Formal and Informal Rural Credit in Four Provinces of Vietnam

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Routledge
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ABSTRACT *This paper uses a survey of 932 rural households to uncover how the rural credit market operates in Vietnam. Households obtain credit through formal and informal lenders. Formal loans are almost entirely for production and asset accumulation, while informal loans are used for consumption smoothening. The determinants of formal and informal credit demand are distinct. While credit rationing depends on education and credit history, in particular, regional differences in the demand for credit are striking. A 'one size fits all' approach to credit policy in Vietnam would be inappropriate.*

I. Introduction

Despite more than a decade of excellent macroeconomic performance Vietnam remains a poor country. Some 70 per cent of the population continues to live in rural areas and depend on agriculture for their livelihood. How the country can transform itself and its agricultural sector into a more modern society is a critical policy challenge. Access to credit for smallholders is, as elsewhere, a key ingredient in the development process. Diagne et al. (2000) demonstrate that access to credit affects household welfare through two key channels. First, it alleviates capital constraints on agricultural households. This can significantly improve the ability of households to procure needed agricultural inputs, and will also reduce the opportunity costs of capital-intensive assets, encouraging labour-saving technology and raising labour productivity. Second, credit access increases the risk-bearing capacity of households, altering risk-coping strategies. Households with access to credit may be more willing to pursue promising but risky technologies, and will be better able to avoid risk-reducing but inefficient livelihood strategies.

Such considerations have, as elsewhere in the developing countries, led the Vietnamese Government and its donor community to set up rural credit

programmes; and significant expansion is foreseen in the coming years (see World Bank, 2003). Formal and informal credit market segments exist in Vietnam much along the lines of the dual credit market described by Mohieldin and Wright (2000). They cite Hoff and Stiglitz (1993), and point out that there are two competing views as to why formal and informal credit markets co-exist. Government may intervene, capping interest rates, and this remains the case in Vietnam. The alternative view, that differences in the costs of screening, monitoring and contract enforcement across lenders lead to fragmentation, also appears to carry explanatory power.

The interaction between the formal and informal credit market segments is also open to conflicting interpretations. This is evident in the theoretical papers by Gupta and Chaudhuri (1997) and Chaudhuri (2001), on the one hand, and the careful empirical work by Zeller (1994), Diagne (1999) and Diagne et al. (2000), on the other. Diagne and co-authors highlight that understanding how informal institutions serve the financial needs of households and interact with the formal credit institutions is important, especially for 'sustainable and market-oriented financial institutions that plan to expand and complement the services offered by the existing informal credit market rather than substitute for them'. Diagne et al. (2000) offer a concise methodological review, which together with papers by Kochar (1997) and Petrick (2005) provide the general analytical background for the present study. Kochar points out that the literature on rural credit has generally assumed that households are rationed in their access to subsidised 'formal' credit; but she adds that the validity of this assumption hinges on the level of effective demand for formal credit, which is in turn a function of the demand for credit and its availability from 'informal' sources. This implies that the extent of credit market rationing may be less than is often assumed. We take this cautionary note seriously here and attempt to capture credit demand correctly.

Little is known about the rural credit market in Vietnam and the extent to which credit rationing impedes agricultural development. Generating policy-relevant insights into the characteristics and functioning of the rural credit market is, on this background, well justified. It is helpful that the general academic literature on rural credit markets and their importance in developing countries has seen a welcome expansion during the last 15 years, following Jappelli (1990) and Feder et al. (1990). They relied, respectively, on household survey data from the US and China, and this methodological approach has subsequently been put to good use in most of the papers cited above. Our study is situated within this literature, and it relies on what Diagne et al. (2000) refer to as the 'direct method'. More specifically, we provide a careful econometric analysis of the determinants of credit demand and credit rationing for rural households in four provinces of Vietnam,[1] using a new survey of 932 households in combination with information from the 2002 Vietnam Household Living Standard Survey (VHLSS).

The paper is structured as follows. After data description in Section II, we provide in Section III a detailed descriptive overview of the characteristics of the rural credit market with a focus on the division between formal and informal credit. In Section IV, we identify the determinants of credit demand, and proceed to analyse in Section V household characteristics, which potentially influence the probability of being credit rationed. Section VI concludes.

II. Data

Key data used here (including, in particular, information on the demand for credit) were generated in a comprehensive household survey of land, labour and credit markets in the provinces of Long An, Quang Nam, Ha Tay and Phu Tho. The survey, also known as the ILSSA Access to Resources Survey,[2] was carried out in the first quarter of 2003 in collaboration with the Vietnamese Institute of Labour Science and Social Affairs (ILSSA) (see Mekong Economics, 2004). A total of 932 rural households were surveyed. These households are identical to the rural households previously interviewed in quarters 1 and 2 as part of the nationally representative 2002 Vietnam Household Living Standard Survey (VHLSS). In the VHLSS 2002, data were collected on income, expenditure and various other background variables. We use this largely pre-determined information in combination with our own data, collected about a year later to construct explanatory variables.

The provinces studied are located in four different regions of Vietnam as follows: (i) Long An in the fertile Mekong Delta, which is also the most densely populated of the four provinces; (ii) Quang Nam in the sparsely populated Central Highlands; (iii) Phu Tho in the North Western Highlands, a mountainous region with a high share of ethnic minorities; and (iv) Ha Tay in the Red River Delta surrounding Hanoi. The ILSSA survey is not nationally representative, but it is representative for rural households in the provinces under study. They cover a lot of the variation in geographical and socio-economic conditions, including regional differences between the north, centre and south of Vietnam.

The ILSSA survey covered a variety of topics related to land, labour and credit. We rely here on the credit component, including illuminating questions on the source and use of loans, designed to elicit the full credit history of households during the recent past. Care was taken to get correct answers regarding the use of each loan, by asking about both the stated purpose of borrowing and what the loan was actually used for. Even if loans are generally used for the purpose applied for, fungibility in the form of substitution and diversion – using the terminology of Von Pischke and Adams (1980) – may be present. The general purpose of these questions was to help clarify the functioning of rural credit markets and to assess the extent to which credit rationing constrains agricultural development. Questions covered issues such as (i) number of loans applied for and actually received, including information on amounts involved, interest, period and source of the credit; (ii) whether the household had at some point wanted to apply for a loan, but refrained from doing so; and (iii) other relevant background such as the use of the loan and collateral requirements.

