The Effectiveness of Credit in Poverty Elimination: an Application to Rural Vietnam [1]

Carol Newman
Department of Economics, Trinity College Dublin

Finn Tarp
Department of Economics, University of Copenhagen

1. Introduction

In low income countries, the economic choices of poor households are often constrained by the inefficient operation of local financial markets (Banerjee and Duflo, 2007). A key issue for developing countries is the extent to which households can access financial products, particularly in the formal sector. In particular, providing access to borrowings that can be put to productive uses has the potential to lead to long term economic growth. Bencivenga and Smith (1993), among others, explore the effect of a reduction in credit rationing on capital accumulation and economic growth. Bose and Cothren (1997) extend this notion further to illustrate that in response to the accumulation of capital, credit will become less rationed, which will in turn lead to further capital accumulation as investment loans become more available. Through this channel, government policies aimed at facilitating access to credit can lead to growth and economic development. The type of credit available, however, will also matter. Modigliani (1986) and Japelli and Pagano (1994) find that the rationing of consumption loans may have a positive effect on development. If consumption loans are not available, households are more likely to save in order to inter-temporarily smooth consumption and will only borrow for investment purposes which will lead to an accumulation of capital. Hung (2005) suggests, therefore, that in some cases a government policy of financial repression, where credit for consumption purposes is rationed, may have positive effects on economic development.

Policies aimed at alleviating poverty, however, should also consider their impact on the very poor. Given that the probability of default is generally negatively correlated with income and wealth, many formal financial institutions may be reluctant to lend to the poor. As such we might expect to find that poor households rely to a greater extent on informal credit sources than non-poor households. If the effectiveness of informal credit in improving outcomes is less than that of credit accessed through formal sources then this may have implications for the role credit can play in alleviating poverty. Aubert et al. (2009) discuss the importance of creating the right incentives for credit agents in financial institutions to acquire information on potential borrowers so that they are selected in accordance with pro-poor policy objectives.[2]

[1] This paper constitutes an in-depth study written under two Danida Viet Nam programs, namely the Business Sector Program Support (BSPS) and the Agricultural and Rural Development Sector Program Support (ARD-SPS) using data collected by the Viet Nam Access to Resources Household Surveys (VARHSs) of 2006 and 2008. We are grateful for very helpful comments and suggestions from Ms Le Xuan Quynh (CIEM) and Ms Pham Thi Lien Phuong (CAP/IPSARD), as well as seminar participants at a workshop held on 11th March 2010 at the Central Institute for Economic Management (CIEM).

[2] Auber et al. (2009) refer in particular to microfinance institutions but their findings can be generalized to other formal financial institutions.

Finally, any discussion of the role and effectiveness of credit should also consider its interaction with other financial markets. The availability of insurance, for example, may help households better manage their exposure to risks thus freeing up credit for productive uses. In the absence of insurance credit may be used instead to buffer against unexpected income losses.[3] The availability of formal savings facilities may also have an effect. Ahlin and Jiang (2008) explore the long-run effects of micro-credit on development. They find that the extent to which the availability of micro-credit can have persistent positive effects on growth and development depends on the extent to which it facilitates the 'graduation' of the self-employed from small scale to large scale production. For positive long-run effects to be realized the self-employed must also have the ability to save the returns to self-employment in order to accumulate wealth.

In Vietnam, formal credit is provided to households in rural areas through two main state-owned banks, the Vietnamese Bank for Social Policies (VBSP) and the Vietnamese Bank for Agriculture and Rural Development (VBARD). The market is also serviced by a small number of other state-owned and private commercial banks. The VBSP behaves much like a social policy tool with a structured lending programme offering low interest credit for targeted categories of households including the poor, the disadvantaged and the disabled. In contrast the VBARD operates on a commercial basis. Households also rely to a large on informal credit available through Rotating Credit and Savings Associations (ROSCAs), socio-political groups such as Women's Unions and Farmer's Unions, and borrowing from friends and relative. The literature suggests that the extent to which the availability of credit will lead to improvements in outcomes and alleviate poverty will depend on: 1) the purpose of the loans obtained; 2) whether they are sourced formally or informally; and 3) the interaction of credit markets with other financial markets such as savings and insurance. In this paper, we attempt to ascertain the extent to which credit markets in Vietnam, across each of these domains, impact on poverty reducing outcomes focusing, in particular, on the role of formal and informal sources of credit and the VBSP and the VBARD in this process. We perform an in-depth analysis of the workings of credit markets in rural Vietnam for the period 2006 and 2008. First, we construct a profile of the types of households that borrow from different sources (formal and informal). Second, we consider whether differences exist in the characteristics of households that borrow for different purposes (investment, consumption etc). We base both analyses on the 2006 Vietnamese Access to Resources Household Survey (VARHS) data. The third part of the empirical investigation analyses the effectiveness of credit in improving outcomes for households who borrow. In order to achieve this, we exploit the panel structure of the 2006 and 2008 VARHS in considering how past loans affect changes in a variety of outcomes that determine welfare such as income, diversification, investment and productivity. We pay close attention to the source of the loans obtained and their purpose. Ultimately, we aim to use our results to help better inform policy in relation to the future development of rural credit markets in Vietnam. It should be noted, however, that this paper does not address the extent to which extending credit is the best approach to alleviating poverty given that other policy instruments are not

[3] Giné and Yang (2009), however, find no evidence of a link between willingness to use loans for technology adoption with the availability of formal insurance using a randomized field experiment in Malawi. They found that households already had other informal risk sharing mechanisms in place in the event of loan default.

considered. Rather, this paper presents evidence on how effective credit, accessed through different sources and for different purposes, is on various welfare outcomes.

The paper is structured as follows. The data are presented in Section 2. Section 3 presents the empirical results from both stages of the analysis. Section 4 provides a summary and policy recommendations.[4] We conclude with a discussion of future work.

2. Data

The data are taken from the Vietnam Access to Resources Household Survey (VARHS) implemented in 2006 and 2008 in 12 provinces in Vietnam.[5] The households for which a full representative panel is available are spread over 437 communes, 130 districts and total 1,200 households. Along with detailed demographic information on household members, the survey includes sections on financial behavior, in particular in relation to borrowing and savings.

Table 1 presents descriptive statistics on the nature and types of loans obtained by households in our sample in 2006.[6] Sixty-six per cent of households have one or more loans in 2006. There is a lot of variability across provinces with 44 per cent of households having a loan in Ha Tay compared with 91 per cent in Lam Dong. This suggests that either access to credit varies across provinces or the needs of households, in terms of credit requirements, differs across provinces. We also compare households by wealth where quintiles are constructed using principal component analysis of the characteristics of the household dwelling place, such as the size and value of the dwelling, energy supply, sanitation facilities and water supply and ownership of durable goods. A greater proportion of households in the lowest wealth quintile (75 per cent) have a loan with loans valuing over 100 per cent of annual income (compared with 77 per cent on average). This suggests that households in this quintile may be over-indebted. This is further validated by the statistics for poor compared with non-poor households, where poor households are defined as those households in the bottom food expenditure quintile.

Almost three-quarters of all loans are through formal institutions although this varies to some extent across provinces. For example, half of loans held by households in Quang Nam and Dak Lak are through the informal sector. Households in the poorest wealth quintile are more likely to rely on informal sources, although 64 per cent of loans taken out by the least wealthy are through the formal sector. On the basis of these statistics it does not appear that access to formal financial institutions is constrained for rural households in these provinces in Vietnam. Rather, they suggest that co-funding of loans by formal and informal institutions may be a feature of

[4] A description of all of the methods used in this paper is provided in the Appendix.

[5] The survey was developed in collaboration between the Development Economics Research Group (DERG), Department of Economics, University of Copenhagen and the Central Institute of Economic Management (CIEM), the Institute for Labour Studies and Social Affairs (ILSSA) and the Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD), Hanoi, Vietnam.

[6] All data expressed in VND are deflated to be made comparable across regions and time with the Red River Delta in 2006 representing the base year and region. Details of the deflators used are provided in the Appendix.

Vietnamese rural credit markets.[7] These statistics are further validated by the results for poor compared with non-poor households. Also of note is the fact that only 8 per cent of households in 2006 and 6 per cent of households in 2008 reported that they received less than they had applied for suggesting that credit is not rationed.

Table 1: Access to Credit 2006

	% hhs with loans	Total amount borrowed as % income	Total amount owed as % of income	Proportion Formal by Purpose				Proportion Informal by Purpose			
				Total	Agricult.	Inv.	Cons.	Total	Agricult.	Inv.	Cons.
Province											
Ha Tay	44.49	75.98	40.49	84.01	38.73	20.17	9.38	15.99	18.25	38.93	16.99
Lao Cai	85.18	80.56	68.47	80.91	63.59	17.37	2.28	19.09	50.82	23.30	23.25
Phu Tho	71.62	59.46	38.35	83.73	52.29	16.71	7.87	16.27	30.94	15.49	38.82
Lai Chau	58.94	32.23	27.37	89.16	63.41	24.09	4.53	10.84	43.57	0.00	31.29
Dien Bien	77.20	42.69	37.49	91.14	71.83	6.94	9.87	8.86	8.96	8.91	73.19
Nghe An	64.69	55.16	31.45	81.40	41.25	19.53	13.96	18.59	22.18	23.42	32.99
Quang Nam	60.60	45.91	29.05	47.78	43.55	16.76	21.12	52.21	29.75	23.80	35.48
Khanh Hoa	58.46	50.01	36.90	58.03	59.37	2.79	12.39	41.97	30.30	0.00	39.72
Dak Lak	76.56	103.90	40.83	50.04	71.97	5.17	9.73	49.96	59.76	15.24	16.33
Dak Nong	75.49	82.99	46.91	71.74	80.75	4.81	6.60	28.26	66.78	12.04	16.71
Lam Dong	91.30	69.92	31.41	61.41	83.11	11.26	3.38	38.59	53.56	8.83	22.23
Long An	77.56	172.35	50.04	77.60	71.01	8.91	3.70	22.40	71.61	13.54	11.34
Wealth Quintile											
Poorest	74.64	104.17	42.86	64.19	74.53	9.38	6.60	35.81	54.85	13.20	28.10
2nd poorest	65.64	78.47	45.36	74.48	66.30	13.56	6.67	25.52	37.19	19.35	35.31
Middle	70.49	65.49	37.85	76.43	50.97	14.79	12.58	23.57	44.87	18.90	23.47
2nd richest	56.62	71.03	40.57	80.73	46.77	16.27	9.60	19.27	35.12	13.94	28.46
Richest	62.68	68.42	28.29	72.15	40.36	21.41	9.33	27.85	30.73	31.04	13.09
Poor[1]	75.70	97.91	63.21	63.37	63.60	9.45	11.68	36.63	49.46	13.32	33.48
Not Poor	63.37	71.00	31.60	75.92	53.06	16.34	9.04	24.08	40.00	21.60	20.82
Total	66.10	76.93	38.54	72.79	55.44	14.79	9.63	27.21	43.09	18.89	24.97

Note: Data are taken from the VARHS 2006 and are based on the five most important loans obtained in the previous five years (2002 to time of survey in 2006). Only households that are also included in the 2008 data are used for comparability with later analysis. Weights are applied in the computation of these statistics and so they are representative of rural households within the provinces surveyed.
[1] Refers to households in the bottom food expenditure quintile.

In terms of the purpose of the loans obtained we consider three different categories, loans used for investment in agriculture, loans used for investment in land and other assets, and loans used for consumption purposes. Investment loans are productive forms of credit which in the future, if invested wisely, should enable the household to improve their welfare (through higher levels of income, productivity, etc.). Consumption loans, on the other hand, are non-productive but may be an important instrument for smoothing consumption in the face of an exogenous shock. As discussed in Section 1, evidence from the literature suggests that facilitating

[7] Barnebeck Anderson and Malchow-Moller (2006) analyse the strategic interaction between formal and informal lenders in undeveloped credit markets and show that under certain circumstances loans will be co-funded. Our descriptive statistics appear to support this finding.

investment loans can lead to long run growth while flexibility in the availability of consumption loans can have negative effects on development (Hung, 2005). Unsurprisingly, we find that a greater proportion of informal credit is used for consumption purposes. This may be due to the fact that access to credit through formal financial institutions may require households to have a clear plan as to what they will use the money for. Productive investments that have the potential to yield a return are justifiable in this setting given that the return will cover the interest payments. In contrast, credit for consumption may serve to worsen the financial situation of households, particularly if interest payments are high. Informal loans for consumption purposes are more prevalent among poor households. Furthermore, poor households are more likely to use formal loans for agricultural purposes than for other investment opportunities.

