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# Effects of Credit Constraint on Productivity and Rural Household Income in China

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# Effects of Credit Constraint on Productivity and Rural Household Income in China

## Introduction

China has been undertaking economic reforms since 1978. While urban residents' income increased from 343 Yuan in 1978 to 13,786 Yuan in 2007, farmers' income has continued to lag behind (from 134 Yuan in 1978 to 4,140 Yuan in 2007). With increasing agricultural productivity and farmers' income always an important consideration for the government, it is crucial to investigate elements affecting productivity and find ways to improve rural household income.

Agricultural production is strongly conditioned by the fact that inputs are transformed into outputs with considerable time lags (Conning and Udry, 2005), causing the rural household to need to balance its budget during the season when there are high expenditures for input purchase and consumption and few revenues. With limited access to credit, the budget balance within the year can become a constraint to agricultural production. When liquidity is a binding constraint, the amounts and combinations of inputs used by a farmer may deviate from optimal levels which in turn limit the optimum production or consumption choices. The marginal contribution of credit therefore brings input levels closer to the optimal levels, thereby increasing yield and output (Feder et al. 1990). Some empirical literature found that in rural areas of developing countries, credit constraints have significant adverse effects on farm output (Feder et. al., 1990; Sial and Carter, 1996), farm investment (Carter and Olinto, 2003), and farm profit (Carter, 1989). Thus, one motivation underlying many government programs is to seek to provide more credit to the farm sector to improve farm productivity and income.

Like in many developing countries, Chinese rural households have been suffering from a lack of access to capital (Dong and Featherstone, 2006; International Fund for Agricultural Development, 2001; Yu, 2008; and Luo, 2003). Rural capital sources include government financial support, formal and informal credit markets. Because industry development is the focus of the national development, more government financial support goes to urban industry and therefore, agricultural financial support from the government is limited. In addition, agricultural support generally goes to agricultural infrastructure construction, not to individual rural households. Informal rural credit is an important part of rural credit. But most of the informal credit is reportedly obtained for purposes other than production, with construction, social expenditures (wedding, funeral, etc.), and consumption appearing dominant (Feder, et al. 1990). Due to limited fungibility, informal credit is not a good substitute for formal credit (Feder, et al, 1990; Chen, 2003). Formal credit is mostly used for the financing of agricultural production (Feder, et al., 1990). The formal financial institutions currently serving rural China include the Agricultural Bank of China (ABC), Agricultural Development Bank of China (ADBC), Rural Credit Cooperatives (RCCs), and Rural Postal Savings (RPSs). Because of operational costs, high financial risk, and low return (Dong and Featherstone, 2006), formal financial institutions have strict requirements for rural loans and have limiting lending. Although a majority of its deposits from rural areas, the ABC's support to agriculture has been decreasing since its allocation of resources expanded to cities and industries in the mid-1990s. As saving-only financial institutions, RPSs channel funds from rural to urban areas. Currently, RCCs are dominant players in rural lending markets.

To improve the capital shortages in rural China, the China Banking Regulatory Commission (CBRC) relaxed the conditions of entry for financial institutions in rural areas at the end of 2006, allowing investors to set up new types of rural financial institutions such as township and village banks and rural mutual cooperatives. At the end of 2007, 38 new types of rural financial institutions had obtained licenses, including 25 township and village banks, four loan companies and nine rural mutual cooperatives. The total loans outstanding related to agriculture reached 6.09 trillion yuan, of which direct agricultural loans amounted to 1.57 trillion yuan (Cao, 2009). In addition, to enhance micro credit in rural areas, the CBRC also expanded the list of qualified micro-credit lenders from rural credit unions to all banking institutions. The size of allowable credit lines was raised from a range of 3,000 to 5,000 yuan to a range of 10,000 yuan to as much as 3 million yuan. The loan terms extend from less than one year to as long as three years. However, rural financial institutions still need time to expand their coverage from pilot areas in the countryside to remote areas to satisfy more capital-hungry farmers nationwide (Cao, 2009). Credit constraints still exist in most rural areas, which have forced farmers to deviate from optimal resource allocation and production arrangements.