III. Rural Credit

The supply side of the rural credit market in Vietnam includes a number of formal and informal lending institutions. The Vietnam Bank for Agriculture and Rural Development (VBARD) is the biggest formal lender. The much smaller Vietnam Bank for the Poor (VBP) specialises in lending to poorer households, often through the Women's, Farmers' and People's Unions. Credit market segmentation is typical in many developing countries (see for example Yadav et al., 1992; Zeller, 1994;

Duong and Izumida, 2002 for the Vietnamese case); and in Vietnam it is natural to divide the rural credit market into three different segments, one formal and two informal. The formal segment includes all formal institutions (including the Unions),[3] while the informal sector consists of (i) private lending by unrelated individuals and friends charging interest; and (ii) lending from families, relatives and friends carrying zero interest. These two segments will be referred to as 'private' and 'friends' in what follows. The distinction between friends, who lend and charge interest, and friends, who lend charging zero interest, may seem arbitrary. However, the data reveal a marked discontinuity at zero interest. Friends who lend and charge interest, charge on average only slightly less than private money lenders (not characterised as friends).

Table 1 provides details on loans obtained in 2002. This is the most recent year from which data are available, and subtle differences between loans obtained in the different market segments are illustrated. Arguably, the definition of the formal segment is broad, but the characteristics are illuminating.

The differences in terms of volume and loan size are evident. Loan amounts are, on average, twice as large in the formal sector compared with private money lenders,

Table 1. Characteristics of loans obtained, 2002

		Informal segment	
	Formal segment	Private lenders	Friends (zero interest)
Number of loans	250	55	84
Loan amount (Dong)	8,426	3,904	2,602
Duration (average number of months)	15 ($N=248$)	9 ($N=24$)	4 ($N=11$)
Unspecified duration (%)	1	56	87
Interest (% per month)	0.87	1.78	0
Collateral (% of loans)	71	0	0
Partial default[1] (%)	8	11	1
Provinces:	*Pct.*	*Pct.*	*Pct.*
Ha Tay (%) ($N=126$)	52	14	35
Phu Tho (%) ($N=106$)	50	21	29
Quang Nam (%) ($N=24$)	77	8	15
Long An (%) ($N=118$)	88	10	2

Distribution of loans by source and province (weighted by loan size)

	VBP	VBARD	Private lenders	Relatives	Union	Others
Ha Tay (%) ($N=126$)	3	32	6	22	14	22
Phu Tho (%) ($N=106$)	4	42	10	27	7	12
Quang Nam (%) ($N=24$)	4	73	2	6	3	11
Long An (%) ($N=118$)	1	76	2	3	1	18
Total	2	56	4	13	7	18

Source: Authors' calculations based on ILSSA Access to Resources Survey 2003.
Note: [1]Partial default is the default rate measured as the percentage of loans where households have defaulted.

and more than three times the size of loan amounts from friends. In terms of number of loans, private lenders and friends still account for 36 per cent of all loans. This suggests that poor rural households in Vietnam continue to rely on networks and relatives when they try to deal with shocks and face hard times. This is in line with what is generally found in the literature on rural households in developing countries (see Platteau, 1997).

Loans from the formal sector have an average duration of 15 months. The duration is shorter in the interest-carrying informal sector. With an average of nine months, it is clear that this market segment is not only used for short term purposes. Borrowing from friends and relatives at zero interest is either for a short period or no specific duration is agreed for the loan. A total of 87 per cent of the loans among friends have no formal length specified, suggesting that this kind of loan typically involves lending among family members or close friends. Around 56 per cent of the interest-carrying informal loans from private lenders also have no duration specified.

The default rate is the percentage of loans in each segment where households have defaulted, including non-payment of interest or repayment of the principal. The magnitude of the figures is hard to assess. One reason is that the principal is paid in full at the end of the loan term for most formal loans, so only interest payments are made regularly. Paying both interest and principal at the end of the agreed loan period is also quite common. Thus, an 8 per cent default rate within a period of one year (as shown in Table 1) is substantial if this involves non-payment of interest only. On the other hand, it is not clear from the data whether this payment was made sometime later or whether the household simply stopped paying instalments on the loan.

Collateral is used for 70 per cent of all formal loans whereas no collateral is needed in the informal sector. Land with a red book is used as collateral in the majority of loans. House and land without red book are also used, but to a lower degree, and there are significant regional differences in the use of collateral (not reported).

Table 1 confirms that Ha Tay and Phu Tho both have about 50 per cent of the loans in the formal segment. In contrast, in Long An almost 90 per cent of the loans originate in the formal sector. This corresponds well with the perception that southern Vietnam (where Long An is situated) is relatively more 'market-based' than other regions of the country. Similarly, although households in Quang Nam obtain close to 80 per cent of their loans in the formal sector, very few households obtain any credit at all, reflecting the underdeveloped nature of the economy of this province. The bottom of Table 1 provides information on the distribution of loans by different sources. The main difference is between Quang Nam and Long An, on the one hand, and Ha Tay and Phu Tho, on the other.

The above observations suggest that different segments in the loan market serve different needs. In Table 2 this is further explored by tabulating the use of loans in the three credit segments. The formal sector focuses almost entirely on demand for production loans and asset accumulation. A higher share of loans from the informal sector is directed towards health expenditure and consumption. These loans are likely to be due to household shocks or unforeseen events. In addition, more than 50 per cent of the interest bearing loans from the informal sector is for production purposes, demonstrating the importance of this loan segment for the growth process.

Table 2. Use of loan by credit source (%), 2002

| | | Informal segment | | |
| | | | | |
Use of loan	Formal segment $(N=250)$	Private lenders $(N=55)$	Relatives (zero interest) $(N=84)$	Total
Production	81	55	36	68
Repayment of other loans	4	9	1	4
Asset accumulation	9	5	23	12
Health expenditure	3	11	12	6
Consumption	3	20	29	11
Total	100	100	100	100

Source: Authors' calculations based on ILSSA Access to Resources Survey 2003.

IV. Credit Demand

This section seeks to identify the determinants of credit demand at the household level in 2002. In a setup where only matched (that is, approved) loan applications are observable, the analyst cannot identify the characteristics affecting real credit demand at the household level. Even with knowledge about rejected loan applications, identification of 'self constrained' households is challenging. Our dataset contains the information required to address these identification problems. We are able to categorise households as demanding credit if they: (i) obtained a loan; (ii) had a loan rejected; or (iii) did not apply even if they wanted credit.