Given the importance of the VBSP and VBARD to rural credit markets, in Table 2 we present similar descriptive statistics for loans from these sources disaggregated by poor and non-poor households. VBARD loans account for 46 per cent of total formal credit accessed by households in our survey while VBSP loans account for 35 per cent. This highlights the importance of these two sources of formal credit for rural households in Vietnam. In general we find that VBSP loans are used more for agricultural investment and consumption purposes than loans from the VBARD. Of particular note is the fact that poor households rely on the VBSP to a much greater extent than non-poor households (55 per cent compared with 29 per cent, respectively). It is also of interest to note that VBSP loans to poor households are more likely to be for agriculture or consumption compared with VBSP loans to non-poor household. Overall, it appears from these statistics that poor households rely on the VBSP for access to formal credit, particularly for agricultural investments and consumption loans.[8] The determinants of access to credit and the effectiveness of credit are explored further in the empirical analysis presented in the Section 3. Particular focus is placed on the role of credit in enhancing the economic situation of the poor.

Table 2: Access to Credit 2006 (VBSP vs. VBARD)

	% VBSP in Total Formal	% VBARD in Total Formal	Proportion VBSP by Purpose				Proportion VBARD by Purpose			
			Agricult.	Inv.	Cons.	Other.	Agricult.	Inv.	Cons.	Other.
Poor[1]	54.5	27.54	72.47	8.49	11.94	7.10	57.15	16.26	8.08	18.52
Not Poor	28.70	51.84	66.81	13.17	9.03	10.98	57.35	19.16	9.30	14.18
Total	35.03	45.82	68.94	11.41	10.13	9.51	57.32	18.70	9.11	14.87

Note: As for Table 1.

3. Empirical Analysis

3.1 Access to Credit

[8] The extent to which this is demand driven or is associated with the specific targeted policies of the VBSP cannot be deciphered from this analysis. Further investigation into the supply side of credit markets will be required in order to determine the extent to which poor households have limited access to formal credit other than the VBSP.

In order to construct a profile of the households that borrow we perform a number of different regression analyses. We estimate a probit model of the determinants of the probability of a household accessing credit and disaggregate this to consider the determinants of access to credit from formal and informal sources separately. This requires the construction a bivariate probit model that estimates the determinants of both outcomes simultaneously. Estimating these models simultaneously allows the factors that determine formal and informal credit to be jointly determined controlling for correlations between the unobserved components of each individual probit equation.[9] We also explore access to formal credit further by analyzing the determinants of access to VBSP loans and VBARD loans separately, also within a bivariate probit framework.

The explanatory variables considered in each model are described in the Appendix. The results of the probit models are presented in Table 3. The dependent variable in the probit model presented in column (1) is a dummy indicator for whether the household had a loan (from either formal or informal sources) in any of the 5 years prior to 2006. Income is not an important factor in determining whether a household had loans however wealth does appear to be an important factor. This may be due to the fact that household wealth can be used as collateral and so wealthier households are more likely to have access to credit. Income or ability to repay, on the other hand, does not appear to be an important factor. This is further evidenced by the fact that poor households, in the bottom food expenditure quintile, are more likely to have loans. There is some evidence that households where the head of household has a higher level of education are associated with a higher probability of having loans, however, this effect disappears for the highest education levels. This may be due to the fact that households with higher levels of education potentially have greater access to information regarding financial institutions and may be more likely to understand loan application procedures. This possibility will be explored further once the results are disaggregated by the source of credit. Households with older household heads are less likely to have loans, consistent with the lifecycle model of consumption and saving. The greater the proportion of active household members who work, the less likely the household is to have loans. We also find that households with savings are less likely to have loans. Combined, these results suggest that some households choose to either diversify their income (through more active household participants earning an income) or save, rather than relying on credit. The greater the land area owned by the household the more likely they are to have loans suggesting that having collateral may be an important determinant of access. We find that households that suffered an idiosyncratic shock are more likely to have loans suggesting that credit might be an important coping mechanism in the face of idiosyncratic adverse income shocks.

In columns (2) and (3) we disaggregate loans by source (formal and informal). This model is estimated within a bivariate probit framework to control for correlations in the unobserved components of each individual model. The first important difference between households accessing formal credit and informal credit is that poorer households are more likely to have informal credit. While education does not appear to affect the probability of having informal loans it has a positive and significant effect on the probability of having formal loans, although not at the highest education

[9] Details of the methodological approach are provided in the Appendix.

levels. This is consistent with our suggestion that more educated households may have more information regarding formal credit institutions and may be better able to understand the application process. The total land area owned has a positive and significant effect on access to *formal* credit, which is consistent with our suggestion that land an important source of collateral for accessing formal credit. Barslund and Tarp (2003) find a similar result in their analysis of a sample of 932 households from rural Vietnam in 2002. They highlight a statistically significant difference in total land holdings among households that were approved for formal loans compared with those that were rejected. On the basis of our results, the importance of land holdings for access to credit, in particular, formal credit appears to still hold. Households suffering idiosyncratic shocks are more likely to have both forms of credit although the magnitude of the effect is larger for informal loans. We also find that households suffering income shocks due to natural disasters are more likely to have loans from formal sources.

Table 3: Access to Credit

	Probit	Bivariate Probit		Bivariate Probit	
	Credit	Formal Credit	Informal Credit	VBSP Loans	VBARD Loans
	(1)	(2)	(3)	(4)	(5)
Constant	0.722* (0.412)	-0.071 (0.388)	-0.372 (0.486)	-1.074** (0.450)	-1.014** (0.398)
Income	-0.0003 (0.001)	0.0001 (0.001)	0.0005 (0.001)	-0.002 (0.002)	0.001 (0.001)
Poor	0.247** (0.112)	0.023 (0.102)	0.254** (0.110)	0.260** (0.110)	-0.302*** (0.110)
Wealth Quint 2	-0.037 (0.135)	0.077 (0.126)	-0.015 (0.136)	0.133 (0.137)	-0.110 (0.135)
Wealth Quint 3	0.112 (0.137)	0.112 (0.126)	0.055 (0.136)	0.079 (0.141)	0.081 (0.130)
Wealth Quint 4	-0.078 (0.146)	0.079 (0.137)	-0.286* (0.156)	0.159 (0.159)	-0.076 (0.141)
Wealth Quint 5	-0.033 (0.153)	-0.018 (0.144)	-0.061 (0.158)	0.029 (0.178)	0.016 (0.147)
Education 2	0.196* (0.118)	0.363*** (0.111)	-0.167 (0.122)	0.112 (0.128)	0.242** (0.116)
Education 3	0.323*** (0.119)	0.453*** (0.111)	-0.047 (0.122)	0.224* (0.128)	0.356*** (0.115)
Education 4	0.130 (0.155)	0.256* (0.148)	-0.219 (0.168)	0.273 (0.176)	0.236 (0.152)
Education 5	0.134 (0.287)	0.245 (0.281)	0.109 (0.326)	-0.506 (0.482)	0.122 (0.288)
Age	-0.007** (0.003)	-0.003 (0.003)	-0.009** (0.003)	-0.003(0.004)	0.005* (0.003)
HHsize	0.019 (0.026)	0.059** (0.024)	-0.038 (0.027)	0.021 (0.027)	0.042* (0.025)
HH_work_prop	-0.736** (0.299)	-0.630** (0.278)	-0.0003 (0.327)	-0.324 (0.321)	-0.319 (0.277)
Formal Saving	-0.350** (0.176)	-0.350** (0.177)	-0.358* (0.210)	-0.320 (0.250)	-0.277 (0.188)
Informal Saving	-0.102 (0.141)	-0.018 (0.136)	-0.253 (0.159)	-0.007 (0.170)	0.078 (0.135)
Home Saving	-0.198** (0.093)	-0.153* (0.088)	-0.233** (0.100)	-0.223* (0.105)	-0.075 (0.092)
Total Area Owned	0.006* (0.003)	0.009*** (0.003)	-0.003 (0.003)	0.002 (0.001)	0.0005 (0.001)
Shock: Natural	0.110 (0.095)	0.177** (0.089)	0.119 (0.097)	0.216** (0.101)	0.018 (0.092)
Shock: Economic	-0.068 (0.472)	0.370 (0.401)	0.132 (0.377)	...	...
Shock: Idiosyncratic	0.471*** (0.111)	0.224** (0.099)	0.545*** (0.103)	0.306*** (0.112)	0.133 (0.098)
Province Dummies	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-668.17	-1,350.95		-1,223.66	
N	1,233	1,233		1,233	

Standard errors are given in parenthesis, *** denotes significance at the 1 per cent level, ** denotes significance at the 5 per cent level, * denotes significance at the 10 per cent level.
Economic shocks are excluded from the bivariate probit model of VBSP vs. VBARD loans as no households with VBSP loans suffered an economic shock causing perfect multicollinearity in the model.

In columns (4) and (5) we focus on the factors related to households' decisions to access credit via the VBSP and the VBARD. The dependent variable in the model presented in column (4) takes a value of one if the household has a loan specifically with the VBSP and zero otherwise. Similarly, the dependent variable in the model

presented in column (5) takes a value of one if the household has a loan specifically with the VBARD and zero otherwise. The determinants of loans from the VBSP are similar to those for informal credit (column (3)). As expected, poor households are more likely to have loans with the VBSP and are less likely to have loans with the VBARD. The expected effect of age and households size on access to formal credit is evident for the VBARD loans but not for loans from VBSP. Education is an important factor for accessing VBARD loans but less so for loans from the VBSP. We also find that households suffering adverse income shocks rely greatly on loans from the VBSP but not at all from the VBARD. Overall these results are consistent with what we might expect given that the VBSP offers structured lending at low interest rates for those in need. In contrast, the VBARD operates on a commercial basis with the expected access constraints for poor, less educated households evident.

Overall, these results suggest that while access to credit in rural Vietnam is very high, the sources of credit vary considerably across different household groups. If the effectiveness of obtaining credit on welfare outcomes varies by source of loan (formal/informal, VBSP/VBARD) then this may have important consequences for policies aimed at reducing poverty. This is particularly the case since informal credit is more associated with poorer and less educated households, while formal credit is more associated with educated and wealthier households. Furthermore, the only source of formal credit accessible by the poor is through the VBSP.

3.2 Use of Loans

To further consider the profile of households accessing credit (in 2006) we analyze the factors determining the use of the loans accessed by households. Since households may hold many loans for different purposes we construct a variable which measures the share of total loans held by the household by purpose. We consider four separate budget shares, the share used for agricultural investment, the share used for investment in assets and land, the share used for consumption and an 'other' category that encompasses all other types of uses for loans. Using the share of total loans by purpose rather than the value of loans by purpose allows us to reveal trade-offs between the different purposes for which credit is used. For example, are certain households more likely to access credit for agricultural investments than consumption? If all households in our sample accessed credit then these models could be estimated using standard regression techniques. However, since not all households borrow and those that do are a selected sample, the standard ordinary least squares approach will yield biased and inconsistent estimates of the parameters. In other words, using standard techniques, the factors that determine whether the household has access to credit are not controlled for when considering the determinants of the purpose of the loans. We can control for selection bias using a Heckman sample selection model where in the first stage we model the probability of having a loan and use the inverse mills ratio, constructed from the parameter estimates of this first stage model, to correct for sample selection in the second stage. Details of this approach can be found in the Appendix.

We run a Heckman sample selection model for the proportional amount of credit attributable to each source that controls for the factors determining access to credit. The dependent variables considered are: 1) the share of credit for agriculture investment; 2) the share of credit used for investments in land and other assets; 3) the share of credit used for consumption purposes and 4) an 'other' category which

includes non-farm activity, repayment of other loans and other purposes. The model is estimated only for households with loans in 2006. The results are presented in Table 4.

Table 4: Heckman Sample Selection models of loans by purpose (proportion of credit by purpose)

	Agriculture Investment	Land and Asset Investment	Consumption	Other
Constant	0.709*** (0.233)	-0.057 (0.143)	0.351*** (0.125)	0.033 (0.226)
Income	-0.001 (0.001)	0.0003 (0.0003)	-0.0003 (0.0003)	0.001* (0.0005)
Poor	-0.100* (0.057)	-0.024 (0.034)	0.046 (0.030)	0.084 (0.055)
Wealth Quint 2	-0.002 (0.061)	-0.011 (0.036)	0.022 (0.032)	-0.019 (0.059)
Wealth Quint 3	-0.121** (0.062)	0.002 (0.036)	0.012 (0.032)	0.096 (0.060)
Wealth Quint 4	-0.131* (0.068)	0.014 (0.041)	0.045 (0.036)	0.057 (0.066)
Wealth Quint 5	-0.159** (0.072)	0.069 (0.044)	0.001 (0.038)	0.076 (0.070)
Education 2	-0.080 (0.057)	0.013 (0.034)	-0.007 (0.030)	0.066 (0.055)
Education 3	-0.165** (0.065)	0.011 (0.039)	-0.009 (0.034)	0.160** (0.063)
Education 4	-0.113 (0.075)	0.090* (0.045)	-0.018 (0.040)	0.060 (0.073)
Education 5	-0.157 (0.145)	-0.008 (0.089)	0.056 (0.078)	0.163 (0.140)
Age	0.0003 (0.002)	-0.0005 (0.001)	0.002*** (0.001)	-0.002 (0.002)
HHsize	0.018 (0.012)	0.0004 (0.007)	-0.019*** (0.006)	0.0003 (0.012)
HH_work_prop	0.370** (0.160)	0.122 (0.096)	-0.166** (0.084)	-0.320** (0.154)
Total Area Owned	0.0003 (0.0006)	-0.0003 (0.0003)	-0.0005 (0.003)	0.001 (0.001)
Shock: Natural	0.084** (0.035)	-0.032 (0.024)	-0.032 (0.021)	-0.015 (0.034)
Shock: Economic	0.082 (0.162)	-0.074 (0.104)	-0.058 (0.090)	0.066 (0.156)
Shock: Idiosyncratic	-0.191*** (0.068)	0.021 (0.041)	0.144*** (0.036)	0.023 (0.066)
Province Dummies	Yes	Yes	Yes	Yes

Note: Standard errors are given in parenthesis, *** denotes significance at the 1 per cent level, ** denotes significance at the 5 per cent level, * denotes significance at the 10 per cent level. Results for the selection equation are not presented but are available on request. The total number of observations is 1,233. The number of censored observations is 914.