While rural credit plays an important role in agricultural and rural development, few studies have focused on the impact of credit on agricultural production in China. The exception is Feder, et al (1990) when they examine the impact of credit on productivity in Chinese agriculture using data collected in 1987 in Gongzhuling, Jilin province. However, at that time, the household responsibility system just started. After more than 20 years of development, dramatic changes have occurred, such as grain market reforms, rural financial reforms, and the exemption of agricultural tax[1]. Consequently, it is necessary to reexamine how credit constraints affect agricultural productivity and rural household income in China.

[1] Agricultural tax was a lump-sum fee paid by farmers based on the amount of cultivated land and number of family members. It was abolished in 2006.

An important issue in the context of agricultural credit policy is the magnitude of the expected productivity gain. If the marginal productivity effect of credit is small, then the resources may be more beneficially deployed elsewhere. Assessment of the expected productivity gain is not trivial because the effect of credit is likely to differ between liquidity-constrained and unconstrained farm households. This study provides valuable information for policy makers on how credit constraints affect productivity and rural household income and how large the marginal effects of additional credit is. To tap the potential for broad-based economic growth, an understanding of agricultural credit constraints on agricultural productivity and rural household income is essential.

**Research Methodology**

When estimating the impact of credit constraint on productivity, two issues come up. The first is heterogeneity between credit constrained and non-constrained households. All credit constrained and non-constrained households are not homogenous with respect to their credit demand (Feder et al. 1990). For example, many non-borrowers do not borrow because they have sufficient liquidity and do not need to, while some do not borrow because they cannot borrow because of credit constraints. In addition, the effect on agricultural productivity may not be independent of credit status. Under credit constraints, factors of production may have differential effects on agricultural productivity than with credit being unconstrained. Therefore, estimation methods that pool all sampled observations to estimate production/output functions with credit as an input or a determinant can be inappropriate. Separate functions for credit constrained and non-constrained household should be specified. The second issue is endogeneity. Households that are not credit constrained can separate consumption decisions from farm production decisions and choose production inputs optimally for the production process (Foltz, 2004). In contrast, credit constrained households may deviate from input optimal levels to allocate limited available resources between consumption and production, and thus have lower productivity. Therefore, possible sample selection bias may arise. The econometric problem will thus involve both heterogeneity and sample selection. This motivates the use of an endogenous switching regression model that accounts for both heterogeneity and sample selection bias.

Thus, we apply an endogenous switching regression approach where a probit model is applied in the first stage to determine the relationship between household's credit constraint condition and a number of socio-economic and credit variables. A household was credit constrained if the household requested more loans than supplied, or it required loans but were unable to borrow. In the second stage, separate regression equations are set up to model the productivity of the household conditional on a specified credit status.

The credit constraint condition of the *i*th household is described by an excess credit demand function, $I^*$, that is postulated to be a function of a vector of explanatory variables (Feder, et al. 1990; Freeman, Ehui, Jabbar, 1998).

$$I_i^* = \gamma Z_i + u_i \qquad (1)$$

where *Z* is a vector of exogenous variables, $\gamma$ is a vector of parameters, and $u_i$ is a random disturbance. Households are credit constraint if the excess demand is greater than zero. The function that indicates the household's credit constraint status is defined as

$$\begin{aligned} I_i &= 1, \text{ iff } \gamma Z_i + u_i > 0 \\ I_i &= 0, \text{ iff } \gamma Z_i + u_i \geq 0 \end{aligned} \qquad (2)$$