The underlying structural framework for analysing credit demand is a household production model with utility maximising households. They demand credit (demand $= 1$) if a loan is expected to increase utility, and they do not demand credit (demand $= 0$) in the opposite case. If a household demands credit, the size of the loan applied for is determined by variables related to the optimal investment if the loan is for investment purposes or the optimal consumption if the loan is for consumption. This framework leads to a hurdle model where demand for credit is first characterised by a probit model. Thus,

$$P(demand = 1) = \Phi\big(h\big(H_i, X_c, D_p\big)\big) \qquad (1)$$

where h is a linear function of the vectors of explanatory variables. H_i is a vector of household characteristics, X_c captures village characteristics and D_p represents province dummies. The expected value of the amount of credit demanded given that the household demands credit is described by a lognormal model such that:

$$\big\{\log(loan\ amount)|demand = 1, g\,(H_i, X_c, D_p)\big\} \sim N\big(g(H_i, X_c, D_p), \sigma^2\big) \qquad (2)$$

The function $g(H_i, X_c, D_p)$ is a linear form of the same explanatory variables as in the probit model for whether or not to demand credit. The parameters in this stage can be estimated by OLS.[4] From the demand equation (1) and the level

equation (2), the expected level of credit demand conditional on explanatory variables is given by:

$$E(loan\ amount)|H_i, X_c, D_p) = \Phi\big[h(H_i, X_c, D_p)\big]\ \exp\big[g(H_i, X_c, D_p) + \sigma^2/2\big] \quad (3)$$

At the household level controls include age and education of the household head, a proxy for the information level (a dummy capturing whether the newspaper *People* is read or not), and productive assets. These are total land holdings, number of adults as a proxy for labour power, and feed expenditure as a proxy for the size of livestock holdings. We also control for the value of total household assets and the need for obtaining credit. Furthermore, a proxy is included to capture shocks at the household level through a dummy showing whether a household member was hospitalised within the last 12 months. The gender of the household head is also included, and we control for 'connectedness', using a dummy which indicates whether anyone in the household has acquaintances in existing credit institutions. Credit history is controlled for through the variable 'not paid' capturing whether a household has defaulted, that is, not made a repayment on a loan in full or in part on a loan obtained prior to 2001. Finally, we take account of the influence of security of land tenure, including the share of household land area for which a red book is in hand.

Village level information includes distance to the district centre where VBARD/VBP has an office, and four province dummies capture whether households live in Ha Tay, Phu Tho, Quang Nam or Long An.

In the present analysis, data for the following explanatory variables originate from the VHLSS 2002: age, gender, education, adults, dependents, animal feed, total assets, distance, information, and hospitalisation. These data were collected about one year before the ILSSA survey, so can be treated as pre-determined. In addition to the provincial dummies, data for the remaining explanatory variables, that is, total land, connections, credit history and share of land covered by a red book, come from the ILSSA survey. Since land ownership was collected with a time dimension the amount of land owned in 2001 is exogenous to credit demand in 2002.

Two sets of summary statistics are given in Table 3. The first two columns show for each variable the number of observations for which data are available in the total sample used in Section III. Information is missing on distance and total assets for, respectively, 40 and 15 households (with no overlap). In addition, two households had no land in 2001. Accordingly, the last five columns provide summary statistics for the 875 households used in the empirical analysis. They are referred to as the full sample below.

Table 3 demonstrates that the reduction in sample size due to missing observations is not important. Means change very little. The age of the household head ranges from 22 to 93 years, and some 20 per cent of households are female headed. In addition, the education variable confirms that household heads have on average more than six years of schooling. Other observations include that while the average land area is small (that is, around two-thirds of a hectare) there are indeed a few households with large landholdings and substantial assets in the form of livestock. Moreover, 19 per cent of all households in the full sample had at least one member in hospital during 2002, and 21 per cent of households read the newspaper *People*.

Table 3. Demand for credit: summary statistics, 2002[1]

	N^2	Mean	N^3	Mean	Std. dev.	Min	Max
Demand for credit	932	0.34	875	0.367	0.48	0	1
Age	932	47.74	875	47.61	14.31	22	93
Total land (1,000 m^2)	932	6.33	875	6.49	15.44	0.02	177
Total land squared	932	265.5	875	280.2	1,874.4	0.00	31,152
Gender (male = 1)	932	0.80	875	0.81	0.40	0	1
Education	932	6.33	875	6.47	3.35	0	12
Adults	932	2.44	875	2.46	1.21	0	10
Dependents	932	1.93	875	1.96	1.18	0	6
Feed (mill. Dong)	932	1.38	875	1.44	4.91	0	80
Ha Tay	932	0.35	875	0.35	0.48	0	1
Phu Tho	932	0.21	875	0.22	0.42	0	1
Quang Nam	932	0.23	875	0.21	0.41	0	1
Long An	932	0.21	875	0.22	0.41	0	1
Total assets (mill. Dong)	917	12.86	875	13.02	20.91	0	370
Total assets squared	917	589.4	875	606.3	4,938.0	0	137,122
Distance (km)	892	8.82	875	8.75	8.98	0	40
Information	932	0.22	875	0.21	0.41	0	1
Hospitalisation	932	0.20	875	0.19	0.40	0	1
Connections	932	0.52	875	0.52	0.50	0	1
Red book	930	0.78	875	0.79	0.35	0	1
Not paid	932	0.08	875	0.08	0.27	0	1

Source: Authors' calculations based on ILSSA Access to Resources Survey 2003.
Notes: [1]For complete definitions see main text. [2]Total number of observations available for each variable. [3]Number of observations used in the empirical analysis. See main text.

Finally, some 8 per cent of households have defaulted on a loan, and 79 per cent of the total household land area was registered with a red book.

We hypothesise that productive capital (land holdings, number of adults and livestock holdings) affects the propensity to demand credit and the level demanded positively. The greater the landholdings the more likely a farmer is to demand credit to get access to fertiliser and other inputs. The coefficient on education of household head is likewise expected to have a positive sign. Greater ability and human capital should affect investment possibilities. Similarly, being better connected, informed and with secure land rights should have a positive impact on credit demand. Finally, many dependents and a person hospitalised in the last 12 months are proxies for a higher probability of the household being in need of credit. They are thus more likely to demand loans.

