

Note: Regression of consumption expenditures on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table 7: Impact of financial development on consumption smoothing

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit rationing)	-0.530** (0.215)	-0.540** (0.222)	-0.680*** (0.261)	-0.669** (0.290)
Interaction: financial coping instrument <sup>†</sup> * financial development	0.475*** (0.130)	0.451*** (0.129)	0.466*** (0.165)	0.471*** (0.169)
Household size (in adult equivalents)		-0.0447 (0.0831)	-0.117 (0.105)	-0.117 (0.106)
Number of children		0.00143 (0.0524)	0.0172 (0.0602)	0.0178 (0.0608)
Female <sup>†</sup>		0.266* (0.157)	0.193 (0.194)	0.180 (0.198)
Married <sup>†</sup>		0.246 (0.186)	0.0913 (0.226)	0.0648 (0.229)
Age of household head		-0.00311 (0.00422)	-0.000193 (0.00497)	-0.00107 (0.00511)
Years of schooling of household head		-0.0134 (0.0279)	0.0179 (0.0341)	0.0162 (0.0340)
Farmer <sup>†</sup>			0.151 (0.210)	0.148 (0.215)
Informal worker <sup>†</sup>			-0.267 (0.282)	-0.281 (0.286)
Formal worker <sup>†</sup>			-0.417 (0.359)	-0.428 (0.360)
Government official <sup>†</sup>			0.123 (0.370)	0.116 (0.370)
Business/store owner <sup>†</sup>			0.480* (0.275)	0.472* (0.281)
Log earned net income (monthly)			-1.28e-05* (7.18e-06)	-1.27e-05* (7.39e-06)
Household assets (in 100,000 THB)			-0.00556* (0.00305)	-0.00554* (0.00318)
Land owner <sup>†</sup>			-0.0196 (0.168)	0.00128 (0.174)
Land (agr. purpose, in ha)			-0.0114 (0.0162)	-0.0129 (0.0177)
Defaulted loans/loans outstanding			1.060* (0.541)	1.054* (0.539)
Late loan payment/loans outstanding			-0.141 (0.221)	-0.133 (0.224)
Municipal district <sup>†</sup>				-0.00305 (0.238)
Number of schools				0.00500 (0.0318)
Number of universities				-0.0126 (0.0387)
Number of shopping malls				-0.00137 (0.0392)
Number of factory plants				0.000311 (0.000691)
Constant	0.223** (0.106)	0.301 (0.458)	0.429 (0.572)	0.476 (0.570)
Observations	708	708	609	605

Note: Regression of a dummy (=1 if household still has to cut consumption after shock) on household and district characteristics. Equations were estimated by a Probit model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.



## A Appendix

Table A.1: Variable description

Variable	Description
Household size	Head count of nucleus household members. A household member is a person living in the household for at least half of the last year.
Household size (in adult equivalents)	Number of adult equivalent household members. A household member is a person living in the household for at least half of the last year. Adult equivalents are calculated using the methodology of Haagenars et al. (1994) which treats the household head with full weight, each additional adult with 0.5 weight and each child with 0.3 weight.
Number of children	Number of children.
Female	Dummy variable for females. Takes the value 1 for females and 0 otherwise.
Married	Dummy variable for being married. Takes the value 1 for married and 0 otherwise.
Age of household head	Age in years of household head. Household head is defined by the household and is usually the response person for the survey interview.
Years of schooling of household head	Education in years of household head. Household head is defined by the household and is usually the response person for the survey interview.
Consumption	Average monthly consumption in THB for the last 12 months.
Cut consumption after shock	Dummy variable indicating if consumption is reduced after a shock. Takes the value 1 for cut and 0 otherwise. Self reported information by the household.
Unemployed	Dummy variable for being unemployed. Takes the value 1 for being unemployed and 0 otherwise. Targets the economically inactive, i.e. elderly, people incapable to work, and people on job search.
Self-employed	Dummy variable for being self-employed. Takes the value 1 for self-employed and 0 otherwise.
Farmer	Dummy variable for being farmer. Takes the value 1 for farmer and 0 otherwise.
Informal worker	Dummy variable for working as informal worker. Takes the value 1 for being an informal worker and 0 otherwise.
Formal worker	Dummy variable for working as formal worker. Takes the value 1 for being an formal worker and 0 otherwise.
Government official	Dummy variable for being a government official. Takes the value 1 for being an government official and 0 otherwise.
Business/store owner	Dummy variable for being business/store owner. Takes the value 1 for being a business/store owner and 0 otherwise.
Earned net income	Earned net income consists of four sources of income groups net of costs: Net income from farming, net income from household business, wage labor income and other non-labor income such as land rent. To measure earned income we exclude all remittances and transfers.
Household assets	All household assets, e.g. land property, house, machinery, agricultural stocks, savings, valuables etc.
Land owner	Dummy variable for being a land owner.
Land (agr. purpose)	Size of land area used for agricultural purposes measured in ha.
Defaulted loans/loans outstanding	Share of defaulted loans to loans which are still outstanding.
Late loan repayment/loans outstanding	Share of outstanding loans to loans which are still outstanding.
Municipal district	Dummy for a household living in a municipal district.
Number of schools	Number of schools in the district in which the household is living in.
Number of universities	Number of universities in the district in which the household is living in.
Number of shopping malls	Number of shopping malls in the district in which the household is living in.
Number of factory plants	Number of factory plants in the district in which the household is living in.