Income is found to have a significant positive effect on the share of credit used for 'other' purposes (such as business expansion, for example) suggesting that these activities are more associated with higher income households. We also find that households in the upper wealth quintiles hold a smaller proportion of loans for the purpose of investing in agriculture.[10] The higher the education level of the head of household the lower the share of credit used for agricultural investments. In contrast, there is some evidence to suggest that higher education levels are associated with holding a greater share of credit for 'other' activities. Older households are more likely to access credit for consumption purposes. This may suggest that the elderly are more at risk of poverty given that they are more likely to rely on credit for consumption. Larger households and households with a greater proportion of active household members in employment are more likely to hold a greater share of credit for agricultural investments. They also hold a smaller share of credit for consumption purposes. This suggests that larger, more diversified, households are less exposed to the risk of relying on credit for consumption purposes. Households that have suffered an income shock due to a natural disaster hold a greater share of credit for agricultural investments. This is not surprising given that in the wake of a natural disaster farmers

[10] The results for households in the lower food expenditure quintiles are in slight contrast to this suggesting that poorer households in terms of per capita food expenditure hold fewer loans for agricultural purposes, although the result is only weakly significant.

are more likely to need to invest in rebuilding their farming activities. Households that suffer an idiosyncratic shock hold a greater proportion of credit for consumption purposes suggesting that credit is an important coping mechanism in the face of income shocks.

The analysis presented in this section highlights the very different roles that credit plays in the lives of rural Vietnamese households. The use of the loans obtained varies significantly by household characteristics. High income households and more educated households are more likely to use credit to invest in land or assets or other non-farm activities such as enterprise development. The non-productive use of credit, i.e. for consumption purposes, is associated with older households and those who have faced an idiosyncratic adverse income shock. These observations suggest that understanding the effectiveness of credit in improving outcomes will be important in the design of policies aimed at improving rural credit markets. In particular, it is important to understand the extent to which the source of credit obtained, and how those funds are used, impacts on outcomes for different household groups.

3.3 Effectiveness of Credit

Having established the profile of the households that borrow and the reasons why they borrow, we proceed to the third stage of the analysis. Here we attempt to establish the extent to which access to credit improves outcomes. In particular, we focus on poverty reducing determinants such as income, specialization, investment and productivity. These models, however, suffer from a potential endogeneity problem due to the fact that the unobserved factors that affect each dependent variable may be correlated with the unobserved factors that determine whether a household has access to credit leading to biased parameter estimates unless the unobserved factors are controlled for in the model. We address this issue in two ways. First, we use the selected sample of households who have access to credit in analyzing the impact of the amount of credit on outcomes. We control for access to credit using a Heckman sample selection model where the determinants of access to credit are estimated in the first stage (as in Table 3) and use the inverse mills ratio, constructed from the parameter estimates of this model, to correct for sample selection in the second stage. Where we consider the different effects of formal compared with informal credit we restrict our sample to households who have access to credit and control for sample selection associated with access to formal financial institutions. Similarly, where we disaggregate formal credit into credit accessed through the VBSP, the VBARD and 'other' financial institutions (including other state-owned commercial banks, local authorities, private banks, people's credit funds and local authorities) we restrict our sample to households who have access to formal financial institutions and control for sample selection associated with households who access *commercial* financial institutions.

Second, we estimate the second stage model using first differences thus controlling for any unobserved time invariant heterogeneity that is specific to the household. This may include, for example, the household's level of risk aversion which may affect both changes in outcomes and access to credit.[11] As a further control for differences in the level of financial prudence across households (which may affect both outcomes and willingness to borrow) we draw on the extensive information included in the data on shocks and risk-coping. We include an indicator variable for whether the

[11] In most inter-temporal utility maximising models, risk aversion is assumed to be constant across time thus validating the use of this assumption here.

household experienced an income shock between 2006 and 2008 to control for exogenous factors that may require households to borrow more (or exert more financial prudence). We also include an indicator for whether the household managed to fully recover from prior income shocks to capture the household's financial management capabilities. We also include controls for changes in observable factors such as wealth, the number of working household members, etc. The full list of variables considered is provided in the Appendix along with a more detailed exposition of the methodological approach. As in the first stage of our analysis we are particularly interested in the differential effects for poor vs. non-poor households and so, where possible, disaggregate the results for these groups.

Income

We first consider the impact of having credit in 2006 on the change in annual household income between 2006 and 2008. We include controls for changes in wealth, household size, the proportion of active household members who work, whether the household experienced an adverse income shock between these years and whether the household has recovered from a prior income shock. The results for total household income are presented in Table 5.1a. After controlling for sample selection, we find that the amount of credit held in 2006 has a positive and significant effect on the change in annual income between 2006 and 2008. As discussed above, in order to consider the different effects that formal and informal credit may have on income, we must control for the fact that the unobserved factors that influence whether a household has access to *formal* credit may also influence household income changes. For example, it may be the case that households accessing formal credit have greater income earning ability than those that rely more on informal credit potentially biasing our results. Restricting our sample to households who access credit and controlling for access to *formal* credit using the Heckman selection approach will correct for these potential biases. In column (2) we find that the positive effect of credit on income levels is driven by credit obtained from formal sources. In column (3) we find no significant difference in the source of the formal credit obtained.[12] The purpose of the loan obtained also matters. The amount of credit used for investment in land and other assets has a negative effect on income while loans obtained for 'other' purposes have a positive and significant effect. The former may be explained by the fact that returns to capital investments may take longer to realize and so may not be reflected in income changes for some time. Column (5) reveals that these effects only hold for formal credit.

The results for the control variables are also of interest. We find a positive and significant relationship between household wealth and income changes and the proportion of working household members and income changes. Both are in line with expectations. We do not find any other control variables of statistical significance.

[12] In this model we restrict our sample to households who access *formal* credit and control for the fact that the unobserved factors that determine access to *commercial formal* credit as compared with VBSP credit may be also correlated with income changes.

Table 5.1a: Effect of credit on total income (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	-9.381 (15.322)	15.857** (7.480)	13.518 (11.141)	-10.213 (15.335)	-12.743 (15.590)
Total credit obtained	0.065* (0.038)				
Formal credit		0.089*** (0.032)			
Informal credit		-0.181 (0.176)			
Formal (VBSP)			-0.999 (1.246)		
Formal (VBARD)			0.066 (0.063)		
Formal (Other)			0.128 (0.087)		
Credit (Agriculture)				-0.002 (0.096)	
Credit (Land/Asset)				-0.266*** (0.082)	
Credit (Cons.)				-0.134 (0.320)	
Credit (Other)				0.134*** (0.042)	
Formal (Agriculture)					0.096 (0.136)
Formal (Land/Asset)					-0.310*** (0.104)
Formal (Cons.)					-0.085 (0.613)
Formal (Other)					0.149*** (0.044)
Informal (Agriculture)					-0.070 (0.247)
Informal (Land/Asset)					-0.204 (0.225)
Informal (Cons.)					-0.160 (1.192)
Informal (Other)					-0.094 (0.353)
Poor (2006)	-1.358 (5.597)	-0.471 (5.075)	-1.526 (8.756)	-2.639 (5.605)	-1.675 (5.666)
Wealth quintile (change)	5.750*** (2.028)	6.229*** (1.767)	5.891*** (2.173)	6.257*** (2.012)	6.301*** (2.029)
HH_work_prop (change)	36.99*** (12.599)	32.14*** (11.107)	40.932 (14.819)	37.297*** (12.50)	37.978*** (12.58)
HHsize (change)	-1.073 (2.158)	-0.936 (1.860)	-1.942 (2.695)	-1.222 (2.137)	-1.203 (2.138)
Shock: Natural	-0.727 (4.701)	1.812 (4.221)	5.462 (5.926)	-1.199 (4.675)	-1.663 (4.691)
Shock: Economic	6.696 (7.233)	6.761 (6.356)	9.381 (8.344)	6.661 (7.172)	6.193 (7.179)
Shock: Idiosyncratic	1.221 (6.828)	1.160 (6.179)	4.714 (8.479)	1.805 (6.759)	1.699 (6.770)
Recovered from shock	3.289 (5.281)	0.381 (4.657)	0.229 (6.410)	3.151 (5.252)	3.489 (5.292)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	1,220	859	714	1,220	1,220

Note: Standard errors are given in parenthesis, *** denotes significance at the 1 per cent level, ** denotes significance at the 5 per cent level, * denotes significance at the 10 per cent level. Heckman Sample Selection Model. The results for the selection equation for each model are available on request.

Given the focus of this paper we also consider the impact of credit on poor households in isolation.[13] The results are presented in Table 5.1b. We find a very different relationship between loans and changes in income for poor households. We find a larger positive and significant effect of credit on income changes. Once we disaggregate credit into formal and informal credit, and include the relevant controls for selection bias, we find that only informal credit has a significant effect on income changes. We cannot distinguish between the effectiveness of different sources of credit which is not surprising given that formal credit does not significantly affect income changes for poor households. The most important purpose for which credit is accessed is investment in agriculture, through both formal and informal sources. There is also some evidence to suggest that credit accessed for consumption purposes, through informal sources has a positive effect on household income. In fact, the inclusion of this disaggregation renders the coefficient on idiosyncratic shocks positive and significant suggesting that informal credit may be an important mechanism for smoothing income and possibly consumption in the face of such income shocks. The control variables are also different for poor households. Changes

[13] We define poor households as those in the bottom food expenditure quintile.

in wealth and the proportion of adults working do not appear to impact on income changes while changes in household size have a positive and significant effect. We also find that poor households are more likely to suffer significant income losses due to economic shocks.

Table 5.1b: Effect of credit on total income (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	2.944 (6.279)	8.570 (6.941)	10.194 (12.666)	0.245 (6.133)	3.044 (6.137)
Total credit obtained	0.496*** (0.114)				
Formal credit		0.127 (0.178)			
Informal credit		0.802*** (0.197)			
Formal (VBSP)			-0.897 (1.069)		
Formal (VBARD)			0.218 (0.270)		
Formal (Other)			0.222 (0.782)		
Credit (Agriculture)				0.644*** (0.111)	
Credit (Land/Asset)				0.108 (0.281)	
Credit (Cons.)				0.523** (0.228)	
Credit (Other)				-0.168 (0.182)	
Formal (Agriculture)					0.617*** (0.171)
Formal (Land/Asset)					0.259 (0.408)
Formal (Cons.)					0.227 (0.441)
Formal (Other)					-0.090 (0.198)
Informal (Agriculture)					0.768*** (0.161)
Informal (Land/Asset)					1.240 (1.052)
Informal (Cons.)					1.295* (0.732)
Informal (Other)					-1.533 (3.838)
Wealth quintile (change)	-1.979 (2.018)	-2.080 (2.342)	-4.086 (3.940)	-2.757 (1.975)	-2.780 (2.006)
HH_work_prop (change)	13.677 (11.611)	17.185 (17.251)	51.655* (27.259)	8.806 (11.252)	9.031 (11.355)
HHsize (change)	5.459*** (1.252)	5.829*** (1.441)	7.981** (3.537)	6.163*** (1.217)	6.119*** (1.217)
Shock: Natural	0.584 (2.323)	1.030 (2.845)	5.335 (5.866)	0.850 (2.243)	0.540 (2.248)
Shock: Economic	-7.178** (3.342)	-9.255** (4.181)	-15.394** (7.502)	-6.523** (3.224)	-7.570** (3.311)
Shock: Idiosyncratic	4.289 (3.679)	5.721 (4.628)	5.817 (8.537)	6.147* (3.561)	5.415 (3.598)
Recovered from shock	2.103 (2.680)	2.573 (3.225)	6.541 (6.481)	1.978 (2.576)	2.189 (2.632)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	297	231	177	297	297

Note: As for Table 5.1a.