A priori expectations about the signs of the variables capturing the age and sex of the household head and credit history are less clear, so these variables are included as controls without well defined priors. The same goes for the total asset base. A larger asset base would tend to make self financing of loans more viable. On the other hand, it may also improve the loan terms which households are offered, making it cheaper to obtain a loan.

It is expected that the distance (village) coefficient is negative. The further away the household lives from the district centre the more costly it is to obtain the loan. This argument will not necessarily hold if demand is directed towards local

moneylenders. Yet, in remote villages local moneylenders are likely to hold more monopoly lending power, demanding stricter repayment conditions (which we do not control for) and thus discourage credit demand.

Table 4 reports results from estimation of Equations (1) and (2) together with marginal effects. To account for regional diversity and to investigate if coefficients differ between regions, variables of central interest were augmented with regional dummy interaction terms in the demand equation.[5] Land holdings, education, distance to village centre, gender and the share of landholdings with a red book were interacted with regional dummies. We estimated this large model (results not reported) and retained in all subsequent regressions the interaction terms when they were individually significant or the joint test of insignificance failed when including that variable. The procedure suggested that land area be augmented with a dummy for Long An province, distance with Quang Nam and Phu Tho dummy variables and possession of red book with a Quang Nam dummy. The augmented variables are listed in the tables under their 'main' counterpart labelled with the province name for which the variable is augmented.[6]

The results confirm that land is a statistically significant determinant of credit demand, but this impact differs between Long An and the three other provinces. Outside Long An, the probability of demanding credit increases with land size. This is not so for loan size. For Long An, the opposite is true. While the size of land holdings has virtually no impact on the probability of demanding credit, the amount obtained depends significantly on landholdings. In economic terms the effects are not large. In Long An, an extra 1,000 m^2 of land gives a 1.4 percentage point larger loan, whereas the probability of demanding credit goes up 0.66 percentage points for an additional 1,000 m^2 in the other provinces. The connectedness variable is positive, large and strongly significant, confirming that being connected has a clear and positive impact on credit demand. No impact is found for loan size. This suggests that connectedness works through increased knowledge of opportunities rather than through preferential treatment. The number of adults affects credit demand strongly both in terms of statistical and economic significance. An extra adult in the household increases the probability of demanding credit by more than 3 per cent, ceteris paribus. Apart from increasing the investment potential more adults also augment the scope for demand for consumption loans. Assets and the proxy for livestock holdings (feed) have small or no effect on credit demand, but they affect the credit amount (given a loan was obtained) positively and significantly. The effects on loan size are small in economic terms. A doubling of livestock holdings (feed) from its mean level results in a 5 per cent increase in loan size given that the household obtains a loan. The age of the household head is also significant, but the older the household head the less credit is demanded. This likely reflects that older people are more settled and less likely to take new and capital demanding initiatives.

Table 4 reveals interesting differences in credit demand among the provinces under study. Recalling that Ha Tay is the base, there are large significant differences between Ha Tay and the three regional dummy variables for Phu Tho, Quang Nam and Long An. Controlling for other factors the demand for credit is significantly lower in Phu Tho and Quang Nam than in Ha Tay and Long An. Demand is lowest in Quang Nam, although not significantly lower than in Phu Tho, and highest in Long An. The differences have large economic significance as well. For otherwise

Table 4. Determinants of credit demand, 2002

Dependent variable according to column headings	Full sample					
	Probit (demand = 1) Marginal effects[1] (1)		OLS[2] Log (amount) if demand = 1 (2)		Marginal effects[3] ∂E (*amount*) ∂x (3)	
Age	−0.41***	(0.12)	0.0071	(0.0059)	−12.4	(12.6)
Land	0.65**	(0.33)	−0.0004	(0.0030)	43.7	(46.7)
Long An	−0.66*	(0.34)	0.0140***	(0.0041)	−9.5	(54.6)
Gender (male = 1)	−6.46	(4.40)	0.2550	(0.2003)	70.4	(408.3)
Education	−0.07	(0.59)	0.0336	(0.0262)	43.6	(60.0)
Adults	3.25**	(1.32)	−0.0610	(0.0590)	64.6	(148.1)
Dependents	0.81	(1.35)	−0.0038	(0.0672)	34.5	(144.6)
Feed (mill. Dong)	0.63*	(0.34)	0.0374***	(0.0102)	107.5**	(53.7)
Total assets (mill. Dong)	0.10	(0.08)	0.0077**	(0.0031)	20.8**	(9.3)
Distance (km)	−0.45	(0.49)	−0.0212	(0.0154)	−65.7	(51.7)
Phu Tho	1.49**	(0.62)	0.0089	(0.0154)	97.8	(68.3)
Quang Nam	−1.48**	(0.72)	0.0184	(0.0474)	−61.9	(240.2)
Information	−3.73	(4.43)	0.2715	(0.1903)	344.6	(425.1)
Hospitalisation	1.83	(4.66)	0.0941	(0.1873)	324.7	(426.3)
Connections	12.55***	(3.52)	−0.0188	(0.1386)	678.2*	(390.9)
Red book	−0.90	(4.84)	0.2155	(0.2704)	397.9	(615.4)
Quang Nam	27.47	(19.74)	0.5103	(0.6656)	6,097.3	(10,776)
Not paid	6.43	(6.01)	−0.1263	(0.2782)	112.0	(706.9)
Phu Tho	−14.38***	(4.86)	−0.4179**	(0.1974)	−1,282.7**	(581.6)
Quang Nam	−31.98***	(12.34)	−0.2901	(0.7274)	−36,215.4	(8.8E7)
Long An	20.91***	(6.48)	0.6716**	(0.2679)	3,187.2*	(1643.2)
Constant	...		7.112***	(0.4409)	...	
Test: all coefficients are zero	Wald chi²(21) p-value = 0.0000		F(35,44) p-value = 0.0000		...	
Goodness of fit	Mcfadden R^2 = 0.13		R^2 = 0.35		...	
Number of observations (clusters)	875 (46)		293 (45)		875	

