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Financial Development and Household Welfare: Microevidence from Thai Households*

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Abstract

We provide new micro evidence on the discussion about the relationship between financial development and welfare. Relying on the concept of local financial development our analysis focuses on three dimensions of household welfare: vulnerability to poverty, investment, and consumption smoothing. Even though we cannot find a significant effect on vulnerability, we provide evidence that financial development is correlated with higher investment and better possibilities to smooth consumption. The extent of both effects is also economically significant. Our results hold for alternative specifications and variations in the measurement of financial development.

JEL-Classification: O 16, O 17, G 21

Keywords: financial development, credit rationing, vulnerability, consumption smoothing, investment, poverty, growth

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1 Introduction

In recent years, many studies have examined the link between financial development and economic development as well as other economic issues (for a survey see Levine (2004)). To our knowledge all of these studies have in common that their analysis is on the macro level or focuses on the economics of the firm. In this paper we want to turn the focus on the micro level of the household. From this new perspective we would like to see if the relationship, which can be found on the macro level, holds on the small scale, too. Furthermore, we expect to learn more about how household welfare is linked to financial sector development and the existing transmission mechanisms. So, we turn the discussion on the household level by measuring the relationship between financial development and three household welfare indicators: vulnerability to poverty, investment, and consumption smoothing.

Using a new micro-household survey for Thailand we contribute to a more holistic understanding of the link between financial development and economic welfare. Due to the beneficial role of the financial sector in society various ways appear how financial development translates to higher household welfare. In providing access to savings and credit markets and therewith allocating capital more efficiently, financial development could allow the poor to take advantage of profitable investment opportunities, which in turn reduces their vulnerability. Borrowing and savings also provide the poor more opportunities to manage risks and smooth consumption in the face of negative shocks. Thus access to financial services can reduce households' vulnerability to shocks and minimize the adverse impacts of shocks that can sometimes have a long-run impact.

Our study bridges the gap between two streams of literature: studies of the welfare effects of financial development on the macro level and studies of the welfare impacts of microfinance institutions on the micro level. The first strand got renewed interest by the seminal paper of King & Levine (1993). Their cross-country evidence for positive effects of finance on growth was just the beginning of many other macro studies on financial development (for a survey see Levine (2004)). Other papers got interest in the link of financial development to further issues, like financial system structure (for a survey see Demirgüç-Kunt & Levine (1996)), institutional setting (Demirgüç-Kunt & Maksimovic 1998), household portfolios (Antzoulatos & Tsoumas 2010), and also poverty (Jalilian & Kirkpatrick 2005). The second strand 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 have been evaluating microfinance programs, e.g. Amin, Ashok & Topa (2003) and Burgess, Pande & Wong (2005). But the role of financial development for household development in general, rather than microfinance in particular, has been scarcely addressed. We shed light into this gap of the literature.

The paper provides three major contributions: First, we measure the relationship between financial development and three dimensions of household welfare: vulnerability, investment, and consumption smoothing. Second, by separating the effect of financial development on vulnerability, consumption, and investment we achieve a more thorough understanding of the transmission channels of financial development. Third, in replicating methods to retrieve indicators for vulnerability and financial development we can set up a reliable framework for our analysis and proof the usefulness of those methodological frameworks.

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. We have detailed information about household and village characteristics. Our data set is particularly rich for financial data, like lending, borrowing, credit, denials of credit etc. To obtain a measure of financial development we employ the method of Guiso, Sapienza & Zingales (2004). The framework estimates coefficients of district dummies in a regression of credit constraints on a large set of household and regional characteristics. In contrast to the original authors we use as indicators for being credit constrained the de facto ratio of received credit to credit demand and the expected time to get a fixed amount of credit. Both indicators seem to be quite feasible for the financial market in rural Thailand. To estimate an indicator of vulnerability we replicate the method of Chaudhuri, Jalan & Suryahadi (2002), which uses cross-sectional information to estimate the probability to stay or fall below the poverty line. Information of the other welfare indicators, investment and consumption smoothing, are explicitly contained in our data set.

Our results on the household level confirm that financial development does contribute to higher investment and better consumption smoothing. A household moving from the financially least to the best developed district increases investment by 16,000 THB, which is about .8 standard deviation. For the same variation in financial development the probability to smooth consumption jumps

up by nearly 50 percent. Our results suggest that the main impacts of financial development on economic welfare do not only result in better consumption smoothing but also through increasing household investment. We are aware of the endogeneity problems which are addressed particularly in the finance-growth literature. Even though we do not have a feasible instrument, we may not face endogeneity problems to the same extent as the macro literature does. Since we analyze the impacts of financial development on household welfare, it is quite unlikely that a single household's welfare is able to affect financial development on the local level. Moreover we can use a number of economic development indicators as control variables. Due to methodological restrictions we can analyze vulnerability just on the district level. On this aggregation stage we cannot find any significant relationship between vulnerability and financial development. This no-result might be driven by two reasons. First, on the district level we rely on 45 observations which questions the reliability of the results. Second, on the district level we cannot control for economic development. These partial results might therefore be subject to endogeneity bias.

The paper is structured as follows: Section 2 surveys the data set and shows some descriptive statistics. We succeed by presenting our indicator of financial development in section 3. This is followed by section 4, which gives further details about our welfare indicators and provides the analysis of the relationship between financial development and our welfare indicators. Section 5 summarizes the paper and concludes.

2 Data and summary statistics

2.1 Data collection

The data used in this study are from the project "Impact of shocks on the vulnerability to poverty: consequences for development of emerging Southeast Asian economies" (DFG FOR 756), funded by the German Research Foundation (DFG). 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. Three provinces were then selected, namely Buri Ram, Ubon Ratchatani and Nakhon Phanom.

Households were selected following a three-stage stratified sampling proce-

where provinces are constituted strata and the primary sampling units (PSU) are sub-districts. Within each of the three provinces, sub-districts were first randomly selected with probability proportional to size by a systematic sample from a list ordered by population density. This ensures proportional coverage of densely (peri-urban) and less densely populated (rural) areas. Within each sub-district, two villages were 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 the survey are contained in Hardeweg, Praneetvatakulb, Duc & Waibel (2007). The survey includes information on household demographics, occupation, health status, education, agricultural activities, off-farm employment activities, household businesses, income, expenditures, 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.