To further explore the effects of access to credit we disaggregate income changes into three different components: agricultural income, rental income and non-farm income.[14] The results for agricultural income are presented in Tables 5.2a and 5.2b. The overall amount of credit held in 2006 does not have a statistically significant effect on the change in agricultural income between 2006 and 2008. We do find, however, that formal credit accessed through other sources (i.e. from formal sources other than the VBSP and the VBARD) has a positive and significant effect. Once the purpose of the loans is taken into account we find that loans used for investment in agriculture from formal sources have a positive and significant effect on the change in agricultural income. In contrast, loans obtained for investment in land and assets (from formal sources) have a negative effect on agricultural income. This suggests that households using loans for investment in land and assets are possibly moving

[14] We also considered the impact of credit on wage income but no statistically significant relationship was found.

away from agriculture as their source of income, choosing to invest in alternative activities.

Table 5.2a: Effect of credit on agricultural income (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	9.241* (4.994)	5.489* (3.110)	-1.101 (4.650)	9.108* (4.932)	6.586 (4.920)
Total credit obtained	0.013 (0.013)				
Formal credit		0.010 (0.013)			
Informal credit		0.007 (0.072)			
Formal (VBSP)			0.170 (0.494)		
Formal (VBARD)			-0.019 (0.026)		
Formal (Other)			0.071** (0.037)		
Credit (Agriculture)				0.123*** (0.031)	
Credit (Land/Asset)				-0.107*** (0.027)	
Credit (Cons.)				-0.135 (0.104)	
Credit (Other)				0.013 (0.014)	
Formal (Agriculture)					0.249*** (0.044)
Formal (Land/Asset)					-0.097*** (0.034)
Formal (Cons.)					-0.029 (0.199)
Formal (Other)					0.013 (0.014)
Informal (Agriculture)					0.013 (0.079)
Informal (Land/Asset)					-0.025 (0.074)
Informal (Cons.)					-0.148 (0.384)
Informal (Other)					0.065 (0.117)
Poor (2006)	-3.034* (1.819)	-0.396 (2.109)	-6.176* (3.638)	-2.940* (1.793)	-1.994 (1.771)
Wealth quintile (change)	0.845 (0.666)	0.457 (0.727)	0.664 (0.883)	0.835 (0.659)	0.677 (0.658)
HH_work_prop (change)	-2.385 (4.125)	-5.928 (4.588)	-7.556 (6.098)	-2.277 (4.059)	-2.430 (4.031)
HHsize (change)	0.282 (0.709)	0.202 (0.768)	0.837 (1.080)	0.206 (0.699)	0.216 (0.692)
Shock: Natural	1.734 (1.544)	0.918 (1.737)	1.273 (2.375)	1.165 (1.528)	0.766 (1.519)
Shock: Economic	3.414 (2.373)	1.985 (2.619)	2.020 (3.345)	3.249 (2.340)	2.943 (2.318)
Shock: Idiosyncratic	0.506 (2.244)	0.397 (2.541)	2.262(3.417)	0.652 (2.212)	0.495 (2.197)
Recovered from shock	1.741 (1.728)	0.264 (1.920)	-0.684 (2.608)	1.321 (1.704)	1.982 (1.694)
Province Dummies	Yes	Yes	Yes	Yes	Yes
N	1,220	859	714	1,220	1,220

Note: As for Table 5.1a.

We further explore the extent to which access to credit impacts on agricultural income by considering poor households in isolation. The results are presented in Table 5.2b. For poor households, only the level of formal credit has a positive and significant effect on changes in income, however, we cannot determine which source of formal credit is of most importance. Credit accessed for agricultural investment, through both formal and informal sources, has a positive and significant effect on the change in agricultural income.

Table 5.2b: Effect of credit on agricultural income (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	-0.477 (3.869)	1.750 (4.229)	-0.060 (7.133)	-1.308 (3.865)	-2.109 (3.856)
Total credit obtained	0.222*** (0.070)				
Formal credit		0.222** (0.112)			
Informal credit		0.155 (0.124)			
Formal (VBSP)			0.223 (0.606)		
Formal (VBARD)			0.234 (0.154)		
Formal (Other)			-0.058 (0.444)		
Credit (Agriculture)				0.278*** (0.070)	
Credit (Land/Asset)				0.022 (0.177)	
Credit (Cons.)				0.151 (0.144)	
Credit (Other)				-0.068 (0.115)	
Formal (Agriculture)					0.441*** (0.107)
Formal (Land/Asset)					0.141 (0.255)
Formal (Cons.)					0.446 (0.278)
Formal (Other)					-0.055 (0.124)
Informal (Agriculture)					0.186* (0.102)
Informal (Land/Asset)					0.574 (0.655)
Informal (Cons.)					0.462 (0.458)
Informal (Other)					-0.106 (2.395)
Wealth quintile (change)	-0.247 (1.244)	-0.917 (1.455)	-0.748 (2.226)	-0.623 (1.245)	-0.840 (1.260)
HH_work_prop (change)	8.493 (7.154)	16.329 (10.606)	40.359*** (15.28)	6.825 (7.089)	7.076 (7.137)
HHsize (change)	0.762 (0.771)	1.071 (0.897)	0.763 (2.015)	1.087 (0.769)	1.112 (0.760)
Shock: Natural	2.220 (1.430)	2.524 (1.781)	7.755** (3.349)	2.357* (1.417)	2.298* (1.404)
Shock: Economic	1.319 (2.059)	0.558 (2.587)	1.365 (4.271)	1.677 (2.036)	1.358 (2.071)
Shock: Idiosyncratic	1.070 (2.266)	0.444 (2.915)	1.415 (4.875)	1.791 (2.250)	2.282 (2.461)
Recovered from shock	0.482 (1.651)	0.242 (2.017)	2.691 (3.691)	0.380 (1.626)	0.383 (1.649)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	297	231	177	297	297

Note: As for Table 5.1a.

The effect of credit on rental income is explored in Tables 5.3a and 5.3b. Overall, the amount of credit held in 2006 has a negative and significant effect on the change in rental income between 2006 and 2008. However, as revealed in Column (2), this negative effect is driven entirely by formal credit (accessed through sources other than the VBSP and VBARD – see Column (3)). Once credit is disaggregated by purpose of the loan we find that credit obtained for investment in land and assets has a positive effect, as might be expected, while credit obtained for other purposes has a negative effect. The former is driven entirely by credit accessed through informal sources while the latter is driven by credit accessed through formal sources. Two possible explanations for this finding are that: 1) returns to buying land take longer to realize and so we may not see any effect (or even a negative effect) for some time after the credit has been obtained and the land transaction has been made; and 2) the amount required to purchase land are so high that formal financial institutions are less likely to offer loans for this purpose and as a result households tend to rely on loans from the informal sector. The negative effect of credit accessed for 'other' purposes on rental income suggests that households accessing this type of credit are moving away from the rental of land and other assets as a source of income. This is also evidenced in Table 5.4a where we find that credit obtained for 'other' purposes has a positive effect on non-farm, non-wage income. It is interesting to note that the positive effect on rental income of credit obtained for the purpose of investing in land and assets is

driven by credit obtained in the informal sector (Table 5.3a, Column (5)) while the positive effect of credit obtained for 'other' purposes on non-farm, non-wage income is driven by credit obtained in the formal sector (Table 5.4a, Column (5)), and in particular, sources other than the VBSP and VBARD (Table 5.4a, Column (3)).

Table 5.3a: Effect of credit on rental income (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	1.338 (1.435)	2.457*** (0.875)	1.954 (1.386)	1.311 (1.427)	0.843 (1.408)
Total credit obtained	-0.013*** (0.004)				
Formal credit		-0.016*** (0.004)			
Informal credit		-0.002 (0.020)			
Formal (VBSP)			0.027 (0.150)		
Formal (VBARD)			0.005 (0.008)		
Formal (Other)			-0.046*** (0.011)		
Credit (Agriculture)				0.003 (0.009)	
Credit (Land/Asset)				0.013* (0.008)	
Credit (Cons.)				0.016 (0.030)	
Credit (Other)				-0.021*** (0.004)	
Formal (Agriculture)					0.021* (0.012)
Formal (Land/Asset)					-0.014 (0.010)
Formal (Cons.)					0.020 (0.057)
Formal (Other)					-0.020*** (0.004)
Informal (Agriculture)					-0.025 (0.023)
Informal (Land/Asset)					0.134*** (0.021)
Informal (Cons.)					0.043 (0.110)
Informal (Other)					0.018 (0.033)
Poor (2006)	0.119 (0.522)	-0.296 (0.594)	-0.760 (1.086)	0.248 (0.518)	0.400 (0.507)
Wealth quintile (change)	-0.482** (0.192)	-0.347* (0.205)	-0.482* (0.265)	-0.534 (0.191)	-0.561*** (0.188)
HH_work_prop (change)	-0.327 (1.189)	-0.956 (1.293)	-2.013 (1.825)	-0.341 (1.176)	-0.204 (1.153)
HHsize (change)	0.035 (0.205)	0.074 (0.217)	0.142 (0.326)	0.041 (0.203)	0.078 (0.198)
Shock: Natural	-0.861* (0.446)	-0.757 (0.490)	-1.181* (0.717)	-0.878** (0.443)	-0.798* (0.434)
Shock: Economic	-1.760*** (0.685)	-1.885** (0.739)	-2.477** (1.010)	-1.780*** (0.679)	-1.739*** (0.663)
Shock: Idiosyncratic	0.093 (0.648)	0.143 (0.717)	0.398 (1.029)	0.028 (0.642)	-0.202 (0.628)
Recovered from shock	-0.057 (0.498)	-0.042 (0.452)	-0.120 (0.783)	-0.063 (0.494)	0.078 (0.485)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	1,220	859	714	1,220	1,220

Note: As for Table 5.1a.

In relation to the control variables, it is also clear from Table 5.3a that increases in wealth are negatively related to changes in rental income but, as revealed in Table 5.4a, are positively related to changes in non-farm, non-wage income. This supports our hypothesis that as households become wealthier they shift away from rental income towards business activities. We also find that natural and economic shocks have a significant negative effect on rental income. This may be due to the destruction of land and property in the aftermath of a natural disaster to the extent that it can no longer be rented or a general decline in economic conditions in the region shrinking the market for rental assets. In contrast, we find that households that suffer an economic shock experience a greater change in non-farm, non-wage income than other households. Coupled with the negative effect on rental income, this may suggest that households switch to other income earning activities (such as starting their own business) in the event of unanticipated economics shocks that threaten their source of income.

Table 5.4a: Effect of credit on non-farm, non-wage income (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	-19.76** (9.500)	-2.883 (6.132)	-1.804 (9.192)	-18.54** (9.424)	-19.15** (9.512)
Total credit obtained	0.141*** (0.024)				
Formal credit		0.149*** (0.027)			
Informal credit		-0.039 (0.144)			
Formal (VBSP)			-0.664 (1.020)		
Formal (VBARD)			0.081 (0.052)		
Formal (Other)			0.256*** (0.072)		
Credit (Agriculture)				-0.093 (0.059)	
Credit (Land/Asset)				-0.049 (0.051)	
Credit (Cons.)				-0.090 (0.197)	
Credit (Other)				0.196*** (0.026)	
Formal (Agriculture)					-0.131 (0.083)
Formal (Land/Asset)					-0.084 (0.064)
Formal (Cons.)					-0.130 (0.375)
Formal (Other)					0.220*** (0.027)
Informal (Agriculture)					-0.060 (0.151)
Informal (Land/Asset)					0.073 (0.138)
Informal (Cons.)					0.022 (0.729)
Informal (Other)					-0.188 (0.216)
Poor (2006)	1.840 (3.473)	0.452 (4.160)	1.957 (7.219)	0.271 (3.443)	0.075 (3.455)
Wealth quintile (change)	3.631*** (1.254)	4.438*** (1.449)	4.028** (1.785)	4.087*** (1.238)	4.378*** (1.241)
HH_work_prop (change)	18.084** (7.801)	18,822** (9.107)	26.168** (12.199)	17.964** (7.687)	19.367** (7.684)
HHsize (change)	-0.800 (1.335)	-0.712 (1.525)	-1.060 (2.209)	-0.814 (1.315)	-0.777 (1.307)
Shock: Natural	2.704 (2.908)	3.150 (3.461)	7.526 (4.858)	3.097 (2.876)	3.114 (2.869)
Shock: Economic	11.617*** (4.475)	12.130** (5.212)	17.259** (6.841)	11.984*** (4.412)	11.910*** (4.389)
Shock: Idiosyncratic	-3.722 (4.223)	-3.418 (5.067)	-4.832 (6.958)	-3.261 (4.159)	-3.730 (4.140)
Recovered from shock	0.232 (3.270)	-1.164 (3.819)	-1.324(5.267)	0.501 (3.229)	0.047 (3.233)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	1,220	859	714	1,220	1,220

Note: As for Table 5.1a.