Source: Samples from ILSSA Access to Resources Survey 2003 as described in the main text.
Notes: Standard errors in parentheses. Level of significance robust for clustering at the enumeration area throughout. *, **, *** significant at 10, 5 and 1 per cent, respectively. [1]Coefficients on continuous variables measure the marginal effect in percentage points on the probability of demanding credit, whereas they measure the effect of discrete changes for the dummy variables. All marginal effects are evaluated at sample means. [2]Coefficients (semi-elasticities) from OLS regression on log(loan amount). Only received loans included. [3]Marginal effects of coefficients on the unconditional expectation of loan amount evaluated at sample means. Robust standard errors obtained by non-parametric bootstrap with 1,000 replications.

similar households, being located in Long An entails a 50 per cent increase in the probability of demanding credit relative to Quang Nam. This is further compounded when taking into account the differences in the amount of credit given that a loan is obtained, and the marginal effects on the unconditional (on having a loan)

expectation of household credit amount. These observations correspond well with the respective level of development of the provinces studied, and it confirms that credit issues will remain key challenges as the transformation of the Vietnamese economy proceeds. Regional differences are also present with respect to distance from the village centre. Relative to Ha Tay province greater distance has a positive impact on the probability of demanding credit in Phu Tho. The opposite is the case in Quang Nam. While it is not obvious what drives the result for Phu Tho, the finding for Quang Nam is in line with the prior expectation of this mountainous region. Finally, among the statistically insignificant variables, it is worth noting the coefficient on the variable 'Red book' – the share of land holding under the red book. For Quang Nam the coefficient is large and positive while for the base (that is, the other three provinces) it is small and negative.

When we pool informal and formal demand we risk blurring the picture of rural credit demand. To explore this, Table 5 presents results of probit regressions where formal and informal credit demand is studied separately in a bivariate probit model where non-independence in the error term is allowed for. Thus, using i to indicate households,

$$
\begin{aligned}
&z_{1i} = 1 \quad \textit{if } z_{1i}^* = \beta_1 q_{1i} + \varepsilon_{1i} > 0, 0 \textit{ otherwise} \quad \textit{(demand for formal credit)}\\
&z_{2i} = 1 \quad \textit{if } z_{2i}^* = \beta_2 q_{2i} + \varepsilon_{2i} > 0, 0 \textit{ otherwise} \quad \textit{(demand for informal credit)}
\end{aligned}
\tag{4}
$$

where ε_{1i} and ε_{2i} have mean zero and unit variance (for normalisation), such that $(\varepsilon_{1i}, \varepsilon_{2i}) \sim binorm(0,0,1,1,\rho_z)$ with ρ_z being the coefficient of correlation. q_j is a vector of explanatory variables. The first element is one, and β_j is the vector of coefficients to be estimated, $j = 1,2$. Our interest is whether factors determining credit demand differ between the formal and informal sectors, that is, whether $\beta_1 = \beta_2$ The explanatory variables are the same as those in Table 4.

The reported test for independence between the equations shows that the null hypothesis of independence cannot be rejected. Specifying an individual probit regression for each equation yields almost the exact same result (not reported) as the bivariate model. Analogous to the results from the pooled formal and informal credit markets presented in Table 4, Table 5 shows determinants of logarithmic loan size and marginal effects conditioning on the households obtaining a loan in, respectively, the formal and informal sector (columns 2, 3, 5 and 6).[7]

As regards the distinction between formal credit and informal credit, it is clear why some of the insignificant statistical results were obtained in Table 4. Columns 1 and 4 of Table 5 show that countervailing impacts between formal and informal credit segments are involved when it comes to education, dependents, assets, credit history and the red books. An additional year of education of the household head significantly reduces the probability of the household demanding credit from informal sources. Also, regarding the formal segment, although education is insignificantly positive as a determinant of credit demand, it increases the size of the loan obtained by around 5 per cent given that a loan is obtained. For the formal market more assets increase the probability of demanding credit; the opposite holds in the informal market. This is consistent with productive assets giving more opportunities for investments and therefore increased demand for credit from formal sources. On the other hand, a larger asset base makes borrowing less necessary in the

Table 5. Determinants of formal and informal credit demand

Dependent variable according to column headings	Demand formal (full sample)			Demand informal (full sample)		
	Probit (demand = 1) Marginal effects[1] (1)	OLS[2] Log (amount) if demand = 1 (2)	Marginal effects[3] ∂E (amount) ∂x (3)	Probit (demand = 1) Marginal effects[1] (4)	OLS[2] Log (amount) if demand = 1 (5)	Marginal effects[3] ∂E (amount) ∂x (6)
Age	−0.24** (0.10)	0.014* (0.008)	0.64 (9.3)	−0.23*** (0.08)	0.004 (0.009)	12.6*** (4.0)
Land	0.32** (0.14)	0.010 (0.007)	35.7*** (10.2)	0.01 (0.09)	−0.016** (0.008)	−4.6 (3.8)
Long An	−0.25 (0.16)	−0.000 (0.007)	−18.7** (9.3)	−0.03 (0.13)	0.109 (0.083)	14.0 (44.4)
Gender (male = 1)	−3.38 (4.01)	0.196 (0.239)	−59.8 (315.0)	−3.11 (2.51)	0.581** (0.269)	136.9 (143.1)
Education	0.48 (0.49)	0.052** (0.025)	102.7*** (31.2)	−0.75** (0.34)	−0.015 (0.040)	−31.5 (20.4)
Adults	2.82** (1.09)	−0.058 (0.086)	106.0 (98.5)	0.67 (0.74)	−0.178* (0.104)	−47.5 (54.7)
Dependents	0.09 (1.33)	0.022 (0.080)	31.4 (91.5)	1.54* (0.79)	−0.042 (0.123)	7.7 (55.3)
Feed (mill. Dong)	0.53** (0.27)	0.016*** (0.003)	51.5*** (8.7)	0.33** (0.15)	0.058*** (0.005)	40.0*** (9.7)
Total assets (mill. Dong)	0.17*** (0.06)	0.005** (0.002)	16.2*** (3.2)	−0.17*** (0.06)	0.026** (0.012)	5.7 (6.2)
Distance (km)	−0.53 (0.39)	−0.017 (0.012)	−53.7*** (16.0)	0.03 (0.26)	0.006 (0.024)	16.4 (10.4)
Phu Tho	1.06** (0.49)	−0.008 (0.016)	52.8*** (20.0)	0.35 (0.33)	−0.016 (0.040)	−2.7 (18.2)
Quang Nam	−1.03 (1.00)	−0.022 (0.064)	−77.5 (64.4)	−0.39 (0.43)	0.034 (0.033)	−13.6 (14.4)
Information	−1.63 (3.94)	−0.140 (0.250)	−237.8 (340.4)	−2.27 (2.15)	0.628** (0.258)	139.8 (217.2)
Hospitalization	−0.90 (3.01)	0.250 (0.220)	267.1 (433.0)	4.44 (3.25)	0.192 (0.246)	396.3 (307.5)
Connections	6.96** (2.70)	0.153 (0.132)	648.3** (279.7)	6.74*** (2.33)	−0.278 (0.238)	261.7** (130.7)
Red book	7.63 (4.84)	−0.302 (0.232)	207.8 (283.6)	−5.27* (3.17)	0.417 (0.455)	39.0 (220.9)
Quang Nam	11.17 (18.11)	1.102 (0.667)	1817.3*** (710.1)	7.83 (9.34)	−1.897 (3.970)	−573.6 (1878.6)
Not paid	−0.79 (4.37)	−0.048 (0.392)	−144.9 (541.1)	7.38* (4.35)	−0.280 (0.543)	−14.2 (250.1)
Phu Tho	−4.50 (4.50)	−0.432 (0.281)	−679.4** (312.1)	−1.04 (4.21)	−0.529 (0.681)	−184.0 (292.6)
Quang Nam	−8.89 (16.75)	−0.384 (0.492)	−843.8 (981.1)	−15.4*** (4.62)	1.228 (3.355)	−330.4 (885.7)
Long An	29.91*** (8.51)	0.793*** (0.275)	4458.4*** (1288.2)	−8.18*** (2.92)	−0.487 (0.730)	−420.5 (316.4)
Constant	...	7.33*** (0.430)	...	...	7.12*** (0.659)	...
Test: all coefficients are zero	Wald chi²(42) p-value = 0.0000	F(21,20) p-value = 0.0000	...	Wald chi²(38) p-value = 0.0000	F(21,13) p-value = 0.0000	...
	Wald test ρ = 0, p-value 0.96			Wald test ρ = 0, p-value 0.84		
Goodness of fit		R² = 0.37	...		R² = 0.34	...
Number of observations (clusters)	875 (46)	192 (41)	875	875 (46)	113 (34)	875