Secondary data on number of financial institutions and demographic variables at district level were extracted from Department of Provincial Administration's District Statistics and Provincial Cooperative Offices' Cooperative Statistics.

2.2 Descriptive statistics

Table 1 summarizes statistics of key variables for the sample households.

(Table 1 about here)

The average family size is 3.98 persons or 2.23 in adult equivalent units. The majority of households are male headed but female-headed households are not uncommon. About 25 percent of the Thai households are female-headed. Educational level of these households is low. The average year of schooling for the head of household is only 5 years.

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 official, business owners and the "economically inactive" group. The most com-

mon occupation is farming, followed by the "economically inactive" group - a large proportion of which is found to be the elderly.

Average annual income of household is nearly 90,000 Baht (1,800 Euro at the present exchange rate) during the period covered by the survey. As households of different size and composition have different needs, we use equivalence scale to adjust household income. Household income per equivalence adult is about 41,000 Baht (820 Euro). 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 excludes remittances and transfers. We exclude the latter two because we want income before any coping strategy is taken. For the average household, farming is the most important source of household income (60 percent).

The annual consumption expenditure for the average household is 2,600 US Dollars (PPP). Food is the largest proportion of household expenditures, accounting for 40 percent of all consumption expenditures.

The value of assets holding owned by the average Thai household is about 100,000 Baht (2,000 Euro). 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 which include among other durable goods, furniture, telephones, motor vehicles, machines and equipment used in agricultural production and households' businesses. Interestingly savings and agricultural assets including livestock and stored crops account for very small shares of total assets.

Turning to the incidence of credit rationing, 209 households, or about 10 percent of the households, report credit rationing. The default rate is very low in Thailand as only 2 percent of the households reports that they have ever defaulted on loans. The incidence of late repayment is relatively higher; about 6 percent of the households reports ever repaid late on loan.

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 B of table 1 presents the basic characteristics of the sample districts. Clearly these districts are heterogeneous, made up of both small and large communities, with densely and less densely population. Some large districts have up to 220,000 inhabitants while some smaller districts have

only 15,000 inhabitants.

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 of 45 districts in northeast Thailand. We borrow this approach from Guiso et al. (2004). They propose that a region is financially less developed if ceteris paribus the fraction of credit denials in the same region is large. Employing a linear probability model we regress variable y , which measures if a household is being credit constrained, on dummy variables for each of the regional entities (Z) as well as on household and village characteristics (X):

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

For our further analysis of vulnerability, consumption smoothing, and investment we will use a normalization of the dummy coefficient γ of region k . The normalized indicator is:

$$findev_k = 1 - \frac{\gamma_k}{max[\gamma]} \quad (2)$$

So, $findev$ lies in between 0 and 1 and the higher the indicator is the more financially developed is the district.

We believe this local approach to be appropriate for the financial situation of rural Thai households. The Thai financial market in general has not been fully integrated yet. In particular households in rural areas might face difficulties to borrow from lenders who are spread over the country. This argument is supported by a number of stylized facts. The subject of our study are small rural households whose major lending institutions are the BAAC¹ and the village funds². Both financial institutions operate inside every district.

¹The Bank of Agriculture and Agricultural Cooperatives (BAAC) is the 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.

²In 2001, the Thai government introduced a microfinance program called "the village funds." Following in 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.

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. Beyond this regional anecdotal evidence even for better developed financial markets several studies find that distance to banking institutions matters (e.g. Petersen & Rajan (2002), Haselmann, Marsch & Mauro (2009)). These studies find that regionalism matters especially for small firms (who are not able to borrow at different branches) and public banks. So, it is reasonable to assume local differences in supply and demand for credit in rural Thailand.

Accepting that credit markets are local the question rises what regional entity is feasible to be considered as a separate market. We set the 45 districts in our 3 provinces as separate financial markets. We believe this to be closest approximation of the real financial markets which provide credit to borrowing households because of three reasons. First, as mentioned above the major lending institutions are BAAC and the village funds. BAAC has one branch per district, in most of the cases in the district capital. It is part of the BAAC's business policy to expand and decentralize its banking operations further from the provincial to the district level (BAAC 2004). The village fund is set up in every village but the fund is exclusively available for residents of a given village and not for residents living in other villages. 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. 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 would not be feasible. We refrain from the other alternative of clustering districts, since this decision is ultimately an arbitrary decision. We tried several rigorous algorithms to combine districts but no one was unique. Our later results will show that districts are indeed relatively heterogeneous (cf. figure 1 and figure 2). Eventually, whether this is the true market or not, is a matter of empirical results. If this procedure works well the district dummy variables in our regression would be significant and substantially explain credit denial.

Our goal is to estimate the likelihood that a household is credit constrained controlling for household characteristics and district dummies. Credit constraints can have an effect on various characteristics of the credit contract, e.g. amount of credit, capital cost, maturity, time to get credit, and others. We use

two alternative measures of credit constraints. First, we calculate the degree of credit that is given relative to the credit which was demanded (*findevdeg*). Second, for robustness checks we use an alternative indicator of credit constraint, the time which household expect to need to get a credit of 5000 THB, which is about 100 EUR (*findevtime*). Even though this indicator does not rely on the past credit history of credit denials as the first one does, it indicates the cross-sectional heterogeneity of households' credit constraints. Since it is the *expected* time to get the credit we focus in our analysis on the indicator of financial development which relies on the past credit denials. We cannot use the information of credit constraint directly on the household level, because households might be feasibly shut off from the credit market conditional on household characteristics or past credit history. Therefore we use a large number of household characteristics as control variables to measure financial development accurately: earned income (*iearninc*), assets (*asset*), asset squared (*assetsq*), age of household head (*headage*), years of education of household head (*iheadeduyr*), number of household members (*hsize*), number of children (*nchild*), dummy for married household head (*married*), dummy for female household head (*female*), dummy for major occupation of household head (*dheadocc2-dheadocc6*), ratio of defaulted loans to total loans (*rdefault*), ratio of arrears to total loans (*rlatepay*). The last two variables control for excessive credit allocation. If there are households who are known to be late payers or defaulters less credit denial would not mean a better developed credit market. Additionally we also use the number of households in the village (*novillhh*) and the number of self employed in the village (*noselfemplact*). To approximate the set of households demanding credit, we use a sub-sample of households who have loans from the credit market outstanding or have experienced credit denials. Table 2 shows the regression results.