Considering the impact of credit on rental incomes and non-farm, non-wage incomes of poor households in isolation also reveals some interesting insights. We find that, for the most part, credit has no impact on either the rental income or non-farm, non-wage income of the poor (Tables 5.3b and 5.4b). However, once we disaggregate by source of formal credit (Table 5.3b, column (3)) we find that credit accessed by poor households from commercial financial institutions (other than VBSP and VBARD) has a positive and significant effect. The only other factor of significance for changes in rental income of the poor is whether they suffered from an idiosyncratic shock. We find that poor households that suffer from such a shock experience an increase in their rental income. This may be due to the fact that they switch to renting property or assets as an income earning activity when faced with difficult economic times.

Table 5.3b: Effect of credit on rental income (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	0.438** (0.192)	0.429** (0.220)	-0.097 (0.414)	0.422** (0.194)	0.423** (0.195)
Total credit obtained	-0.002 (0.003)				
Formal credit		0.001 (0.006)			
Informal credit		-0.002 (0.006)			
Formal (VBSP)			0.025 (0.035)		
Formal (VBARD)			0.005 (0.009)		
Formal (Other)			0.044* (0.026)		
Credit (Agriculture)				-0.002 (0.003)	
Credit (Land/Asset)				0.003 (0.009)	
Credit (Cons.)				0.007 (0.007)	
Credit (Other)				-0.002 (0.006)	
Formal (Agriculture)					-0.002 (0.005)
Formal (Land/Asset)					0.004 (0.013)
Formal (Cons.)					0.001 (0.014)
Formal (Other)					-0.001 (0.006)
Informal (Agriculture)					-0.003 (0.005)
Informal (Land/Asset)					-0.002 (0.034)
Informal (Cons.)					0.015 (0.023)
Informal (Other)					-0.040 (0.124)
Wealth quintile (change)	-0.020 (0.062)	-0.016 (0.076)	-0.109 (0.129)	-0.018 (0.063)	-0.019 (0.064)
HH_work_prop (change)	-0.101 (0.354)	-0.216 (0.551)	-0.093 (0.889)	-0.128 (0.356)	-0.132 (0.361)
HHsize (change)	-0.049 (0.039)	-0.051 (0.047)	-0.154 (0.116)	-0.053 (0.039)	0.051 (0.039)
Shock: Natural	-0.008 (0.072)	-0.021 (0.093)	0.010 (0.193)	-0.009 (0.072)	-0.011 (0.072)
Shock: Economic	-0.085 (0.103)	-0.082 (0.135)	-0.343 (0.247)	-0.092 (0.104)	-0.097 (0.106)
Shock: Idiosyncratic	0.121 (0.114)	0.185 (0.152)	0.198 (0.281)	0.126 (0.115)	0.117 (0.116)
Recovered from shock	0.149* (0.083)	0.189* (0.105)	0.460** (0.213)	0.153* (0.082)	0.163 (0.084)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	297	231	177	297	297

Note: As for Table 5.1a.

For non-farm, non-wage income we find some evidence to suggest that formal credit accessed through the VBSP by poor households has a negative effect on non-farm, non-wage income. This may be due to the fact that these funds are used for specialization in other activities such as agriculture. However, the fact that we do not observe a corresponding positive effect of VBSP lending on agricultural income questions the effectiveness of this lending. This will be explored further in later sections. In contrast to the aggregate results, wealth and the proportion of working adults in the household are negatively associated with changes in non-farm, non-wage income for poor households. This may suggest that the types of income earning activities in this category may be different for poor households compared with non-poor households where these variables have a positive effect. For example, for poor households, non-farm, non-wage income could include income from the use of common property resources which may be more associated with less wealthy households with more inactive household members.

Table 5.4b: Effect of credit on non-farm, non-wage income (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	0.793 (1.701)	1.603 (1.503)	5.209** (2.576)	0.563 (1.715)	0.701 (1.721)
Total credit obtained	-0.017 (0.031)				
Formal credit		-0.021 (0.038)			
Informal credit		-0.019 (0.041)			
Formal (VBSP)			-0.401** (0.208)		
Formal (VBARD)			-0.048 (0.051)		
Formal (Other)			0.047 (0.150)		
Credit (Agriculture)				-0.012 (0.031)	
Credit (Land/Asset)				-0.077 (0.079)	
Credit (Cons.)				0.113* (0.064)	
Credit (Other)				-0.055 (0.051)	
Formal (Agriculture)					-0.012 (0.048)
Formal (Land/Asset)					-0.068 (0.115)
Formal (Cons.)					-0.084 (0.123)
Formal (Other)					0.019 (0.056)
Informal (Agriculture)					-0.013 (0.045)
Informal (Land/Asset)					-0.111 (0.300)
Informal (Cons.)					0.305 (0.207)
Informal (Other)					-0.251 (1.091)
Wealth quintile (change)	-1.577*** (0.547)	-2.231*** (0.502)	-3.121*** (0.784)	-1.620*** (0.553)	-1.406** (0.563)
HH_work_prop (change)	-7.129** (3.143)	-12.015*** (3.72)	-22.557*** (5.72)	-7.924** (3.143)	-7.710** (3.183)
HHsize (change)	0.632* (0.344)	0.490 (0.308)	1.362** (0.660)	0.653* (0.345)	0.650* (0.345)
Shock: Natural	-0.929 (0.639)	-1.103* (0.607)	-3.683*** (1.072)	-0.991 (0.637)	-1.026 (0.638)
Shock: Economic	-0.807 (0.915)	-1.186 (0.897)	-0.906 (1.406)	-0.761 (0.911)	-1.025 (0.936)
Shock: Idiosyncratic	-0.792 (1.013)	-0.150 (0.983)	-0.112 (1.558)	-0.629 (1.011)	-0.980 (1.021)
Recovered from shock	0.301 (0.732)	0.174 (0.688)	-1.319 (1.209)	0.322 (0.726)	0.464 (0.743)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	297	231	177	297	297

Note: As for Table 5.1a.

Overall, we find that the amount of credit a household has in 2006 has a positive effect on changes in income between 2006 and 2008, even when controlling for the factors that determine access to credit in the first place. We find strong evidence to suggest that the effect of credit on outcomes is linked to the purpose of the credit obtained, particularly where credit is accessed through formal sources. We find that, for the most part, formal credit induces positive income effects while informal credit has no effect on income. However, informal credit remains important for the incomes of the poor. As expected, credit obtained for agricultural investments through formal sources has a positive effect on agricultural income and credit obtained for 'other' purposes has a positive effect on non-farm, non-wage income. Contrary to what might be expected, credit accessed through the two main sources of formal credit in Vietnam, the VBSP and VBARD, has a limited effect on income levels. Instead, credit accessed through other formal outlets such as private commercial banks, local authorities, etc, are associated with income improvements.

Our analysis also uncovers some trade-offs in terms of the way in which funds accessed are invested. Credit obtained for investment in land and other assets has a negative effect on agricultural income while credit obtained for 'other' purposes has a negative effect on non-farm non-wage income. This suggests that in accessing credit for a particular purpose, households make a decision with regard to future income-

earning activities, and move away from one type of income earning activity toward another. We also find that the way in which credit is accessed and used is very different for poor compared with non-poor households. Both formal and informal sources of credit are important for the agricultural incomes of the poor with both yielding positive effects. However, access to credit has practically no impact on either the rental income or non-farm, non-wage income of the poor.

Diversification

We now consider the impact that access to credit has on diversification of employment within households. Diversification is often used as a means of spreading risk but has the disadvantage of preventing households from becoming specialized in any one activity. Specialization has the potential to yield economies of scale in production activities leading to increased incomes and helping to alleviate poverty. Access to credit is one way that households can invest in specialization. We measure diversification as the number of different income sources earned by household members and as with the previous models, measure the impact of credit on changes in diversification between 2006 and 2008. The results are presented in Table 6a for all households and 6b for poor households.

On the basis of our first measure, Table 6a reveals that credit reduces the extent of diversification of income within households. We find that this is driven by credit accessed for 'other' purposes through formal means. In particular, the VBSP and other sources of formal credit play an important role. This may suggest that households with access to credit use the opportunity to specialize in certain income-generating activities. This helps to explain the trade-off effects of accessing credit for different purposes observed in the income analysis presented in Tables 5.1 to 5.4.

Table 6a: Effect of credit on income diversification – number of different income sources earned by household members (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	0.369 (0.439)	-0.053 (0.271)	-0.216 (0.363)	0.381 (0.441)	0.390 (0.447)
Total credit obtained	-0.002** (0.001				
Formal credit		-0.002** (0.001)			
Informal credit		0.004 (0.006)			
Formal (VBSP)			-0.112*** (0.039)		
Formal (VBARD)			-0.002 (0.002)		
Formal (Other)			-0.003 (0.003)		
Credit (Agriculture)				-0.001 (0.003)	
Credit (Land/Asset)				-0.003 (0.002)	
Credit (Cons.)				-0.007 (0.009)	
Credit (Other)				-0.002** (0.001)	
Formal (Agriculture)					-0.002 (0.004)
Formal (Land/Asset)					-0.004 (0.003)
Formal (Cons.)					-0.006 (0.018)
Formal (Other)					-0.002** (0.001)
Informal (Agriculture)					-0.003 (0.007)
Informal (Land/Asset)					0.003 (0.007)
Informal (Cons.)					-0.020 (0.035)
Informal (Other)					-0.006 (0.011)
Poor (2006)	0.211 (0.159)	0.198 (0.184)	-0.061 (0.285)	0.204 (0.160)	0.207 (0.161)
Wealth quintile (change)	0.084 (0.059)	0.088 (0.064)	0.168** (0.070)	0.087 (0.059)	0.086 (0.060)
HH_work_prop (change)	2.771*** (0.365)	3.166*** (0.404)	3.166*** (0.479)	2.772*** (0.364)	2.775*** (0.366)
HHsize (change)	0.821*** (0.063)	0.830*** (0.068)	0.764*** (0.086)	0.820*** (0.063)	0.823*** (0.063)
Shock: Natural	0.255* (0.137)	0.394*** (0.153)	0.331* (0.189)	0.252* (0.137)	0.259* (0.138)
Shock: Economic	0.106 (0.210)	0.154 (0.231)	0.082(0.266)	0.110 (0.210)	0.109 (0.210)
Shock: Idiosyncratic	-0.333* (0.199)	-0.393* (0.225)	-0.569** (0.271)	-0.334* (0.199)	-0.340* (0.200)
Recovered from shock	0.014 (0.152)	-0.024 (0.169)	-0.090 (0.206)	0.007 (0.153)	0.008 (0.154)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	1,220	859	714	1,220	1,220

Note: As for Table 5.1a.

Once disaggregated by poor and non-poor households (Table 6b), we find that credit plays a very different role for poor households. Informal credit increases the level of income diversification of households. The positive effect of informal credit for agricultural purposes suggests that poor households may use these borrowings to relieve household labor from agricultural production allowing it to focus on other types of income generating activities. This result is consistent with Banerjee and Duflo (2007) who find that poor households will often choose to diversify their income sources rather than invest in specialization in order to spread risk, despite the fact that specialization may yield higher returns due to economies of scale. We also find however, that credit obtained from the VBSP has a large and significant negative effect on income diversification suggesting that this is an important source of credit for poor households wishing to specialize.

Table 6b: Effect of credit on income diversification – number of different income sources earned by household members (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	0.047 (0.741)	-0.093 (0.787)	-0.285 (1.089)	0.224 (0.750)	0.130 (0.743)
Total credit obtained	0.014 (0.013)				
Formal credit		0.008 (0.020)			
Informal credit		0.046** (0.022)			
Formal (VBSP)			-0.309*** (0.091)		
Formal (VBARD)			0.018 (0.023)		
Formal (Other)			0.069 (0.067)		
Credit (Agriculture)				0.011 (0.013)	
Credit (Land/Asset)				0.042 (0.035)	
Credit (Cons.)				-0.023 (0.028)	
Credit (Other)				-0.018 (0.022)	
Formal (Agriculture)					-0.001 (0.021)
Formal (Land/Asset)					0.062 (0.050)
Formal (Cons.)					0.036 (0.053)
Formal (Other)					0.009 (0.024)
Informal (Agriculture)					0.037** (0.019)
Informal (Land/Asset)					0.195 (0.130)
Informal (Cons.)					0.008 (0.089)
Informal (Other)					-0.616 (0.471)
Wealth quintile (change)	-0.251 (0.238)	-0.099 (0.263)	-0.393 (0.338)	-0.330 (0.242)	-0.282 (0.243)
HH_work_prop (change)	1.922 (1.370)	3.521* (1.947)	6.314*** (2.354)	2.114 (1.375)	1.818 (1.373)
HHsize (change)	0.993*** (0.150)	0.991*** (0.162)	1.013*** (0.301)	1.011*** (0.151)	0.979*** (0.149)
Shock: Natural	0.297 (0.279)	0.684** (0.319)	0.273 (0.498)	0.364 (0.279)	0.315 (0.276)
Shock: Economic	0.677* (0.399)	0.760 (0.471)	0.704 (0.638)	0.711* (0.399)	0.589 (0.404)
Shock: Idiosyncratic	-0.281 (0.442)	-0.471 (0.517)	-0.581 (0.724)	-0.246 (0.443)	-0.258 (0.442)
Recovered from shock	0.324 (0.319)	0.406 (0.31)	-0.287 (0.551)	0.295 (0.318)	0.374 (0.321)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	297	231	177	297	297

Note: As for Table 5.1a.