Source: Samples from ILSSA Access to Resources Survey 2003 as described in the main text.

Notes: Standard errors in parenthesis. Robust standard errors and adjustment for clustering at the enumeration area throughout. *, **, *** significant at 10, 5 and 1 per cent, respectively. [1]Coefficients on continuous variables measure the marginal effect in percentage points on the probability of demanding credit, whereas they measure the effect of discrete changes for the dummy variables. All marginal effects are evaluated at sample means. Estimated jointly with bivariate normal error term. Estimate of correlation coefficient: ρ = 0.03. [2]Coefficients (semi-elasticities) from OLS regression on log(loan amount). [3]Marginal effect of coefficients on the unconditional expectation of loan amount evaluated at sample means. Standard errors obtained by the delta method.

case of negative shocks – hence, a lower probability of borrowing from the informal sector. If a loan is obtained, it tends to increase with asset base in both segments. Arguably, this is due to easier access to collateral when the asset base is larger.

In addition to the observations outlined above, two policy-relevant differences are apparent between Tables 4 and 5. The first relates to credit history (not paid). Pooling formal and informal credit demand yields a large positive (but insignificant) marginal effect of a 'bad' credit history. Table 5 suggests an explanation for this result. A bad credit history significantly increases the probability of demanding credit from an informal source – and the effect is large in economic terms. For the formal sector the effect is negative, though insignificant. While caution is needed in interpreting this finding, it is consistent with 'bad' credit history households being unable to secure loans in the formal sector. They therefore direct their demand towards the informal sector. The second issue is that of red book coverage of land holdings. A larger share of land with a red book means more secure land rights. This in turn may induce productivity enhancing investments as suggested by Besley (1995). In the pooled sample no such effect is evident, except from – insignificantly – the province of Quang Nam. Splitting the formal and informal credit market gives a large positive effect on formal credit demand bordering on significance. Demand for informal credit is significantly and negatively affected by red book status. It seems the red book enables households to obtain loans on better terms in the formal sector than those available in the informal sector.[8]

In sum, formal demand is driven by factors such as total land and to a lesser extent by red book status, while being connected is equally important. Informal credit is negatively associated with age and education and positively dependent on a bad credit history and on the number of dependents, reflecting household need to smooth consumption and address external shocks. When households have assets they are better able to manage these needs without relying on informal credit as reflected in the coefficient of total assets. Provincial differences stand out. In terms of the informal credit market, Quang Nam and Long An have significantly less activity. For Long An this is more than compensated for by very high formal market participation relative to the base province of Ha Tay, whereas Quang Nam also has lower activity in the formal market (not significant). The province of Quang Nam is clearly a relatively underdeveloped province (as compared to Ha Tay) whereas Long An stands out as the most developed province.

V. Credit Rationing

Earlier literature typically assumed that all households have a positive demand for credit (see Eswaran and Kotwal, 1989; Braverman and Stiglitz, 1989). Households, who had not obtained credit within a given period, were considered credit rationed.[9] Several more recent papers have, however, documented that this assumption may be too restrictive (see Kochar, 1997).

We pursue this theme here and identify factors at the household level, which influence the probability that a household with given characteristics is credit constrained. It would be preferable to study the formal and informal sectors separately, but only 25 households had a loan application rejected (formal and informal). Nevertheless, the characteristics which influence credit rationing are likely

to be at least similar in the formal and informal segments making it worthwhile to pursue the issue in the aggregated sample. Similarly, because of sample composition, it is not feasible to augment variables with province level dummies. Nevertheless, interesting results emerge.