The productivity function of two groups of households is modeled by

$$\begin{aligned} y_{1i} &= X_{1i}\beta_1 + \varepsilon_{1i} \quad \text{iff } \mathrm{I}_i\text{=1} \\ y_{2i} &= X_{2i}\beta_2 + \varepsilon_{2i} \quad \text{iff } \mathrm{I}_i\text{=0} \end{aligned} \qquad (3)$$

where $y_{1i}$ and $y_{2i}$ are the productivity for credit constrained and credit unconstrained households, respectively. $X_{1i}$ and $X_{2i}$ are vectors of exogenous variables. $\beta_1$ and $\beta_2$ are vectors of parameters. And $\varepsilon_{1i}$ and $\varepsilon_{2i}$ are random disturbance terms. Here $u_i$, $\varepsilon_{1i}$ and $\varepsilon_{2i}$ are assumed to have a tri-variate normal distribution with mean vector zero and covariance matrix

$$\Sigma = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{1u} \\ \sigma_{12} & \sigma_2^2 & \sigma_{2u} \\ \sigma_{1u} & \sigma_{2u} & \sigma_u^2 \end{bmatrix} \tag{4}$$

where $\sigma_1^2$ and $\sigma_2^2$ are variances of the error terms, $\varepsilon_{1i}$ and $\varepsilon_{2i}$, in the equation (3), $\sigma_u^2$ is the variance of the error term, $u_i$, in the equation (2), and $\sigma_{12}$, $\sigma_{1u}$, and $\sigma_{2u}$ are, respectively, the covariance of $\varepsilon_{1i}$ and $\varepsilon_{2i}$, $\varepsilon_{1i}$ and $u_i$, and $\varepsilon_{2i}$ and $u_i$. $\sigma_u^2$ is assumed to be 1 because $\gamma$ is estimable only up to a scale factor (Maddala, 1983).

Because the disturbance terms in equation (3) are conditional on the sample selection criterion and thus have non-zero expected values, the OLS estimates of $\beta_1$ and $\beta_2$ will suffer from sample selection bias and are inconsistent (Maddala 1983; Lee 1978). Some studies have used a two-stage estimation method to estimate this system of equations of (2) and (3) (Lee, 1978; Feder, et al, 1990; Freeman, Ehui, and Jabbar, 1998). Freeman, Ehui, and Jabbar (1998) used weighted least squares to account for the heteroscedastic errors. However, the use of weighted least squares is limited only to situations where the exact form of heteroscedasticity is known, which is rarely the case (Alene and Manyong, 2007).

To estimate the endogenous switching regression model more efficiently, we use the full information maximum likelihood (FIML) method (Lokshin and Sajaja 2004; Greene 2000). The

FIML method simultaneously estimates the probit equation and the regression equations to yield consistent standard errors. The log likelihood function for this model is

$$\ln L(\beta_1, \beta_2, \sigma_1^2, \sigma_2^2, \sigma_{1u}, \sigma_{2u}) = \sum_i (I_i[\ln\{F(\frac{(\gamma Z_i + \rho_1 \varepsilon_{1i} / \sigma_1)}{\sqrt{(1-\rho_1^{\ 2}}})\} + \ln\{f(\varepsilon_{1i} / \sigma_1) / \sigma_1\}]$$
$$+ (1 - I_i)[\ln\{1 - F(\frac{(\gamma Z_i + \rho_2 \varepsilon_{2i} / \sigma_2)}{\sqrt{(1-\rho_2^{\ 2}}})\} + \ln\{f(\varepsilon_{2i} / \sigma_2) / \sigma_2\}]) \tag{5}$$

where $F$ is a cumulative normal distribution function, $f$ is a normal density distribution function, $\rho_1 = \sigma_{1u} / \sigma_u \sigma_1$ is the correlation coefficient between $\varepsilon_{1i}$ and $u_i$, and $\rho_2 = \sigma_{2u} / \sigma_u \sigma_2$ is the correlation coefficient between $\varepsilon_{2i}$ and $u_i$. Only one value of $y$, $y_{1i}$ or $y_{2i}$, is actually observed for any given household, depending upon which regime that particular household is in, credit constrained or unconstrained. Therefore, $\sigma_{12}$ does not occur in the likelihood function and is not estimable.