(Table 2 about here)

The normalized *findevdeg* indicator ranges from 0 to .96 and *findevtime* ranges from 0 to .76. We employ a Wald test to challenge the hypothesis of zero influence of our district dummy variables. The null of zero influence is rejected on the 1% significance level. There are 11 (41) dummy coefficients for *findevdeg* (*findevtime*) individually significant. As noted above, neighboring regions rarely exhibit the same degree of financial development, which makes us confident that district is the appropriate regional entity. Figure 1 and figure 2 show the maps

of the survey area and the levels of `findev1` and `findev2`.

(Figure 1 about here)

(Figure 2 about here)

Both measures, `findevdeg` and `findevtime`, evaluate the degree of financial development of equal districts qualitatively the same. The highly significant correlation (.54) supports the strong relationship further.

4 The relationship 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 three aspects of household welfare which could be affected by financial development: vulnerability, investment, and consumption smoothing.

It is not obvious that financial development reduces or increases vulnerability, which is the probability to stay or fall below the poverty line. A higher amount of credit increases also the risk of failing, which is well known from corporate finance under the topic of the leverage ratio. Especially in the presence of the current financial crisis one might be tempted to argue in such a way. But on the other side there are channels where financial development can improve household welfare. These channels result from the functions of financial markets as intermediaries. One function of the financial sector is providing access to savings and credit markets and therewith allocating capital more efficiently. Hence on the household level financial development could allow the poor to take advantage of profitable investment opportunities. These investments tend to be indivisible and may be difficult to finance out of current household income but could provide for a higher income in the future. Thus access to financial services could enable the poor to invest in productive assets which in turn enhance their productivity and reduce their vulnerability. Additionally, borrowing and savings also provide the poor more opportunities to manage risks and smooth consumption in the face of negative shocks. Thus access to financial services can reduce households' vulnerability to shocks and minimize the adverse impacts of

shocks that can sometimes have a long-run impact. It is worth to note that financial development can increase household welfare without the household actively engaging in the financial market. Already the option value of available credit and consumption insurance allow the household to invest in more riskier projects (Eswaran & Kotwal 1990).

First, we address vulnerability, i.e. the exposure of households to poverty, which is in the focus of policy programs. Second, the impact of financial development on investments shows the possibilities of households to change their welfare *ex ante*. Third, by analyzing consumption smoothing we want to see whether financial development helps households to smooth consumption and cope with shocks. This focuses on the *ex post* transmission channel of financial development on household welfare.

We are aware of the endogeneity problems which are addressed in the past literature. Unlike the country analysis we cannot fall back on a large time series for instruments as e.g. King & Levine (1993) do. Our data set is particularly rich in the cross-section but restricts us using a single wave. Thus past values are not available as instruments. Other instruments like in the case of Guiso et al. (2004) are also not available. But on the other hand we may not face endogeneity problems to the same extent as the macro literature does. Since we analyze household welfare and financial development, we can use indicators for economic development as control variable. In fact, it is quite unlikely that a single household's welfare is able to affect financial development on the local level. To control for aggregate effects we use information on the average income per capita of the district, a dummy for municipal districts, as well as the number of schools, universities, shopping malls, and factories in the district.

4.1 Vulnerability to poverty

Targets for policy programs have moved from a backward looking poverty reduction strategy to an *ex ante* prevention strategy. These policy programs aim on reducing the number of vulnerable households, which are either likely to fall below poverty line or remain in poverty (Morduch 1994). The variety of approaches which address vulnerability empirically is manifold, e.g. Glewwe & Hall (1998), Jalan & Ravallion (1999), Dercon & Krishnan (2000), Ligon & Schechter (2003), Amin et al. (2003), Calvo & Dercon (2008). As vulnerability follows the household's consumption path over time a comprehensive analysis

should preferably rely on panel data. Such data requirements are often not fulfilled in developing countries as it is in our case. For the numerous cases where only one wave of data is available Chaudhuri et al. (2002) suggest a vulnerability measure which is based on the instruments of poverty analysis. Since this is to the best of our knowledge currently the least restrictive way to estimate a vulnerability indicator with cross-sectional data, we follow their procedure.

We want to estimate the vulnerability v_h , which is the probability of household h to fall below the poverty line z :

$$\hat{v}_h = Pr \left(\frac{\ln z - \hat{E}[\ln c_h | X_h]}{\hat{V}[\ln c_h | X_h]} \right) \quad (3)$$

Hence the task is to find an estimate for the mean and variance for c_h . This is the estimation of the level of consumption on some household characteristics:

$$\ln c_h = X_h \beta + \varepsilon_h \quad (4)$$

It is obvious that the variance might be heteroscedastic and depend on some or the same set of household characteristics. Since we cannot follow the households over time it is not possible to say whether β is stable. We therefore have to assume that shocks are identically and independently distributed over time. But we do not have to assume that shocks are identically distributed across households, which means we allow different variances for households, i.e. heteroscedasticity:

$$\sigma_{\varepsilon_h}^2 = X_h \theta + \eta \quad (5)$$

In the presence of heteroscedasticity the estimator for the variance would be biased. To overcome this problem the literature uses a three-step feasible generalized least squares (FGLS) procedure to estimate this probability (Amemiya 1977). Assuming consumption to be log-normally distributed the estimated vulnerability level is then:

$$\hat{v}_h = \widehat{Pr}(\ln c_h < \ln z | X_h) = \Phi \left(\frac{\ln z - X_h \hat{\beta}}{\sqrt{X_h \hat{\theta}}} \right) \quad (6)$$

with Φ as the cumulative density function of the standard normal distribution.

For the estimation of equations 4 and 5 we large set of control variables: household income per equivalence scale (*iearninc_eqsc*)³, household assets (*asset*), equivalence scale (*eqsc*), equivalence scale squared (*eqscsq*), number of children (*nchild*), age (*squared*) of household head (*headage*, *headagesq*), years of education of household head (*iheadeduyr*), dummy for female household head (*female*), dummy variables for major occupation of household head (*dheadocc2*-*dheadocc6*), dummy variables for the provinces (*province1*, *province2*), average income per capita in the district (*incpp*), dummy for municipal districts (*municipaldummy*), number of shopping malls in the district (*noshopmal*), number of schools in the district (*noschool*), number of universities on the district (*nouniversity*), number of factory plants in the district (*nofactory*). The poverty line z is the official poverty line of the respective province in which the household is located. The mean of our vulnerability index is about .23 with a standard deviation .11. Figure 3 shows the vulnerability distribution of households.