Importantly, a household is defined as being credit rationed if it has *both* applied for a loan (formal or informal) *and* had the application rejected.[10] From household responses it can be established whether a household demands credit, but for those households who did not apply for credit, it is impossible to observe what the lender decision would have been had those households actually applied. We address this sample selectivity problem by specifying a bivariate variant of Heckman's selection model (Wooldridge, 2002) as follows:

$$
\begin{aligned}
y_{1i} &= 1 \quad if \; y_{1i}^* = \delta_1 x_{1i} + u_{1i} > 0, 0 \; otherwise \quad (rationed) \\
y_{2i} &= 1 \quad if \; y_{2i}^* = \delta_2 x_{2i} + u_{2i} > 0, 0 \; otherwise \quad (applied)
\end{aligned}
\tag{5}
$$

Error terms are assumed to be bivariate normally distributed with zero mean, unit variance and correlation ρ_u. Thus $(u_{1i}, u_{2i}) \sim binorm(0,0,1,1,\rho_u)$ and y_{1i} (that is, a loan is approved or rejected) is observed only when $y_{2i} > 0$. The vectors of explanatory variables, x_{1i}, x_{2i}, have one as their first element. The second equation is the selection equation, explaining the household decision to apply for a loan ($y_{2i} = 1$). It is specified using the results from Section IV.[11] Characteristics at the household, commune and province level are aggregated in, respectively, x_{1i} and x_{2i}.

This simultaneous approach allows the identification of determinants of credit rationing taking into account the possible selection bias for households applying for credit. Testing for independence between the two equations is equivalent to testing the hypothesis that ρ_u equals zero.

Table 6 summarises our results about credit rationing. The first column (base applied) shows the coefficients (not marginal effects), including all of the variables used in Section IV, and it is instructive to compare the various estimates with those in Table 4. The significant rationing variables in Table 6 correspond well with the credit demand results in Table 4. This suggests that our results are indeed robust.

The base specification of rationing is shown in column two (specification 1). We include only variables which are believed to affect borrower ability to repay loans, and which are (at least in principle) observable to the lender, together with provincial dummies. Thus, we include land and assets, education, feed expenditures, credit history and the share of land for which the borrower has a red book. This last variable is a proxy of borrower ability to secure repayment. Arguably, the number of adults might also be a useful indicator of repayment ability. We do not include it in the rationed base since the lender is in effect unable to monitor the effort to repay, and including adults brings no qualitative changes to the results (not reported).

A bad credit history and education are significant with the expected signs. Also the coefficients for assets and the share of land with a red book have expected signs, although they fail conventional significance tests. The larger the share of land for which the household has a red book the lower the probability of being refused access to credit. The sign of the coefficient on the land variable is contrary to prior expectations, but insignificant. The provincial dummies reveal significant differences in the probability of being rationed. Relative to Ha Tay, the households in Phu Tho,

Table 6. Credit rationing, 2002

Variables	Base applied[1]		1. Rationed base[2]		2. Age, gender[2]		3. Distance, information[2]		4. Connections[2]	
Age	−0.0117***	(0.0030)			0.024	(0.044)				
Total land (1,000 m²)	0.0030	(0.0039)	0.022	(0.024)	0.021	(0.025)	0.022	(0.025)	0.029	(0.023)
Gender (male = 1)	−0.2081*	(0.1076)			1.379*	(0.0754)				
Education	−0.0004	(0.0162)	−0.363***	(0.112)	−0.390**	(0.171)	−0.375***	(0.112)	−0.331***	(0.095)
Adults	0.0951**	(0.0387)								
Dependents	0.0012	(0.0367)								
Feed (mill. Dong)	0.0188**	(0.0078)	0.054	(0.056)	0.050	(0.055)	0.057	(0.054)	0.052	(0.057)
Total assets (mill. Dong)	0.0023	(0.0026)	−0.019	(0.034)	−0.021	(0.032)	−0.020	(0.034)	−0.016	(0.032)
Distance (km)	0.0002	(0.0097)					−0.015	(0.082)		
Information	−0.1726	(0.1188)					0.513	(1.225)		
Hospitalisation	0.1187	(0.1312)								
Connections	0.3686***	(0.0947)							−1.554*	(0.892)
Red book	0.1341	(0.1360)	−1.607	(1.295)	−1.731	(1.223)	−1.598	(1.278)	−1.697	(1.263)
Not paid	0.1674	(0.1476)	6.206*	(3.586)	6.571*	(3.739)	6.401*	(3.740)	6.767*	(3.870)
Phu Tho	−0.0137	(0.1599)	−1.641*	(0.945)	−1.648*	(0.889)	−1.488	(1.015)	−1.585*	(0.945)
Quang Nam	−0.7387***	(0.1807)	−2.967***	(0.806)	−2.987***	(0.775)	−2.959***	(0.828)	−2.940***	(0.782)
Long An	0.3043*	(0.1650)	−1.472*	(0.826)	−1.510**	(0.771)	−1.366	(0.882)	−1.583**	(0.791)
Constant	−0.2189	(0.2540)								
Test: all coefficients are zero	⋯		F(9,37) p-value = 0.006		F(11,35) p-value = 0.000		F(11,35) p-value = 0.017		F(10,36) p-value = 0.004	
Test: independence of equations	⋯		Wald test ρ = 0 p-value 0.14		Wald test ρ = 0 p-value 0.07		Wald test ρ = 0 p-value 0.06		Wald test ρ = 0 p-value 0.38	
Number of observations/ uncensored/clusters	875/311/46		875/311/46		875/311/46		875/311/46		875/311/46	

Source: Samples from ILSSA Access to Resources Survey 2003 as described in the main text.

Notes: Standard errors in parenthesis. Robust standard errors and adjustment for clustering at the enumeration area throughout. *, **, *** significant at 10, 5 and 1 per cent, respectively. [1]Coefficients from the selection equation estimated jointly with 'Rationed Base'. The selection results differ only marginally due to the simultaneous structure and are not reported. [2]Marginal effects in per cent.

Quang Nam and Long An all have lower probabilities of having a loan application rejected. The differences within these three provinces are not significant. The statistically significant results also carry economic significance. In the sample, around 9 per cent of loan applications are rejected. A 6 per cent increase in the probability of being rationed as a result of bad credit history therefore constitutes a large relative increase in the risk of being rejected.

Apart from land holdings, the only variable which does not conform to our prior hypotheses is the proxy for livestock. A lender should be more willing to lend if the borrower has livestock which can be sold in case of default. In contrast, the coefficient on feed is positive, but insignificant. Finally, it appears that the selection framework is in the present case not strictly necessary as the independence of equations cannot be rejected.