Investment

We now turn our attention to the investment behavior of households in the aftermath of obtaining credit for various purposes. The results for the effect of credit on investments made in land between 2006 and 2008 are presented in Table 7a for all households and 7b for poor households.

As revealed in Table 7a, while the source of credit on aggregate does not seem to matter for investment once credit is disaggregated by purpose we find the unexpected result that credit for consumption purposes has a positive and significant effect on investment. This only holds for credit accessed for consumption purposes through the formal sector. This result is robust to controlling for selection bias associated with households who have access (or choose to access) *formal* credit. It may be the case that households who borrow for consumption purposes do so to free up other household resources that can be used for investment purposes. In this way consumption loans indirectly act as investment loans.

Table 7a: Effect of credit on investment in land (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	0.438 (5.053)	-0.461 (3.329)	5.566 (5.455)	-2.595 (5.010)	-2.663 (5.052)
Total credit obtained	0.003 (0.013)				
Formal credit		0.0001 (0.014)			
Informal credit		-0.024 (0.078)			
Formal (VBSP)			-0.526 (0.563)		
Formal (VBARD)			-0.018 (0.030)		
Formal (Other)			0.008 (0.044)		
Credit (Agriculture)				0.056* (0.032)	
Credit (Land/Asset)				-0.039 (0.028)	
Credit (Cons.)				0.448*** (0.107)	
Credit (Other)				0.008 (0.014)	
Formal (Agriculture)					0.058 (0.045)
Formal (Land/Asset)					-0.033 (0.035)
Formal (Cons.)					1.072*** (0.206)
Formal (Other)					0.003 (0.014)
Informal (Agriculture)					0.052 (0.082)
Informal (Land/Asset)					0.002 (0.076)
Informal (Cons.)					-0.397 (0.395)
Informal (Other)					-0.031 (0.119)
Poor (2006)	-2.213 (1.827)	-1.581 (2.259)	3.832 (4.258)	-1.558 (1.809)	-1.504 (1.812)
Wealth quintile (change)	0.818 (0.684)	0.835 (0.788)	0.926 (1.019)	0.711 (0.677)	0.684 (0.676)
HH_work_prop (change)	7.706* (4.195)	8.817* (0.788)	12.081* (7.097)	8.064** (4.139)	7.246* (4.139)
HHsize (change)	0.208 (0.724)	0.199 (0.829)	0.139 (1.238)	0.176 (0.715)	0.124 (0.712)
Shock: Natural	1.807 (1.578)	1.823 (1.882)	3.771 (2.722)	1.343 (1.564)	1.592 (1.566)
Shock: Economic	5.682** (2.422)	6.181** (2.834)	7.846** (3.834)	5.111** (2.393)	5.724** (2.384)
Shock: Idiosyncratic	-1.691 (2.296)	-1.448 (2.756)	-0.726 (3.928)	-1.682 (2.268)	-1.753(2.265)
Recovered from shock	-1.337 (1.757)	-1.789 (2.076)	-2/262 (3.015)	-1.100 (1.737)	-0.953 (1.741)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	1,220	859	714	1,220	1,220

Note: As for Table 5.1a.

For poor households (presented in Table 7b) we find that credit obtained in 2006, and in particular, formal credit has a positive effect on investments made in land between 2006 and 2008. Loans obtained through the VBARD are particularly effective. Once we disaggregate by source of credit we find that loans obtained for agricultural purposes are the source of this effect.

Table 7b: Effect of credit on investment in land (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	-1.441 (4.829)	-3.641 (5.439)	-1.911 (10.369)	-0.839 (4.892)	-3.616 (4.805)
Total credit obtained	0.169** (0.087)				
Formal credit		0.396*** (0.143)			
Informal credit		-0.003 (0.159)			
Formal (VBSP)			0.171 (0.874)		
Formal (VBARD)			0.482** (0.221)		
Formal (Other)			-0.944 (0.640)		
Credit (Agriculture)				0.180** (0.088)	
Credit (Land/Asset)				-0.049 (0.226)	
Credit (Cons.)				-0.163 (0.182)	
Credit (Other)				-0.011 (0.146)	
Formal (Agriculture)					0.514*** (0.135)
Formal (Land/Asset)					0.140 (0.322)
Formal (Cons.)					0.152 (0.342)
Formal (Other)					0.063 (0.162)
Informal (Agriculture)					-0.031 (0.124)
Informal (Land/Asset)					0.032 (0.839)
Informal (Cons.)					-0.348 (0.575)
Informal (Other)					-0.423 (1.591)
Wealth quintile (change)	0.552 (1.547)	0.672 (1.867)	0.250 (3.224)	0.201 (1.572)	0.091 (1.565)
HH_work_prop (change)	-0.254 (8.908)	3.895 (13.624)	13.403 (22.330)	0.261 (8.942)	2.154 (8.858)
HHsize (change)	0.048 (0.978)	-0.278 (1.151)	-2.782 (2.891)	0.315 (0.987)	0.372 (0.967)
Shock: Natural	0.682 (1.814)	0.499 (2.282)	3.357 (4.793)	0.843 (1.820)	1.032 (1.782)
Shock: Economic	2.789 (2.598)	1.742 (3.321)	5.638 (6.133)	3.241 (2.601)	3.421 (2.609)
Shock: Idiosyncratic	0.480 (2.878)	1.341 (3.733)	5.497 (6.976)	0.620 (2.892)	1.622 (2.857)
Recovered from shock	2.075 (2.075)	3.856 (2.586)	10.042* (5.297)	1.857 (2.070)	1.807 (2.074)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	297	231	177	297	297

Note: As for Table 5.1a.

Productivity

Finally, we analyze the effect of credit on productivity. We consider two measures of productivity. First, we consider the productivity of labor employed in agriculture measured as the change in agricultural income as a proportion of household members working in agriculture between 2006 and 2008. Second, we focus on rice production and measure the change in productivity as the change rice yields (in kilograms) as a proportion of the total land area farmed for rice production (in square meters).

The results for labor productivity for all households are presented in Table 8.1a and for poor household in Table 8.1b. The total amount of credit obtained in 2006 has a positive and significant effect on the change in the productivity of labor between 2006 and 2008. This is driven by credit accessed through the formal sector and in particular through financial institutions other than the VBSP and the VBARD. Once we disaggregate credit by source we find that credit accessed for the purpose of investing in agriculture has a significant and positive effect, from both formal and informal sources. We also find that credit accessed for 'other' purposes through the formal sector also leads to increases in labor productivity. This can be explained by the fact that investments resulting from this type of credit may be used to diversify household income sources potentially leading to some household members moving away from agricultural production. This will lead to fewer household members working on the

farm leading to an overall improvement in productivity using our measure. In contrast, we find that credit accessed for investments in land and other assets has a negative effect on agricultural productivity. This may be due to the fact that the types of investments associated with this form of credit may move households away from agricultural production toward income generated from the rental of these assets, as is suggested from our earlier findings on rental income (Table 5.3a).

Table 8.1a: Effect of credit on agricultural productivity (agricultural income/number of household members working in agriculture) (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	6.042** (2.727)	2.807 (1.807)	0.780 (3.034)	5.406** (2.705)	4.158 (2.710)
Total credit obtained	0.029*** (0.007)				
Formal credit		0.028*** (0.007)			
Informal credit		0.068 (0.052)			
Formal (VBSP)			0.141 (0.290)		
Formal (VBARD)			0.001 (0.015)		
Formal (Other)			0.072*** (0.021)		
Credit (Agriculture)				0.056*** (0.018)	
Credit (Land/Asset)				-0.045*** (0.016)	
Credit (Cons.)				-0.079 (0.062)	
Credit (Other)				0.033*** (0.008)	
Formal (Agriculture)					0.102*** (0.025)
Formal (Land/Asset)					-0.045** (0.019)
Formal (Cons.)					-0.026 (0.137)
Formal (Other)					0.033*** (0.008)
Informal (Agriculture)					0.082* (0.046)
Informal (Land/Asset)					0.032 (0.053)
Informal (Cons.)					-0.174 (0.225)
Informal (Other)					0.087 (0.101)
Poor (2006)	-1.483 (1.029)	-0.792 (1.157)	-3.064 (2.168)	-1.525 (1.016)	-1.145 (1.009)
Wealth quintile (change)	0.006 (0.415)	-0.315 (0.448)	-0.276 (0.560)	-0.041 (0.414)	-0.044 (0.423)
HH_work_prop (change)	-6.684** (2.811)	-8.273*** (3.058)	-9.867** (4.256)	-6.640** (2.778)	-6.485** (2.775)
HHsize (change)	-0.533 (0.401)	-0.618 (0.433)	-0.022 (0.640)	-0.593 (0.398)	-0.557 (0.396)
Shock: Natural	0.009 (0.883)	0.032 (0.985)	0.010 (1.397)	-0.145 (0.876)	-0.318 (0.873)
Shock: Economic	-0.024 (1.361)	-0.518 (1.491)	-0.638 (1.981)	-0.0001 (1.348)	-0.148 (1.339)
Shock: Idiosyncratic	0.429 (1.327)	0.215 (1.500)	0.386 (2.056)	0.270 (1.315)	0.226 (1.308)
Recovered from shock	-0.322 (0.982)	-1.067 (1.085)	-1.957 (1.517)	-0.441 (0.971)	-0.241 (0.968)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	1,116	784	654	1, 116	1, 116

Note: As for Table 5.1a.

When we consider poor households in isolation in Table 8.1b we find that credit accessed for agricultural investments through formal sources has a clear positive effect on agricultural productivity. There does not appear to be any statistically significant difference in the source of formal credit once the usual controls for selection bias are included.

Table 8.1b: Effect of credit on agricultural productivity (agricultural income/number of household members working in agriculture) (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	0.394 (1.899)	-0.089 (2.072)	-0.402 (3.860)	0.055 (1.910)	-0.293 (1.901)
Total credit obtained	0.059* (0.036)				
Formal credit		0.117** (0.055)			
Informal credit		0.014 (0.059)			
Formal (VBSP)			0.047 (0.319)		
Formal (VBARD)			0.135 (0.085)		
Formal (Other)			-0.216 (0.232)		
Informal credit					
Credit (Agriculture)				0.083** (0.035)	
Credit (Land/Asset)				-0.052 (0.088)	
Credit (Cons.)				0.071 (0.074)	
Credit (Other)				-0.026 (0.060)	
Formal (Agriculture)					0.170*** (0.055)
Formal (Land/Asset)					0.031 (0.129)
Formal (Cons.)					0.129 (0.162)
Formal (Other)					-0.069 (0.065)
Informal (Agriculture)					0.024 (0.049)
Informal (Land/Asset)					-0.070 (0.034)
Informal (Cons.)					0.131 (0.234)
Informal (Other)					0.336 (1.176)
Wealth quintile (change)	0.101 (0.669)	-0.059 (0.752)	0.021 (1.233)	-0.032 (0.681)	-0.261 (0.700)
HH_work_prop (change)	-1.388 (4.163)	0.814 (5.379)	10.347 (9.751)	-2.420 (4.160)	-2.094 (4.191)
HHsize (change)	-0.331 (0.388)	-0.228 (0.434)	-0.527 (1.129)	-0.240 (0.387)	-0.188 (0.382)
Shock: Natural	0.370 (0.734)	0.606 (0.875)	2.646 (1.889)	0.395 (0.730)	0.454 (0.725)
Shock: Economic	0.597 (1.049)	-0.199 (1.254)	0.144 (2.266)	0.753 (1.042)	0.750 (1.049)
Shock: Idiosyncratic	1.407 (1.244)	1.305 (1.512)	3.094 (2.994)	1.593 (1.237)	1.791 (1.228)
Recovered from shock	0.575 (0.815)	1.024 (0.970)	3.273* (1.957)	0.557 (0.809)	0.504 (0.815)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	279	220	169	279	279

Note: As for Table 5.1a.