(Figure 3 about here)

For further descriptive analysis of the vulnerability indicator we plot the vulnerability indicator against the poverty ratios in Figure 4.

(Figure 4 about here)

The strong negative relationship between poverty and vulnerability is plausible. The poorer a household is the more likely it is that the household remains in poverty or falls below the poverty line.

But what we are mainly interested in is the relation between vulnerability and financial development. For this reason we aggregate the individual information on vulnerability to the district level. The alternative of regressing vulnerability on financial development and controlling for other household and district characteristics is not feasible, since we used the information of household and district characteristics already in the calculation of the vulnerability indicator. For this purpose we calculate the correlation between vulnerability and the financial development indicators (cf. table 4).

³We use the OECD-modified equivalence scale, assigning 1 to the household head, 0.5 to each other adult and 0.3 to each child (Haagenars, de Vos & Zaidi 1994).

(Table 4 about here)

(Figure 5 about here)

(Figure 6 about here)

The correlation coefficients are in neither case significant and around zero. Figures 5 and 6 support the result of no correlation between financial development and vulnerability. This no-result might be driven by two reasons. First, on the district level we rely on 45 observations which questions the reliability of the results. Second, on the district level we cannot control for economic development. These partial results might therefore be subject to endogeneity bias.

4.2 Investment

In this section we want to analyze whether there is a relation between the households investments and financial development. As we have to rely on a single wave of data, predictions of a long-run variable like household assets are hard to make. Another way to examine whether the improved access to financial services brought by financial development increases households' investment opportunities is to look at the amount of input supplies used by households. Households may buy more input supplies such as fertilizers and pesticides. We look at households' expenditures on crop production as agriculture is the most important source of income for our sample households; nearly 85 percent of the households are performing arable agriculture. Most of these expenditures are in the forms of fertilizers, pesticides and seedlings. Table 6 presents the list of explanatory variables and the regression results for full and restricted specifications for each of the financial development indicators.

(Table 6 about here)

Most importantly, the results show that our financial development indicator significantly increases the amount of household investments in input supplies. In particular, moving from the least financially developed district to the most financially developed, the average amount of productive investment increases

by 16,000 Baht. The results of our alternative financial development indicator (findevtime) are significant on the ten percent level and positive as well. The results remain significant when we use clustered standard errors on the district level to circumvent the Moulton bias (Moulton 1986).⁴

Regarding other explanatory variables, we find that investments in crop inputs are positively related the size of the agricultural area on the one percent level. A robustly significantly negative relation appears between crop expenditure and the household's landholdings and business owners. In some specifications also the number of schools (positive) and the number of factories (negative) in the district are significant.

4.3 Consumption smoothing

By analyzing consumption smoothing we want to see whether financial development helps households to cope with shocks. This focuses on the ex post transmission channel of financial development on household welfare. Our survey gives us detailed retrospective 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 has not cut consumption anymore. Using a probit model we regress on this dummy variable the financial development indicator and a large set of household and district characteristics as controls. In adding information about the economic development in the district we hope to catch most of the endogeneity problems which appear in cross-country regressions of financial development and economic development. We adjust for the sampling design, but using clustered standard errors on the district level does not change the results.⁵ Table 5 presents the regression results for consumption regressions. The table shows the list of explanatory variables and the regression results for full and restricted specifications for each of the financial development indicators.

(Table 5 about here)

Most importantly, we find that financial development positively reduces the likelihood to have to cut consumption after a shock. As moving from the district

⁴Results are not in the paper and are available on request.

⁵Results are not in the paper and are available on request.

which is financially least developed to the best developed reduces the probability of cutting consumption by nearly 50 percent, this result is economically meaningful. Besides the financial development indicator also an indicator of economic development is significant. The higher the average income in the district the less likely it is that the household has to cut consumption. We find it promising that controlling for economic development on the district level still leaves the indicator for financial development significant. The financial development indicator based on the time to get credit yields affirmative results of a significant positive effect of financial development on consumption smoothing.

Our results also show that cutting consumption is negatively related to household income, landholdings and age of the household head, the last one with diminishing effect. There is also some tentative evidence that female headed households are prone to cutting consumption after a shock. This could be due to less availabilities of coping mechanisms, in particular to less access to the credit market. Finally, households who are known to have defaulted in the past are also more likely to cut consumption after a shock happened. Restricted access to coping mechanisms like the financial market might be also here the reason for the positive coefficient.

Ultimately, financial development is consistently negatively correlated to the probability of cutting consumption after a shock. We control for most of the factors, which remain unexplained in usual cross-country regressions, in particular economic development. Thus, we are confident that our results can be seen as more than simple correlation.

5 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 three household welfare indicators: vulnerability to poverty, investment, and consumption smoothing.

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 two streams of literature,

studies of the welfare effects of financial development on the macro level and the program evaluations of the microfinance literature.

We employ the method of Guiso et al. (2004) to obtain a measure of local financial development. The framework estimates coefficients of district dummies in a regression of credit constraints on a large set of household and regional characteristics. In contrast to Guiso et al. (2004) we use as indicators for credit constrained the de facto ratio of received credit to credit demand and the expected time to get a fixed amount of credit. Both indicators show to be quite feasible for the financial market in rural Thailand. To estimate an indicator of vulnerability we replicate the method of Chaudhuri et al. (2002). Information for the welfare indicators of investment and consumption smoothing are explicitly contained in our data set.

Our results on the household level confirm that financial development does contribute to higher investment and better consumption smoothing. A household moving from the financially least to the best developed district increases investment by 16,000 THB, which is about .8 standard deviation. For the same variation in financial development the probability to smooth consumption jumps up by nearly 50 percent. Our results suggest that the main impacts of financial development on economic welfare do not come only through increasing household consumption but also through increasing household investment and productivity. Due to methodological restrictions we can analyze vulnerability just on the district level. On this aggregation stage we cannot find any significant relationship between vulnerability and financial development. This no-result might be driven by two reasons. First, on the district level we rely on 45 observations which questions the reliability of the results. Second, on the district level we cannot control for economic development. these partial results might therefore be subject to endogeneity bias.