Table A.2: Impact of financial development on log investment expenditures

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit processing)	0.0262 (0.339)	0.0219 (0.340)	-0.0926 (0.290)	-0.213 (0.268)
Interaction: credit demand <sup>†</sup> * financial development	0.556*** (0.173)	0.560*** (0.176)	0.392** (0.176)	0.466*** (0.151)
Household size (in adult equivalents)		0.303*** (0.0486)	0.0838** (0.0344)	0.0715* (0.0360)
Number of children		-0.115*** (0.0327)	-0.0501** (0.0235)	-0.0497** (0.0239)
Female <sup>†</sup>		-0.177* (0.0916)	-0.0803 (0.0845)	-0.0837 (0.0825)
Married <sup>†</sup>		0.0136 (0.109)	-0.0237 (0.0944)	-0.0238 (0.0929)
Age of household head		0.00218 (0.00276)	0.00100 (0.00233)	0.00138 (0.00228)
Years of schooling of household head		0.00240 (0.0128)	0.00588 (0.0134)	0.00954 (0.0125)
Farmer <sup>†</sup>			0.105 (0.0843)	0.0973 (0.0813)
Informal worker <sup>†</sup>			-0.351* (0.194)	-0.379* (0.192)
Formal worker <sup>†</sup>			0.0638 (0.153)	0.0513 (0.157)
Government official <sup>†</sup>			-0.0238 (0.151)	-0.0230 (0.147)
Business/store owner <sup>†</sup>			-0.186 (0.166)	-0.187 (0.165)
Log earned net income (monthly)			1.93e-07 (2.74e-06)	7.05e-08 (2.69e-06)
Household assets (in 100,000 THB)			0.00267 (0.00258)	0.00247 (0.00258)
Land owner <sup>†</sup>			-0.0615 (0.0652)	-0.0377 (0.0656)
Land (agr. purpose, in ha)			0.226*** (0.0153)	0.228*** (0.0159)
Defaulted loans/loans outstanding			-0.0343 (0.280)	-0.0270 (0.283)
Late loan payment/loans outstanding			0.0350 (0.124)	0.0484 (0.124)
Municipal district <sup>†</sup>				-0.0307 (0.105)
Number of schools				0.0172 (0.0200)
Number of universities				0.0602*** (0.0166)
Number of shopping malls				0.0146 (0.0366)
Number of factory plants				-0.00183*** (0.000660)
Constant	9.086*** (0.157)	8.444*** (0.249)	8.353*** (0.271)	8.253*** (0.261)
Observations	1,757	1,757	1,757	1,740
R2 adjusted	0.0134	0.0459	0.344	0.354

Note: Regression of input cost of crops on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table A.3: Impact of financial development on log investment revenues