In specifications 2, 3 and 4, we augment the rationed base regression with other variables from Table 4, which should not in theory affect lender decisions given the information contained in the variables from the base regression. The main purpose is to assess the robustness of the base specification, but additional interesting results also emerge as described below. In column three (specification 2), we include age and gender of the head of household. The results suggest (significant at 10%) that women who apply for credit are more likely than men to be approved for a loan, and the size of the marginal effect is not trivial. The gender result must be interpreted with caution, since we do not have individual level information on loan allocations. However, our result does correspond with observations made in studies of the allocation of firm credit in Vietnam (see World Bank, 2005). With respect to the other baseline variables, signs, magnitudes and significance levels are virtually unchanged for all variables.

The third specification (in column 4) looks at the effect of distance to a district centre (distance) and a proxy for the household information level (information). We offer no prior expectations about the sign of the distance coefficient; but outreach is of particular concern, so insights on the importance of this variable are potentially important information in assessing how credit should be expanded in rural Vietnam. Both distance and information are insignificant. Finally, in the fourth specification we try to isolate the effect of being well connected (with respect to contacts in credit institutions). The estimated dummy variable coefficient is negative and significant at 10 per cent, which corresponds to stating that being well connected with credit institutions promotes the application process. Again, relative to the base specification, the coefficients are very robust to the inclusion of the connectedness variable.

Looking at the four sets of simultaneous regressions overall, the signs of the coefficients in the base regression are very robust. Education and credit history turn out to be robust significant predictors of credit rationing with opposite sign, and provincial differences are clear. All three dummy variables are statistically significant in the majority of specifications, and households located in Ha Tay have significantly higher risk of being rationed compared with the three other provinces.

VI. Conclusions

Little is known about the characteristics and operation of the rural credit market in Vietnam. This paper was written with the aim of helping to fill this gap based on a

new dataset covering 932 households in four provinces (Ha Tay, Phu Tho, Quang Nam and Long An) surveyed in early 2003. In the formal analysis these data were complemented with information available in the 2002 Vietnam Household Living Standard Survey (VHLSS). A number of general observations emerge, which deserve close attention in efforts to further develop the existing credit system.

An active and growing rural credit market exists, and formal credit is indeed expanding its share of total credit. In parallel, a sizeable informal sector continues to operate, accounting for about one-third of all loans, and reflecting that poor rural households remain reliant on informal networks and relatives. Different segments in the loan market serve different needs, and the formal sector focuses almost entirely on production loans and asset accumulation.

A strongly constraining factor in credit demand in both the formal and informal sector is not being connected. In the informal sector it is moreover typical that older and better educated households have less credit demand. In contrast, a larger number of dependents and a bad credit history tend to increase a household's informal credit demand. This does not necessarily reflect market failure, but it does suggest there is need and space for careful, well designed public action in expanding credit facilities. The social returns of such action may well be high. Land is a statistically significant determinant of overall credit demand. This result is, as shown in Section IV, driven by formal credit demand geared towards production purposes and asset management.

The most striking and cross-cutting general insight emerging is the extent of regional differences in almost all aspects of the credit market. The design of public policy should be alert to the region, the household group and the market segment in question. The formal sector accounts for around 50 per cent of loans in Ha Tay and Phu Tho. Long An and Quang Nam have much higher shares, but this characteristic is a reflection of very different levels of development. Few households in Quang Nam obtain credit, and credit demand in this province is clearly limited. This is so both overall and in the various market segments. Our results show that pooling demand for formal and informal credit risks blurring the picture of rural credit demand. Countervailing effects are at work between the formal and informal credit segments when it comes to education, distance, credit history and also the provincial dummy effects differ.

A 'one size fits all' approach to expanding credit is not going to be the most effective. This needs to be kept in mind in the planned expansion of rural credit through the Vietnam Bank for Social Policies. The VBSP aims at operating a large number of new branches throughout Vietnam (World Bank, 2003). We suggest that expansion needs to be carefully monitored to take account of the need for credit in areas where access is presently low – such as in Quang Nam and to some extent Ha Tay and Phu Tho. We also stress that regional differences in credit rationing are present, although these are smaller than for the demand for credit, and households with a bad credit history are more likely to get rationed. This merits attention as these households are likely to include those households who are the most affected by shocks and difficult circumstances. It would, given the regional differences identified above, be desirable to inter-act the provincial dummy variables with a larger number of core variables to detect province specific effects. This is left for future research

when better data become available. The same goes for the challenge of establishing the degree of credit rationing which households experience.

Acknowledgements

Notes

1. See Duong and Izumida (2002) and McCarty (2001) for earlier credit studies on Vietnam.
2. See Barslund et al. (2004).
3. The questionnaire identifies all major credit institutions and provides an option to specify additional institutions. See Barslund and Tarp (2007) for further details.
4. Only households obtaining a loan were used in this stage, since loan amounts are not available for rejected and self-constrained households.
5. We are not able to specify a fully unconstrained model (that is, with regional interaction terms on all variables). Our data are sampled in clusters (46 different clusters/enumeration areas) and, thus, have less degrees of freedom in our estimation procedures than with an 'unclustered' approach. The advantage is that the significance of our statistical results is robust to observations being independent between, but not within, clusters. Assuming independence of all observations strengthens our results considerably.
6. We also estimated the model removing 58 households, who obtained a zero interest loan from friends. The motives for demanding credit in this situation may differ from the framework set up here. Yet, results are very similar.
7. Self-rationed households did not indicate in which sector they would have applied if they had applied for a loan. Thus, self-rationed households were treated as not demanding credit in the sector specific analysis.
8. Some 29 households obtained a loan from both a formal and an informal credit source. The limited number of households does not permit formal econometric analysis (that is, through a trivariate probit estimation). The data suggest that these households rely on formal lenders for longer term (that is, longer than average) financing and on relatives and other private lenders for short term financing. See Barslund and Tarp (2007) for additional explanation.
9. In what follows, the terms credit constrained and credit rationed are used interchangeably.
10. In fact a household may be approved for a loan smaller than it applied for. These households are also to some extent credit rationed. We asked questions about amount obtained, amount wanted and amount applied for to identify households rationed in the loan amount. In our sample, 21 households reported (credibly) that they were rationed in the amount obtained in 2002. For simplicity these households are considered not rationed in the present study. The qualitative results hold if we include the 21 households (except three households which were rationed in large loan amounts) as rationed.
11. The definitions for households demanding credit and applying for credit differ as discussed in Barslund and Tarp (2007).

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