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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6 Tables

Table 1: Descriptive statistics of the data set

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|---|--------------|----------|-----------|----------|------------|
| Panel A | | | | | |
| Female headed household [†] | 2186 | 0.27 | 0.44 | 0.00 | 1.00 |
| Married [†] | 2186 | 0.78 | 0.42 | 0.00 | 1.00 |
| Age of household head | 2186 | 54.64 | 13.36 | 23.00 | 104.00 |
| Years of education of household head | 2186 | 4.96 | 2.41 | 1.00 | 18.00 |
| Household size | 2186 | 3.98 | 1.73 | 0.00 | 17.00 |
| Equivalence scale | 2186 | 2.23 | 0.72 | 1.00 | 7.20 |
| Number of children (< 18) | 2186 | 1.30 | 1.11 | 0.00 | 9.00 |
| Occupation | | | | | |
| Economically inactive [†] | 2186 | 0.15 | 0.36 | 0.00 | 1.00 |
| Farmer [†] | 2186 | 0.62 | 0.49 | 0.00 | 1.00 |
| Informal worker [†] | 2186 | 0.09 | 0.28 | 0.00 | 1.00 |
| Formal worker [†] | 2186 | 0.03 | 0.18 | 0.00 | 1.00 |
| Government official [†] | 2186 | 0.04 | 0.19 | 0.00 | 1.00 |
| Business owner [†] | 2186 | 0.08 | 0.26 | 0.00 | 1.00 |
| Wealth | | | | | |
| Area of owned land (hectre) | 2186 | 2.00 | 3.14 | 0.00 | 62.16 |
| Earned income | 2186 | 89025.76 | 194583.30 | 0 | 3664111.00 |
| Earned income per equivalence scale | 2186 | 40945.61 | 91374.38 | 0 | 1744815.00 |
| Consumption expenciture (USD-PPP) | 2186 | 2601.92 | 743.05 | 1727.76 | 4524.17 |
| Cut consumption after shock [†] | 708 | 0.53 | 0.50 | 0.00 | 1.00 |
| Vulnerability [‡] | 2160 | 0.23 | 0.11 | 0.00 | 0.72 |
| Total assets [§] | 2186 | 10.15 | 16.46 | 0.01 | 412.01 |
| Investment | | | | | |
| Crop production [†] | 2186 | 0.83 | 0.38 | 0.00 | 1.00 |
| Expenditures on crop production | 1806 | 18619.71 | 31099.87 | 0.00 | 464000.00 |
| Credit access | | | | | |
| Fully or partially credit rationed [†] | 2186 | 0.10 | 0.29 | 0.00 | 1.00 |
| Defaulted on a loan [†] | 2186 | 0.02 | 0.12 | 0.00 | 1.00 |
| Arrear on a loan [†] | 2186 | 0.06 | 0.20 | 0.00 | 1.00 |
| Degree of credit rationing | 2186 | 0.07 | 0.24 | 0.00 | 1.00 |
| Panel B | | | | | |
| District population | 45 | 74395.62 | 46077.98 | 14958.00 | 223636.00 |
| District area | 45 | 588.52 | 362.48 | 121.87 | 1853.00 |
| Income per capita | 45 | 2854.96 | 813.13 | 1852.29 | 6557.34 |
| Municipal district [†] | 45 | 0.16 | 0.37 | 0.00 | 1.00 |
| Number of shopping mals | 44 | 0.80 | 1.85 | 0.00 | 10.00 |
| Number of Malls | 44 | 3.41 | 2.14 | 1.00 | 9.00 |
| Number of factories | 44 | 9.18 | 52.90 | 0.00 | 352.00 |
| findevdeg [‡] | 45 | 0.62 | 0.22 | 0.00 | 0.96 |
| findevtime [‡] | 45 | 0.46 | 0.17 | 0.00 | 0.76 |

Note: [†] Denotes a dummy variable. [‡] We estimate these variables in our paper, see sections 3 and 4.1. [§] Measure in 100.000 Thai Baht. All currency variables are in Thai Baht if not specified else.

Table 2: Estimation of financial development district dummy variables

| VARIABLES | (1) degrat | (2) d2getcreds |
|---------------------------------|------------------------|-------------------------|
| iearninc | -4.24e-08 (0.103) | -1.49e-06 (0.132) |
| asset | -0.00144** (0.0314) | -0.0557*** (0.00326) |
| asset_sq | 3.66e-06** (0.0241) | 0.000217** (0.0325) |
| headage | -7.92e-05 (0.909) | 0.00523 (0.736) |
| iheadeduyr | 0.000709 (0.802) | -0.00147 (0.982) |
| hhsiz | 0.00580 (0.354) | 0.179 (0.295) |
| nchild | -0.00403 (0.651) | -0.228 (0.402) |
| married | -0.0110 (0.556) | 0.207 (0.726) |
| female | -0.00782 (0.684) | -0.496 (0.257) |
| dheadocc2 | -0.0152 (0.549) | -0.309 (0.599) |
| dheadocc3 | 0.0645 (0.105) | -0.573 (0.432) |
| dheadocc4 | -0.0140 (0.748) | -0.989 (0.330) |
| dheadocc5 | -0.0226 (0.595) | -0.370 (0.728) |
| dheadocc6 | 0.0196 (0.550) | -1.018 (0.149) |
| rdefault | 0.115 (0.115) | 4.891** (0.0132) |
| rlatepay | 0.0789** (0.0298) | -0.973 (0.136) |
| novillhh | 0.000138 (0.110) | -0.000150 (0.947) |
| noselfemplact | -0.00553** (0.0201) | 0.0368 (0.580) |
| Observations | 2186 | 2185 |
| Observations subsample | 1778 | 1777 |
| R-squared | 0.154 | 0.306 |
| Wald test: Regional Dummies = 0 | 3.092 | 4.473 |
| P-value | 2.00e-05 | 3.37e-08 |

Note: Regression of the degree to which households get credit (spec. 1) and the number of days to get get credit (spec. 2) on household and district characteristics and 45 district dummy variables to compute the degree of local financial development. Estimations by least squares with respect to the survey design. The level of significance are denoted by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, p-values in parentheses. In specification 1 resp. 2 there are 11 resp. 41 district dummy variables significant.