In Tables 8.2a and 8.2b we focus on rice production and analyze the effect of credit on changes in the productivity of rice production measured as the change rice yields (in kilograms) as a proportion of total land area farmed for rice production. In Table 8.2a we find that credit on aggregate does not appear to have a significant effect on rice yields. Once we disaggregate by the purpose of the credit obtained we find that credit accessed for the purpose of investing in agriculture from formal sources has a positive and significant effect on the change in the productivity of rice producers between 2006 and 2008. For poor households, the effect of credit on rice productivity is even stronger and is evident for both formal and informal sources of credit (see Table 8.2b) although the effect of informal credit on productivity is of a greater magnitude than the effect of formal credit. Our results also suggest that, at least in the case of rice production, informal credit markets, offering loans for investment in agriculture, are effective in increasing productivity.

Table 8.2a: Effect of credit on rice productivity (rice yields/total rice area farmed) (all households)

	(1)	(2)	(3)	(4)	(5)
Constant	-0.332 (0.921)	-0.037 (0.52)	0.006 (0.110)	-0.445 (0.926)	-0.556 (0.952)
Total credit obtained	0.001 (0.002)				
Formal credit		0.001 (0.002)			
Informal credit		0.007 (0.020)			
Formal (VBSP)			0.006 (0.011)		
Formal (VBARD)			0.0002 (0.001)		
Formal (Other)			-0.0002 (0.001)		
Informal credit					
Credit (Agriculture)				0.013** (0.007)	
Credit (Land/Asset)				-0.009 (0.008)	
Credit (Cons.)				0.008 (0.030)	
Credit (Other)				-0.0001 (0.003)	
Formal (Agriculture)					0.017** (0.008)
Formal (Land/Asset)					-0.004 (0.010)
Formal (Cons.)					0.007 (0.060)
Formal (Other)					-0.0005 (0.003)
Informal (Agriculture)					0.013 (0.023)
Informal (Land/Asset)					0.005 (0.032)
Informal (Cons.)					0.018 (0.105)
Informal (Other)					-0.001 (0.035)
Poor (2006)	-0.785** (0.329)	-0.679** (0.346)	-0.031 (0.086)	-0.768** (0.329)	-0.741** (0.331)
Wealth quintile (change)	-0.149 (0.157)	-0.121 (0.155)	-0.005 (0.026)	-0.154 (0.157)	-0.168 (0.161)
HH_work_prop (change)	-0.319 (0.887)	-0.392 (0.882)	0.016 (0.162)	-0.372 (0.885)	-0.378 (0.893)
HHsize (change)	-0.284** (0.125)	-0.301** (0.123)	0.003 (0.024)	-0.289** (0.125)	-0.289** (0.126)
Shock: Natural	0.136 (0.288)	0.288 (0.291)	0.049 (0.057)	0.126 (0.288)	0.114 (0.289)
Shock: Economic	0.383 (0.436)	0.290 (0.439)	0.020 (0.078)	0.333 (0.437)	0.325 (0.347)
Shock: Idiosyncratic	0.364 (0.444)	0.233 (0.447)	-0.032 (0.084)	0.341 (0.443)	0.351 (0.444)
Recovered from shock	0.124 (0.328)	-0.019 (0.333)	-0.108* (0.063)	0.123 (0.327)	0.153 (0.330)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	835	576	508	835	835

Note: As for Table 5.1a.

Table 8.2b: Effect of credit on rice productivity (rice yields/total rice area farmed) (poor households)

	(1)	(2)	(3)	(4)	(5)
Constant	-2.657 (2.343)	-1.784 (2.169)	0.561 (0.524)	-2.972 (2.311)	-3.016 (2.213)
Total credit obtained	0.185** (0.075)				
Formal credit		0.171** (0.075)			
Informal credit		0.781*** (0.198)			
Formal (VBSP)			-0.069 (0.049)		
Formal (VBARD)			-0.018 (0.013)		
Formal (Other)			-0.141*** (0.032)		
Credit (Agriculture)				0.248*** (0.068)	
Credit (Land/Asset)				-0.179* (0.109)	
Credit (Cons.)				-0.015 (0.115)	
Credit (Other)				-0.221** (0.097)	
Formal (Agriculture)					0.268*** (0.078)
Formal (Land/Asset)					-0.017 (0.151)
Formal (Cons.)					0.332 (0.306)
Formal (Other)					-0.200* (0.116)
Informal (Agriculture)					0.913*** (0.208)
Informal (Land/Asset)					-0.089 (0.419)
Informal (Cons.)					-0.260 (0.331)
Informal (Other)					-0.094 (1.264)
Wealth quintile (change)	-1.090 (1.011)	-0.610 (1.014)	-0.017 (0.226)	-2.170** (0.994)	-2.157** (0.991)
HH_work_prop (change)	0.702 (4.930)	1.211 (5.904)	0.427 (1.433)	1.705 (4.821)	3.551 (4.897)
HHsize (change)	-1.451*** (0.495)	-1.581*** (0.465)	0.158 (0.146)	-0.758 (0.501)	-0.881* (0.475)
Shock: Natural	-0.057 (0.899)	-0.113 (0.952)	0.185 (0.250)	0.478 (0.874)	0.387 (0.852)
Shock: Economic	1.257 (1.466)	0.855 (1.463)	0.617* (0.372)	2.154 (1.397)	2.549* (1.414)
Shock: Idiosyncratic	0.275 (1.500)	0.202 (1.575)	0.057 (0.345)	0.956 (1.450)	0.039 (1.448)
Recovered from shock	0.546 (1.047)	0.608 (1.078)	-0.535** (0.270)	0.372 (1.003)	0.568 (1.007)
Province Dummies	Yes	Yes	Yes	Yes	Yes
n	217	162	133	217	217

Note: As for Table 5.1a.

4. Summary and Policy Implications

In this paper we construct a profile of households using credit from different sources for a variety of purposes. We consider: 1) the factors determining access to credit; 2) the factors determining how loans are used by households; and 3) the effect of various forms of credit on outcomes.

We find that access to credit in rural Vietnam is very high but the sources of credit vary considerably across different household groups. We find that access to formal credit is more associated with wealthier more educated households while the opposite is the case for informal credit. Savings act as a substitute for credit rather than a complement as found in other studies (Baland et al., 2007). In contrast, ownership of land is positively correlated with access to formal credit suggesting that land plays an important role in serving as collateral for loans with formal financial institutions and may be an important access route not available to poorer, landless households. We also find that poor households are much more likely to have loans with the VBSP and are much less likely to have loans with the VBARD. Similarly, education is an important factor for accessing VBARD loans but less so for loans from the VBSP. These findings have important implications for understanding the effectiveness of credit on poverty alleviation. In particular, since we find that the effectiveness of

credit on welfare outcomes varies considerably depending on the source of credit (formal/informal and VBSP/VBARD), understanding the characteristics of the households that have access (or choose to access) different forms of credit is an important step in understanding why some forms of credit work and others do not.

The use of the loans obtained also varies by household characteristics. High income households and more educated households are more likely to use credit to invest in land or assets or other non-farm activities such as enterprise development. In contrast, poorer households are more likely to hold credit for agricultural investments. Credit for consumption is important for older households but larger households with a greater proportion of working household members are much less likely to borrow for consumption. Households who suffer an idiosyncratic shock also rely on credit to smooth consumption in times of economic hardship. These results highlight the very different roles that credit plays in the lives of rural Vietnamese households and highlights the need to focus on the differential impact of credit on different groups of households. In particular, it is important to understand the extent to which the source of credit obtained, and how those funds are used, impacts on outcomes for different household groups.

The core of our empirical investigation explores how access to credit affects outcomes, focusing on the source of credit obtained, how the funds are used and, in particular, on the differences in the effectiveness of credit for poor and non-poor households. In what follows, we summarize our key findings.

In the income analysis presented in Tables 5.1 to 5.4 we find that the amount of credit a household has in 2006 has a positive effect on changes in income between 2006 and 2008, even when controlling for the factors that determine access to credit in the first place. We find strong evidence to suggest that the effect of credit on outcomes is linked to the purpose of the credit obtained, particularly where credit is accessed through formal sources. We find that, for the most part, formal credit induces positive income effects while informal credit has no effect on income. However, informal credit remains important for the incomes of the poor. As expected, credit obtained for agricultural investments through formal sources has a positive effect on agricultural income and credit obtained for 'other' purposes has a positive effect on non-farm, non-wage income. Credit obtained for the purpose of investing in land and other assets from informal sources yields positive returns on rental income for non-poor households. Formal credit, however, is not found to have any effect. This may suggest that formal credit for this particular purpose may be rationed. Contrary to what might be expected, credit accessed through the two main sources of formal credit in Vietnam, the VBSP and the VBARD, has a limited effect on income levels. Instead, credit accessed through other formal outlets such as private commercial banks, local authorities, etc, are associated with income improvements.

From a policy point of view these results suggest that access to formal credit is important for the incomes of Vietnamese households, in particular, for agricultural incomes and non-farm, non-wage incomes and so improving access to commercial financial institutions for these purposes may help in improving the incomes of the poor who still rely on informal credit markets which appear less effective. Our findings also suggest that further investigations into the workings of the formal credit market for investment in rental assets are required since, on the basis of our analysis,

they appear to be non-existent. Further investigation is also required into the effectiveness of *formal* credit obtained from various sources. Understanding why commercial institutions are more effective than the VBARD and the VBSP will be important for designing future government policies in relation to rural credit markets.

Our income analysis also reveals a number of trade-offs between the use of funds and different income earning activities suggesting that in accessing credit for a specified purpose, households are more likely to specialize in that activity. This leads to increases in income earned from their chosen specialist activity and a reduction in income earned from other activities. In support of this conclusion we find that access to formal credit reduces the extent of income diversification of households, inducing them to become more specialized (see Tables 6a and 6b). In contrast, we find that for poor households, access to credit through informal sources increases the level of income diversification of households suggesting that poor households prefer to spread risk across different income earning activities rather than specializing. This result is consistent with other findings in the literature (Banerjee and Duflo, 2007). The fact that poor households do not specialize means that they do not benefit from the economies of scale that would allow them to move from small scale production units to large-scale viable enterprises. This may act as a barrier to poverty alleviation. We do find evidence however, that credit obtained from the VBSP has a negative and significant effect on diversification suggesting that these funds are used for specialization. For poor households we find that these funds are used to specialize in agriculture. This may be an important vehicle for poverty alleviation and our findings suggest that the VBSP is successful in achieving this goal. It should be noted, however, that particularly for poor household, the need for income diversification as a means of spreading risk may also be an important welfare outcome. Further investigation will be required into understanding the conflicting needs of poor households to diversify income to spread risk or specialize to improve profitability.

The level of credit obtained is found to have a very limited effect on the investment behavior of households (see Tables 7a and 7b). There is some evidence to suggest that formal credit, accessed for consumption purposes, has a positive effect. This contradicts much of the literature (see for example, Hung (2005)) which suggests that consumption loans can stagnate economic development. In contrast, our results suggest that consumption loans (accessed through the formal sector) may in fact have investment enhancing effects. We explain this by the fact that households who borrow for consumption purposes may do so to free up other household resources that can be used for investment purposes. In this way consumption loans indirectly act as investment loans. Further investigation will be required in order to understand why credit obtained for investment purposes does not lead to increases in observed investment levels. In contrast, for poor households we find that credit obtained in 2006, and in particular, formal credit has a positive effect on investments made in land between 2006 and 2008. Loans obtained through the VBARD are particularly effective. Once we disaggregate by source of credit we find that loans obtained for agricultural purposes are the source of this effect.

The final part of our empirical analysis explores the relationship between credit and productivity. We find that credit has very strong and robust effects on productivity. For rice producers, particularly poor rice producers, productivity gains are realized whether credit is accessed through the formal or informal sector and the positive

effect appears to be even stronger for poor households. For agricultural productivity in general, however, only loans accessed through the formal sector have a positive effect. Consistent with our earlier findings we find that loans accessed through formal commercial financial institutions other than the VBSP and the VBARD appear to be the most important sources of formal credit.

Overall, our results provide strong evidence that credit is an effective instrument for improving welfare outcomes, and by consequence, for alleviating poverty. However, the source of credit (formal or informal) and the purpose of the credit are important factors to understand in designing effective policy. This is particularly the case given that the effectiveness of the source and purpose of credit in improving outcomes differs for poor and non-poor households. We find that formal credit is much more effective than informal credit. One possible explanation for this is that the monitoring of the use of credit and contract enforcement, in general, may be more difficult when credit is accessed informally (Banerjee and Duflo, 2004). Households accessing informal credit may, therefore, be more likely to use credit for purposes not linked with the original stated purpose on the loans thereby diluting the effect of credit. One finding of particular note is that we do *not* find evidence that credit accessed through the VBSP has a significant effect on outcomes, even for poor households. The only exception is some evidence that VBSP loans help households to specialize production. This does not extend to improvements in welfare outcomes, however. While it could be argued that we cannot fully control for potential differences in the unobserved characteristics of households that access commercial financial institutions that may also influence outcomes, we can conclude that credit accessed through *formal commercial* financial institutions is certainly associated with improved outcomes on most of the metrics considered in this paper, for both poor and non-poor households. There are many reasons why this may be the case. The most likely reason is that commercial financial institutions require more rigorous conditions on households in terms of collateral and ability to pay criteria before extending credit to these households. Similarly, it could also be due to a self-selection effect whereby households that are more likely to experience improved outcomes are also more likely to access these institutions. Controlling for these factors, however, we find many correlations between access to formal commercial financial institutions and improvements in outcomes while we find no such correlations between access to VBSP credit and improvements in outcomes. While causal relationship cannot be definitively established the results from this research suggest that finding ways of improving access to *formal commercial* institutions for poor households may help in poverty alleviation. Whether it is in the process of preparing households to be eligible to access credit from commercial institutions (by, for example, improving education outcomes, income security, building up collateral, etc.) that ultimately leads to improvements in outcomes or whether it is the funds themselves that matter remains unclear.