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit processing)	0.167 (0.258)	0.223 (0.247)	0.0694 (0.233)	0.0443 (0.231)
Interaction: credit demand <sup>†</sup> * financial development	0.729*** (0.165)	0.664*** (0.152)	0.561*** (0.154)	0.581*** (0.151)
Household size (in adult equivalents)		0.454*** (0.0605)	0.195*** (0.0383)	0.194*** (0.0407)
Number of children		-0.164*** (0.0362)	-0.0787*** (0.0236)	-0.0785*** (0.0236)
Female <sup>†</sup>		-0.257*** (0.0838)	-0.143** (0.0692)	-0.143** (0.0691)
Married <sup>†</sup>		0.0976 (0.0992)	0.0467 (0.0760)	0.0442 (0.0769)
Age of household head		-0.00243 (0.00280)	-0.00322 (0.00254)	-0.00297 (0.00257)
Years of schooling of household head		-0.00356 (0.0138)	-0.00770 (0.0150)	-0.00664 (0.0150)
Farmer <sup>†</sup>			0.211** (0.100)	0.219** (0.102)
Informal worker <sup>†</sup>			-0.475** (0.185)	-0.473** (0.184)
Formal worker <sup>†</sup>			-0.147 (0.163)	-0.133 (0.169)
Government official <sup>†</sup>			0.188 (0.175)	0.206 (0.172)
Business/store owner <sup>†</sup>			-0.417** (0.171)	-0.393** (0.172)
Log earned net income (monthly)			1.07e-05*** (3.66e-06)	1.07e-05*** (3.73e-06)
Household assets (in 100,000 THB)			-0.000435 (0.00199)	-0.000338 (0.00205)
Land owner <sup>†</sup>			0.0302 (0.0792)	0.0394 (0.0798)
Land (agr. purpose, in ha)			0.227*** (0.0178)	0.227*** (0.0185)
Defaulted loans/loans outstanding			-0.284 (0.234)	-0.272 (0.234)
Late loan payment/loans outstanding			-0.115 (0.119)	-0.104 (0.121)
Municipal district <sup>†</sup>				0.0193 (0.0992)
Number of schools				-0.00474 (0.0181)
Number of universities				0.0354** (0.0134)
Number of shopping malls				-0.0157 (0.0268)
Number of factory plants				-0.000407 (0.000533)
Constant	9.842*** (0.115)	9.150*** (0.250)	8.967*** (0.305)	8.946*** (0.313)
Observations	1,775	1,775	1,775	1,757
R2 adjusted	0.0248	0.0878	0.407	0.406

Note: Regression of revenues from crop production on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table A.4: Impact of financial development on investment profitability

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit processing)	51.46 (75.01)	57.44 (74.53)	56.73 (71.28)	86.44 (71.54)
Interaction: credit demand <sup>†</sup> * financial development	-5.982 (42.86)	-12.96 (43.10)	-3.776 (41.63)	-22.44 (35.94)
Household size (in adult equivalents)		28.26** (13.38)	16.94 (12.48)	20.04 (12.02)
Number of children		-14.97 (9.267)	-10.79 (8.400)	-10.78 (8.382)
Female <sup>†</sup>		-13.34 (22.26)	-14.12 (21.72)	-14.19 (21.62)
Married <sup>†</sup>		8.301 (26.15)	16.45 (25.84)	14.94 (25.82)
Age of household head		-0.867 (0.634)	-0.983 (0.698)	-1.049 (0.687)
Years of schooling of household head		1.243 (3.590)	-2.463 (3.351)	-3.304 (3.377)
Farmer <sup>†</sup>			-28.97 (25.41)	-24.97 (25.33)
Informal worker <sup>†</sup>			-66.16 (45.35)	-56.22 (44.25)
Formal worker <sup>†</sup>			-54.24 (43.14)	-48.02 (42.35)
Government official <sup>†</sup>			20.26 (42.34)	23.87 (42.79)
Business/store owner <sup>†</sup>			-89.11** (43.94)	-84.75* (42.94)
Log earned net income (monthly)			0.00325*** (0.000859)	0.00326*** (0.000834)
Household assets (in 100,000 THB)			-0.680 (0.629)	-0.584 (0.600)
Land owner <sup>†</sup>			-0.430 (27.36)	-6.656 (27.38)
Land (agr. purpose, in ha)			-0.255 (3.231)	-0.987 (3.147)
Defaulted loans/loans outstanding			-58.24 (68.36)	-59.03 (69.45)
Late loan payment/loans outstanding			4.344 (48.40)	2.735 (48.42)
Municipal district <sup>†</sup>				3.035 (31.45)
Number of schools				-6.812 (4.864)
Number of universities				-8.755 (5.789)
Number of shopping malls				-5.969 (11.17)
Number of factory plants				0.409* (0.207)
Constant	197.6*** (31.10)	189.7*** (62.55)	241.3*** (86.75)	273.3*** (84.78)
Observations	1,746	1,746	1,746	1,729
R2 adjusted	0.000375	0.00204	0.0288	0.0373

Note: Regression of return on investment of crop production on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table A.5: Impact of financial development on log consumption expenditures