Table 3: Estimation of vulnerability

| VARIABLES | (1) lnconeqsc | (2) errsq | (3) trans_errsq | (4) trans_lnconeqsc |
|------------------------|---------------------------|----------------------------|-------------------------|----------------------------|
| iearninc_eqsc | 7.20e-07** (0.0262) | -3.34e-08 (0.938) | -7.04e-07** (0.0120) | 8.13e-07** (0.0292) |
| asset | 0.00784** (0.0186) | 0.0169*** (0.000940) | 0.00276 (0.213) | 0.00442 (0.173) |
| eqsc | -0.0834 (0.316) | -0.328*** (0.00121) | -0.258*** (0.00452) | -0.140 (0.101) |
| eqscsq | 0.000397 (0.977) | 0.0314** (0.0478) | 0.0316** (0.0213) | 0.00981 (0.496) |
| nchild | -0.0272 (0.126) | 0.0307 (0.190) | -0.0270 (0.185) | -0.0358** (0.0238) |
| headage | 0.0140* (0.0886) | -0.00447 (0.676) | -0.0116 (0.184) | 0.0211** (0.0129) |
| headagesq | -0.000207*** (0.00486) | 4.92e-05 (0.604) | 8.65e-05 (0.259) | -0.000256*** (0.000808) |
| iheadeduyr | 0.0343*** (5.27e-07) | -0.0209*** (0.00999) | -0.0191*** (0.00565) | 0.0440*** (2.53e-08) |
| female | -0.00359 (0.922) | 0.0806* (0.0645) | 0.0617 (0.316) | 0.00302 (0.940) |
| dheadocc2 | -0.113** (0.0314) | 0.00831 (0.887) | -0.0312 (0.524) | -0.124** (0.0215) |
| dheadocc3 | -0.172** (0.0139) | 0.0404 (0.590) | -0.171*** (6.45e-08) | -0.200*** (0.00767) |
| dheadocc4 | 0.164** (0.0385) | -0.220*** (0.00333) | -0.201*** (0.000793) | 0.146* (0.0939) |
| dheadocc5 | 0.246*** (0.00988) | 0.0100 (0.915) | -0.0794 (0.201) | 0.168* (0.0980) |
| dheadocc6 | 0.272*** (0.000224) | -0.0689 (0.398) | -0.0978* (0.0508) | 0.297*** (8.54e-05) |
| dprovince1 | 0.172*** (0.00766) | -0.146*** (0.00549) | -0.0424 (0.421) | 0.145*** (0.0165) |
| dprovince2 | 0.0512 (0.439) | -0.130** (0.0181) | 0.0300 (0.590) | 0.0387 (0.533) |
| incpp | 0.000138*** (0.00117) | -0.000124*** (0.000842) | 2.54e-05 (0.468) | 0.000124*** (0.00279) |
| municipaldummy | -0.0575 (0.395) | 0.0552 (0.313) | -0.0341 (0.516) | -0.0725 (0.319) |
| noshopmal | -0.00722 (0.725) | 0.0300 (0.140) | 0.00531 (0.727) | 0.0103 (0.651) |
| noschool | 0.00524 (0.613) | 0.00366 (0.611) | -0.00207 (0.799) | -0.000427 (0.967) |
| nouniversity | 0.000177 (0.991) | -0.0125 (0.398) | 0.0253** (0.0192) | 0.000249 (0.988) |
| nofactory | -0.000580 (0.280) | 0.000854 (0.134) | -0.000735** (0.0499) | -0.00118* (0.0562) |
| Constant | 3.696*** (0) | 1.402*** (0.000179) | 1.284*** (7.20e-05) | 3.607*** (0) |
| Observations | 2186 | 2186 | 2186 | 2180 |
| Observations subsample | 2166 | 2166 | 2166 | 2160 |
| R-squared | 0.200 | 0.115 | 0.802 | 0.979 |

Note: Regression of vulnerability by a 3-step FGLS approach (Chaudhuri et al. 2002). Column 1 and 2 refer to the consumption equation with 1 being the original regression and 2 the transformed regression. Column 3 and 4 refer to the estimation of the variance with 3 being the original regression and 4 the transformed regression. The level of significance are denoted by *** p<0.01, ** p<0.05, * p<0.1, p-values in parentheses.

Table 4: Correlation between vulnerability and financial development

| | vuln | findevdeg | findevtime |
|------------|------------------|------------------|------------|
| vuln | 1 | | |
| findevdeg | 0.0276 0.8590 | 1 | |
| findevtime | 0.1404 0.3632 | 0.5432 0.0001 | 1 |

Note: Pairwise correlation coefficients between vulnerability and financial development. First figure gives correlation coefficient and second is the p-value. The number of observations is 45 (districts).

Table 5: Estimation of consumption smoothing

| VARIABLES | (1) cutcons | (2) cutcons | (3) cutcons | (4) cutcons |
|------------------------|-------------------------|-------------------------|---------------------------|-------------------------|
| shockage | 0.197 (0.141) | | 0.200 (0.135) | |
| iearninc_eqsc | -2.24e-06** (0.0465) | -2.11e-06* (0.0508) | -2.34e-06** (0.0396) | -2.16e-06** (0.0459) |
| ownland | -0.0442*** (0.00706) | -0.0433*** (0.00905) | -0.0396** (0.0164) | -0.0376** (0.0218) |
| headage | 0.0520* (0.0723) | 0.0502* (0.0510) | 0.0481* (0.0928) | 0.0461* (0.0683) |
| headagesq | -0.000479* (0.0593) | -0.000470** (0.0350) | -0.000456* (0.0705) | -0.000442** (0.0444) |
| iheadeduyr | 0.0243 (0.406) | | 0.0239 (0.413) | |
| eqsc | 0.131 (0.726) | | 0.132 (0.721) | |
| eqscsq | -0.0314 (0.638) | | -0.0288 (0.664) | |
| nchild | -0.00215 (0.970) | | -0.0125 (0.827) | |
| married | 0.184 (0.279) | | 0.178 (0.296) | |
| female | 0.268* (0.0712) | 0.188* (0.0875) | 0.249* (0.0911) | 0.173 (0.113) |
| dheadocc2 | -0.0170 (0.926) | | -0.0381 (0.834) | |
| dheadocc3 | -0.281 (0.296) | | -0.300 (0.263) | |
| dheadocc4 | -0.526 (0.108) | | -0.538 (0.100) | |
| dheadocc5 | -0.460 (0.231) | | -0.471 (0.221) | |
| dheadocc6 | 0.144 (0.527) | | 0.149 (0.507) | |
| rdefault | 0.935** (0.0274) | 0.880** (0.0395) | 0.897** (0.0325) | 0.851** (0.0452) |
| rlatepay | -0.105 (0.636) | | -0.116 (0.602) | |
| incpp | -0.000232** (0.0129) | -6.32e-05 (0.201) | -0.000280*** (0.00603) | -5.42e-05 (0.321) |
| municipaldummy | 0.0166 (0.919) | | 0.0479 (0.772) | |
| noshopmal | 0.0439 (0.349) | | 0.0526 (0.273) | |
| noschool | 0.0295 (0.290) | | 0.0276 (0.344) | |
| nouniversity | 0.00387 (0.926) | | -0.0112 (0.792) | |
| nofactory | 0.000910 (0.461) | | 0.00149 (0.218) | |
| findev2 | -0.651*** (0.00265) | -0.626*** (0.00548) | | |
| findev3 | | | -0.618* (0.0648) | -0.434* (0.096) |
| Constant | -0.759 (0.443) | -0.526 (0.460) | -0.580 (0.559) | -0.607 (0.406) |
| Observations | 2186 | 2186 | 2186 | 2186 |
| Observations subsample | 704 | 708 | 704 | 708 |