As highlighted in the introduction, this paper does not address the extent to which extending credit is the best approach to alleviating poverty given that other policy instruments are not considered. Furthermore, it does not address the question of whether rural households are over-indebted. Future research analyzing the operation of the complete financial market in rural areas (including credit, savings and insurance) is therefore a natural extension of this work and an important theme for future research.

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Appendix

Technical details of econometric methods[15]

The Bivariate Probit Model

A standard probit model is used in cases where we have a binary dependent variable. To derive this model we assume that there exists an underlying latent model with a continuous, but unobservable dependent variable. For example, if we interpret the latent variable as an index of utility preferences relating to households desire to access credit we can assume that this utility index can be explained by the same set of characteristics as the observed actions of the individual, that is the observed outcome of whether the household accesses credit or not.

The model can be described as follows:

$y^* = \mathbf{x}'\boldsymbol{\beta} + e$	where y^* is unobserved and therefore latent
$y = 1$	if $y^* > 0$ i.e. utility is positive
$y = 0$	if $y^* \leq 0$ i.e. utility is zero or negative

where y^* is the underlying utility associated with accessing credit, y is the observed binary outcome, that is whether the household accessed credit or not, $\mathbf{x}$ is a vector of explanatory variables, $\boldsymbol{\beta}$ is a vector of parameters that we wish to estimate and e is a statistical noise or disturbance term. Assuming that the statistical noise term follows a standard normal distribution ($e \sim N(0,1)$) we can construct a log-likelihood equation for this model that can be estimated using maximum likelihood estimation. The log-likelihood equation takes the following form:

$$ln\, L = \sum_{y=0} \ln\left[1 - \Phi(\mathbf{x}'\boldsymbol{\beta})\right] + \sum_{y=1} \ln \Phi(\mathbf{x}'\boldsymbol{\beta})$$

where $\Phi(.)$ is the cumulative distribution function for the standard normal distribution and $\Phi(\mathbf{x}'\boldsymbol{\beta})$ represents the probability of observing $y = 1$ (for example, a households that has access to credit).

A natural extension of the probit model is to allow more than one equation with correlated disturbances. This model would apply to situations where we believe two separate outcomes are determined simultaneously. In this paper, this may apply to the decision to access credit from either formal or informal sources.

A general specification for the two equation model would be:

$y_1^* = \mathbf{x}'\boldsymbol{\beta_1} + e_1$, $y_1 = 1$ if $y_1^* > 0$ and 0 otherwise
$y_2^* = \mathbf{x}'\boldsymbol{\beta_2} + e_2$, $y_2 = 1$ if $y_2^* > 0$ and 0 otherwise

[15] A subscript representing each observational unit in the sample is suppressed for ease of exposition. Characters in bold font represent vectors while those in standard font represent scalars.

where y_1^* is the underlying utility associated with accessing *formal* credit, y_1 is the observed binary outcome, that is whether the household accessed *formal* credit or not, y_2^* is the underlying utility associated with accessing *informal* credit, y_2 is the observed binary outcome, that is whether the household accessed *informal* credit or not, $\mathbf{x}$ is a vector of explanatory variables, $\boldsymbol{\beta}_1$ is a vector of parameters associated with access to *formal* credit, $\boldsymbol{\beta}_2$ is a vector of parameters associated with access to *informal* credit, and e_1 and e_2 are statistical noise or disturbance terms associated with each decision.

For the mean of the distribution of the disturbance terms we assume that:

$$E[e_1 \mid \mathbf{x}_1, \mathbf{x}_2] = E[e_2 \mid \mathbf{x}_1, \mathbf{x}_2] = 0$$

For the variance of the distribution of the disturbance terms we assume that:

$$V[e_1 \mid \mathbf{x}_1, \mathbf{x}_2] = V[e_2 \mid \mathbf{x}_1, \mathbf{x}_2] = 1$$

We also assume that the covariance between the two error terms is given by:

$$Cov[e_1, e_2 \mid \mathbf{x}_1, \mathbf{x}_2] = \rho$$

The model will collapse to two separate probit models when $\rho = 0$. Where a correlation between the two error terms exists it indicates that the unobserved effects determining the two binary outcomes are related to each other and so consideration of this must be made in estimating the parameters of the model. This model is also estimated using maximum likelihood estimation procedures.

The Sample Selection Model

In cases where the sample is in some way selected or non-random using standard regression techniques will result in biased parameter estimates. In this paper, when analyzing both the types of credit that households access and the effects of credit on outcomes we must control for the fact that households who access credit are self-selecting. These households may possess characteristics that are related to both the fact that they access credit and the outcomes that we are analyzing. To control for the bias that this introduces to parameter estimates using standard regression techniques we use Heckman's sample selection model. This requires a two stage estimation procedure where in the first stage the factors determining access to credit are modeled using a probit model. These factors are controlled for in the second stage regression on the outcome variable of interest by including the inverse mills ratio from the first stage probit model.

Formally, the first stage selection mechanism is given by:

$y^* = \mathbf{x}'\boldsymbol{\beta} + e$; $y = 1$ if $y^* > 0$ and zero otherwise.

$$P(y = 1 \mid \mathbf{x}) = \Phi(\mathbf{x}'\boldsymbol{\beta})$$

$$P(y = 0 \mid \mathbf{x}) = 1 - \Phi(\mathbf{x}'\boldsymbol{\beta})$$

where each term is as for the probit model above.

The second stage regression model is given by:

$z = \mathbf{w}'\boldsymbol{\alpha} + u$ observed only if $y = 1$

$\begin{pmatrix} e \\ u \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{eu} \\ \sigma_{eu} & \sigma_u^2 \end{pmatrix} \right)$ with correlation ρ

where z is the observed continuous variable (either the proportion of total credit accessed for a particular purpose as in section 3.2 or a particular outcome variable as in section 3.3), $\mathbf{w}$ is a vector of explanatory variables that must differ by at least one variable to $\mathbf{x}$ for identification, $\boldsymbol{\alpha}$ is a vector of parameters to be estimated and u is a statistical noise or disturbance term. z is only observed for households that access credit (i.e. $y = 1$).

The model can be written as:

$E(z \mid y = 1, \mathbf{w}, \mathbf{x}) = \mathbf{w}'\boldsymbol{\alpha} + \alpha_\lambda \lambda(\mathbf{x}'\boldsymbol{\beta})$

where $\lambda(\mathbf{x}'\boldsymbol{\beta}) = \phi(\mathbf{x}'\boldsymbol{\beta}) / \Phi(\mathbf{x}'\boldsymbol{\beta})$, $\phi(.)$ is the standard normal density function and $\Phi(.)$ is the standard normal cumulative distribution function. The term $\lambda(\mathbf{x}'\boldsymbol{\beta})$ is a sample selection adjustment term that adjusts for sample selection bias in the second stage regression.

We use Heckman's two step estimation procedure to estimate this model. In the first stage we estimate the probit model using maximum likelihood estimation, as described above, to obtain estimates for $\boldsymbol{\beta}$ and use these estimates to compute the estimated Inverse Mills Ratios $\hat{\lambda}(\mathbf{x}'\hat{\boldsymbol{\beta}}) = \phi(\mathbf{x}'\hat{\boldsymbol{\beta}}) / \Phi(\mathbf{x}'\hat{\boldsymbol{\beta}})$ for each observation in the sample. In the second stage we estimate $\hat{\boldsymbol{\alpha}}$ and $\hat{\alpha}_\lambda$ using an ordinary least regression of z on $\mathbf{w}$ and $\hat{\lambda}$.

Independent Variables and Summary Statistics

	Description	*2006*	*2008*
Income	Deflated annual household income from all sources (VND '000)	28,184	43,601
Poor	Households in the bottom quintile of the wealth distribution constructed based on food expenditure (deflated value of per capita food consumption in the previous 4 weeks in VND '000)		
	Food quintile 1	29.98	36.27
	Food quintile 2	62.16	82.30
	Food quintile 3	93.94	136.75
	Food quintile 4	142.01	206.51
	Food quintile 5	311.21	421.99
Age[1]	Age of head of household	49.49	33.33
HHsize	Size of household	4.78	4.75
HH_work_prop	Proportion of active household members in work	94.81	94.18
Total Area Owned	Total area of agricultural land owned (square metres)	10,315	8,847
		Frequency (%)	
Education	Level of education of head of households		
	Cannot read and write/did not attend school	36.87	48.21
	Completed lower primary	21.39	8.60
	Completed lower secondary	29.17	26.88
	Completed Upper secondary	10.40	15.95
	College/University	2.17	0.36
Formal Saving	Dummy variable =1 if household has formal saving	5.53	5.30
Informal Saving	Dummy variable =1 if household has informal saving	9.19	3.58
Home Saving	Dummy variable =1 if household has home saving	45.26	38.24
Shock: Natural	Dummy variable =1 if household suffered natural disaster between 2002 and 2006	32.71	45.14
Shock: Economic	Dummy variable =1 if household suffered economic shock between 2002 and 2006	1.12	14.87
Shock: Idiosyncratic	Dummy variable =1 if household suffered idiosyncratic shock between 2002 and 2006	20.31	12.48
Province Dummies	Dummy variable =1 if household located in province:		
	Ha Tay	12.99	
	Lao Cai	6.50	
	Phu Tho	8.44	
	Lai Chau	8.29	
	Dien Bien	7.92	
	Nghe An	14.49	
	Quang Nam	8.51	
	Khanh Hoa	2.54	
	Dak Lak	10.38	
	Dak Nong	6.35	
	Lam Dong	5.00	
	Long An	8.59	
Wealth Quintile	Wealth quintile based on principal component analysis of the characteristics of the household dwelling place, such as the size and value of the dwelling, energy supply, sanitation facilities and water supply and ownership of durable goods.		

Note: Summary statistics are based on sample of 1,339 households used in the analysis.

[1] The difference in the average age of the head of household may be due to the fact that in 2006 individuals were asked to state their age while in 2008 individuals were asked what year they were born. This will not affect our results given that only age in 2006 is used in our regression analysis.

Outcome Variables and Summary Statistics

	2006		*2008*
Total income (Mean '000 VND)	28,694		44,835
Agricultural income (Mean '000 VND)	11,089		17,375
Rental income (Mean '000 VND)	517		396
Income from non-farm, non-wage activities (Mean '000 VND)	4,534		7,883
Income diversification: number of different sources of income earned by household members (Mean)	4.36		4.78
Investment in land between 2006 and 2008 (Mean '000 VND)		2,948	
Agricultural productivity: agricultural income/number of household members working in agriculture (Mean VND)[1]	5.15		8.32
Rice productivity: rice yields/total rice area farmed (Mean)[2]	8.32		4.74

Note: Summary statistics are based on the sample of households who access credit in 2006 (855 households).

[1] Based on a sample of 751 households.

[2] Based on a sample of 576 households.

Consumer Price Index

Region	*Year*	*Month*	*CPI*
Red River Delta	2006	July	100.00
		August	99.85
		September	99.70
		October	99.24
North East	2006	July	90.09
		August	89.85
		September	89.31
		October	89.19
North West	2006	July	98.14
		August	97.86
		September	97.37
		October	96.37
North Central Coast	2006	July	85.52
		August	85.52
		September	85.19
		October	84.85
South Central Coast	2006	July	96.92
		August	98.88
		September	97.94
		October	97.72
Central Highlands	2006	July	92.43
		August	92.01
		September	91.67
		October	91.42
Mekong River Delta	2006	July	95.14
		August	95.29
		September	94.88
		October	94.90
Red River Delta	2008	July	115.72
		August	115.76
		September	117.02
North East	2008	July	104.37
		August	104.97
		September	106.05
North West	2008	July	114.39
		August	114.77
		September	116.58
North Central Coast	2008	July	102.61
		August	103.11
		September	104.09
South Central Coast	2008	July	116.18
		August	117.55
		September	117.95
Central Highlands	2008	July	111.88
		August	112.41
		September	113.26
Mekong River Delta	2008	July	115.67
		August	115.81
		September	116.35

Source: Computed based on CPI data available in the Vietnamese Household Living Standards Survey.