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit processing)	-1.143*** (0.252)	-0.895*** (0.202)	-0.710*** (0.140)	-0.730*** (0.130)
Interaction: credit demand <sup>†</sup> * financial development	0.754*** (0.113)	0.524*** (0.0932)	0.506*** (0.102)	0.536*** (0.0922)
Household size (in adult equivalents)		0.374*** (0.0218)	0.248*** (0.0251)	0.241*** (0.0278)
Number of children		-0.0536*** (0.0148)	-0.0196 (0.0162)	-0.0204 (0.0168)
Female <sup>†</sup>		0.00668 (0.0449)	-0.0225 (0.0443)	-0.0303 (0.0443)
Married <sup>†</sup>		0.0498 (0.0475)	0.00969 (0.0514)	0.00434 (0.0512)
Age of household head		-0.00622*** (0.00150)	-0.00770*** (0.00160)	-0.00805*** (0.00156)
Years of schooling of household head		0.0696*** (0.00709)	0.0241*** (0.00857)	0.0233*** (0.00865)
Farmer <sup>†</sup>			-0.112** (0.0514)	-0.127** (0.0513)
Informal worker <sup>†</sup>			-0.0984 (0.0667)	-0.127* (0.0677)
Formal worker <sup>†</sup>			0.138* (0.0748)	0.111 (0.0739)
Government official <sup>†</sup>			0.183* (0.0950)	0.176* (0.0979)
Business/store owner <sup>†</sup>			0.151* (0.0800)	0.137 (0.0819)
Log earned net income (monthly)			5.02e-06*** (1.33e-06)	5.04e-06*** (1.34e-06)
Household assets (in 100,000 THB)			0.0103** (0.00385)	0.00986** (0.00381)
Land owner <sup>†</sup>			0.0151 (0.0422)	0.0140 (0.0386)
Land (agr. purpose, in ha)			0.0253*** (0.00848)	0.0269*** (0.00865)
Defaulted loans/loans outstanding			0.190 (0.175)	0.186 (0.175)
Late loan payment/loans outstanding			0.133 (0.0824)	0.131 (0.0825)
Municipal district <sup>†</sup>				-0.0724 (0.0554)
Number of schools				0.0207* (0.0112)
Number of universities				0.00736 (0.0104)
Number of shopping malls				0.0238 (0.0171)
Number of factory plants				-0.000355 (0.000336)
Constant	8.717*** (0.0971)	7.880*** (0.157)	8.197*** (0.161)	8.166*** (0.158)
Observations	2,186	2,186	1,806	1,788
R2 adjusted	0.0352	0.177	0.210	0.212

Note: Regression of consumption expenditures on household and district characteristics. Equations were estimated by a least squares model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.

Table A.6: Impact of financial development on consumption smoothing

Specification	(1)	(2)	(3)	(4)
Financial development indicator (credit processing)	-0.322 (0.349)	-0.317 (0.341)	-0.359 (0.371)	-0.290 (0.379)
Interaction: financial coping instrument <sup>†</sup> * financial development	0.558*** (0.167)	0.526*** (0.166)	0.544*** (0.207)	0.550*** (0.211)
Household size (in adult equivalents)		-0.0219 (0.0804)	-0.0883 (0.102)	-0.0918 (0.103)
Number of children		-0.00722 (0.0518)	0.00532 (0.0604)	0.00750 (0.0608)
Female <sup>†</sup>		0.261* (0.155)	0.190 (0.188)	0.161 (0.194)
Married <sup>†</sup>		0.231 (0.184)	0.0741 (0.223)	0.0397 (0.228)
Age of household head		-0.00362 (0.00428)	-0.00134 (0.00505)	-0.00247 (0.00504)
Years of schooling of household head		-0.0141 (0.0271)	0.0151 (0.0331)	0.0120 (0.0331)
Farmer <sup>†</sup>			0.140 (0.210)	0.130 (0.213)
Informal worker <sup>†</sup>			-0.260 (0.280)	-0.290 (0.285)
Formal worker <sup>†</sup>			-0.462 (0.366)	-0.491 (0.359)
Government official <sup>†</sup>			0.146 (0.369)	0.140 (0.367)
Business/store owner <sup>†</sup>			0.472* (0.274)	0.464* (0.280)
Log earned net income (monthly)			-1.28e-05* (7.19e-06)	-1.31e-05* (7.47e-06)
Household assets (in 100,000 THB)			-0.00536** (0.00265)	-0.00553* (0.00297)
Land owner <sup>†</sup>			0.0162 (0.164)	0.0327 (0.171)
Land (agr. purpose, in ha)			-0.0100 (0.0154)	-0.0112 (0.0170)
Defaulted loans/loans outstanding			1.059* (0.548)	1.058* (0.542)
Late loan payment/loans outstanding			-0.151 (0.225)	-0.142 (0.228)
Municipal district <sup>†</sup>				0.0254 (0.222)
Number of schools				-0.00302 (0.0334)
Number of universities				-0.0146 (0.0365)
Number of shopping malls				-0.00385 (0.0358)
Number of factory plants				0.000901 (0.000582)
Constant	0.0975 (0.152)	0.174 (0.473)	0.254 (0.579)	0.346 (0.588)
Observations	708	708	609	605

Note: Regression of a dummy (=1 if household still has to cut consumption after shock) on household and district characteristics. Equations were estimated by a Probit model using clustered standard errors (district level). The omitted category for occupation is unemployed/retired. The level of significance are denoted by \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors are reported in parenthesis. <sup>†</sup> denotes dummy variables.