Note: Regression of the a dummy (=1 if household still has to cut consumption after shock) on household and district characteristics, in particular financial development. Equations were estimated by a binary probit model with respect to the survey design. The level of significance are denoted by *** p<0.01, ** p<0.05, * p<0.1, p-values in parentheses.

Table 6: Estimation of investment

| VARIABLES | (1) cropcost | (2) cropcost | (3) cropcost | (4) cropcost |
|------------------------|------------------------|------------------------|------------------------|------------------------|
| croparea | 5,749*** (0) | 6,045*** (0) | 5,742*** (0) | 6,026*** (0) |
| iearninc_eqsc | 0.0690 (0.148) | | 0.0690 (0.155) | |
| asset | 151.0 (0.282) | | 152.5 (0.276) | |
| ownland | -873.7*** (0.00183) | -563.5 (0.104) | -927.7*** (0.00156) | -641.2* (0.0764) |
| headage | -36.80 (0.935) | | 66.11 (0.886) | |
| headagesq | -0.0274 (0.994) | | -0.747 (0.844) | |
| iheadeduyr | -413.0 (0.403) | | -349.3 (0.466) | |
| eqsc | -311.2 (0.905) | | -603.4 (0.807) | |
| eqscsq | 1,484 (0.827) | | 1,878 (0.777) | |
| nchild | -1,043 (0.205) | | -989.7 (0.229) | |
| married | -409.2 (0.789) | | -204.5 (0.896) | |
| female | -967.9 (0.446) | | -547.3 (0.653) | |
| dheadocc2 | -3.113 (0.999) | | -165.0 (0.944) | |
| dheadocc3 | -2,558 (0.374) | | -2,619 (0.363) | |
| dheadocc4 | -654.3 (0.870) | | -92.43 (0.981) | |
| dheadocc5 | -4,403 (0.306) | | -4,734 (0.284) | |
| dheadocc6 | -7,224** (0.0389) | -2,807*** (0.00494) | -7,709** (0.0389) | -3,497*** (0.00123) |
| rdefault | 19,644 (0.190) | | 20,355 (0.188) | |
| rlatepay | 2,257 (0.350) | | 1,953 (0.389) | |
| incpp | -0.224 (0.871) | | 0.121 (0.948) | |
| municipaldummy | 1,354 (0.531) | | -56.52 (0.976) | |
| noshopmal | 731.3 (0.225) | | 749.4 (0.287) | |
| noschool | 417.1 (0.300) | | 641.1* (0.0710) | 863.7** (0.0374) |
| nouniversity | 111.4 (0.883) | | 430.6 (0.567) | |
| nofactory | -20.78 (0.264) | | -37.92** (0.0165) | -6.801 (0.134) |
| findev2 | 17,358** (0.0206) | 17,344*** (0.00363) | | |
| findev3 | | | 7,998* (0.081) | 7,429* (0.096) |
| Constant | -8,913 (0.535) | -8,417** (0.0468) | -6,863 (0.634) | -2,531 (0.441) |
| Observations | 2186 | 2186 | 2186 | 2186 |
| R-squared | 0.293 | 0.236 | 0.285 | 0.231 |
| Observations subsample | 1788 | 1806 | 1788 | 1788 |

Note: Regression of crop expenditure on household and district characteristics, in particular financial development. Equations were estimated by a least squares model with respect to the survey design. The level of significance are denoted by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, p-values in parentheses.

7 Figures

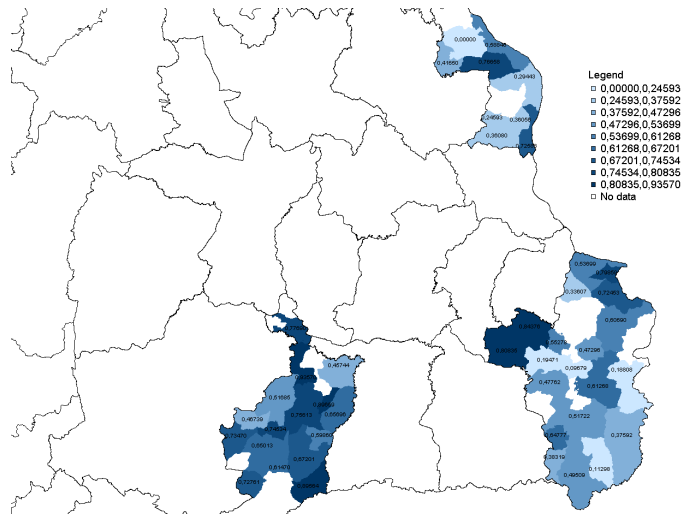


Figure 1: Map of financial development indicator (findevdeg)

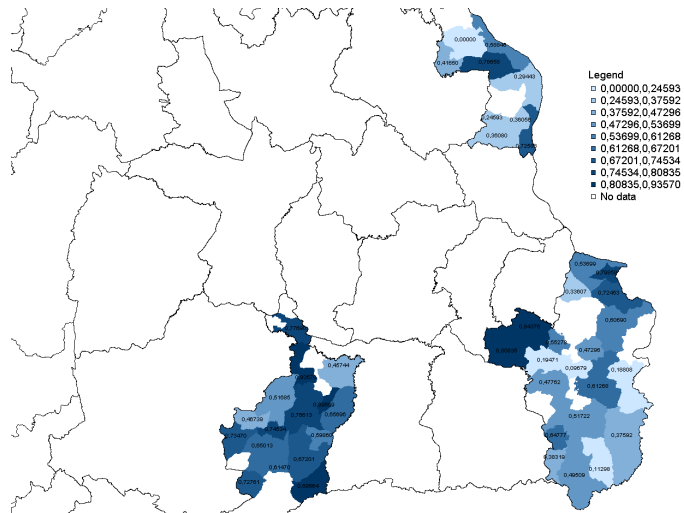


Figure 2: Map of financial development indicator (findevtime)

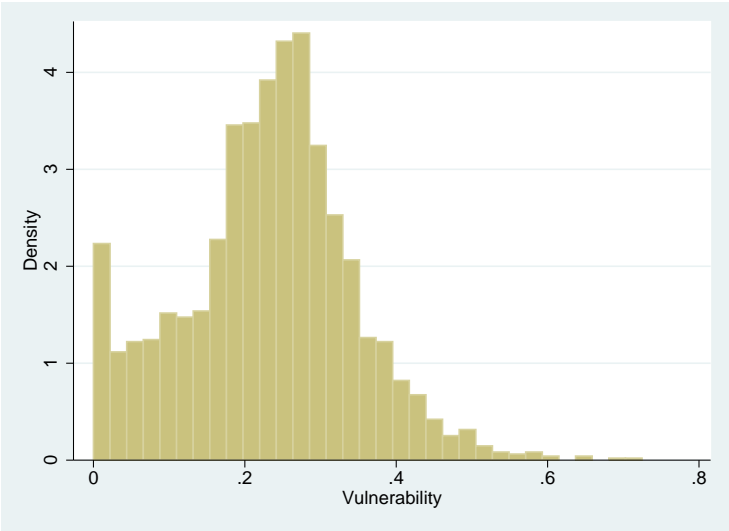


Figure 3: Histogram of vulnerability

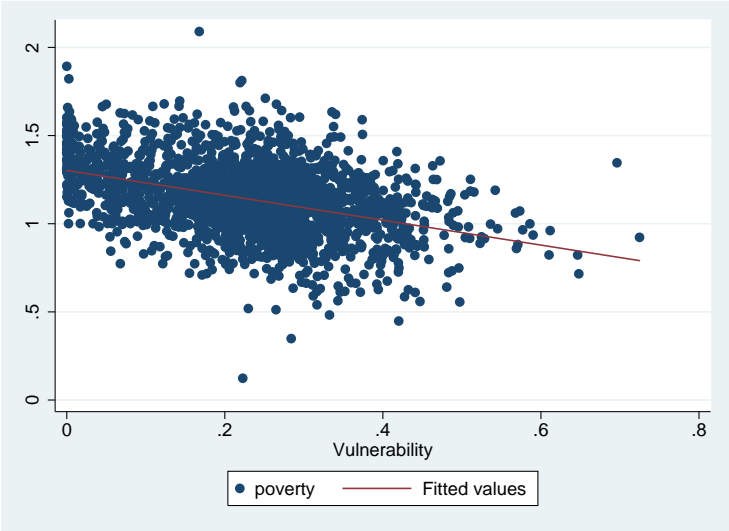


Figure 4: Scatter plot of vulnerability and poverty

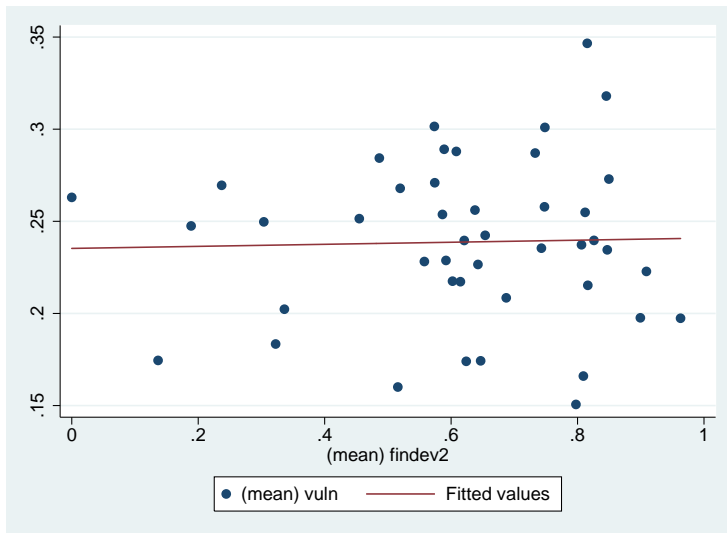


Figure 5: Scatter plot of vulnerability and financial development (findevdeg)

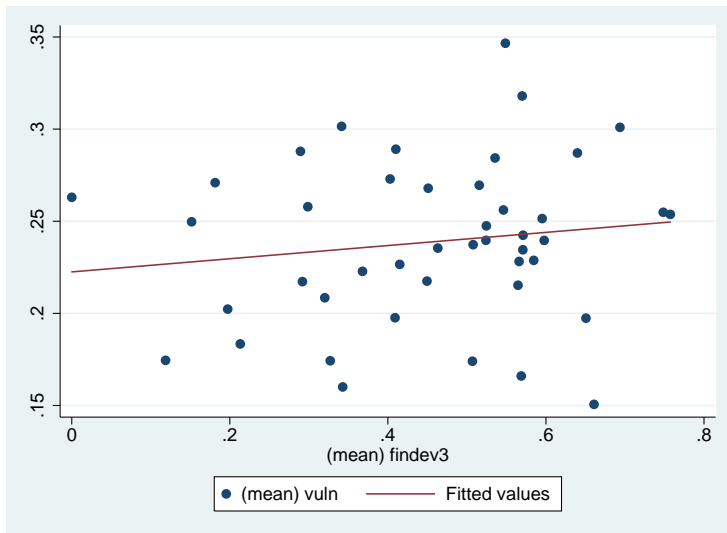


Figure 6: Scatter plot of vulnerability and financial development (findevtime)