**Data**

The data used in this study came from a rural financial survey conducted in Xinglonggang County, Heilongjiang province in 2008. Farmers in Xionglonggang County produce mainly soybeans, corn, wheat, rice, and sweet beets. Raising cattle or sheep were also important. After deleting all households with missing values, the sample comprised of 511 rural households that accounted for 18.3% of the total 2,794 rural households in Xinglonggang County. The survey asked demographic questions including age of the household head, education, household size, household labor, and how many college students. The survey also asked financial and operational questions such as value of real estate (house), major operations (farm, off farm, or both), saving, income, and production inputs and outputs, whether the farmer had a loan, the amount of the loan, the use of the loan, if the loan needed collateral or pledge, if a loan was received before, and whether the loan was repaid on time.

The summary statistics of the data are listed in table 1. The dependent variable in the criterion equation is the household's credit constraint condition (*Constraint*). A household was credit constraint if the household desired for credit, but could not get all that was desired. This variable (*Constraint*) takes a value of 1 if the household is credit constrained and 0 otherwise. About 17% of households were credit constraint in the sample.

The dependent variable in the switching regression model is productivity (*Prod*). Because farmers engaged in several different crops or cattle/sheep production in the survey, we used monetary values instead of quantities to measure the productivity to make it comparable across households. Productivity was measured as net revenue (production output value-input value) per household labor. The explanatory variables in the switching regression models for labor productivity include age, education level, number of dependents, real estate value, household saving, and number of household members with chronic disease. $age^2$ is included as the effect of age may not be linear. Education is categorized into three levels, elementary school (*edu1*), junior high school (*edu2*), and high school (*edu3*). *edu1* is used as the base and deleted from the regression to avoid singularity. Besides all variables included in the switching regression model, if a loan was received before (*preloan*) and if the loan needed collateral (*collateral*) are also included as instrumental variables in the criterion model for credit constraint. As all surveyed households that received loans before and returned their loans on time, we excluded the variable whether the loan was repaid on time (*return*) from the credit constraint equation.

**Estimation Results**

*Impacts of Credit Constraint on Productivity*

The maximum likelihood estimates of the endogenous switch regression model are shown in table 2. For criterion equation of the credit constraint, *Age* increased the odds of being credit constrained and the effect was not linear as the coefficient of *age2* is significant, too. Education, the number of household member with chronic disease, and the number of college students in the household had no statistically significant effect on the probability of being credit constrained. If a household had more saving, its odds of being credit constrained decreased. This result is similar to that of Feder, et al (1990). In contrast, if a household had a higher real estate value, their odds of being credit constrained are higher. In addition, if a household had more dependents, it would be less likely to be credit constrained. The criterion model also shows that if the household had previous loans, it was more likely to get the loan. But collateral did not significantly affect the odds of getting a loan.

For credit constrained households, only saving helped to increase productivity. This indicates that liquidity was important for improving productivity. In contrast, many factors affected productivity if the household was not credit constrained. This is an important implication that if a household was credit constrained, most resources would just keep dormant and could not be brought into full play. For example, age did not affect productivity if the household was credit constrained. While under credit unconstrained, age had a negative significant effect on labor productivity, or younger farmers had higher productivity. Generally, farm work is labor intensive. Only without credit constraints could younger farmers make full use of their physical advantages. Similarly, education did not affect productivity if the household was credit constrained. However, education improved productivity if the household was not credit constrained. A farmer with high school education (*edu3*) had higher productivity compared to a farmer with just elementary school education (*edu1*). The effect of having junior high school education was not significant compared to that of just elementary school education as the coefficient of *edu2* is not statistically significant. This result has other important implications. China has been making great effort to improve rural education level. If the rural financing conditions are not improved and farmers are credit constrained, the benefits of higher education would not be as supportive on rural productivity as it could be. Therefore, for education to improve rural productivity, the problem of rural credit constraints needs to be solved first. The result of education is similar to that in Feder, et al (1990).

The number of dependents in the household positively affected labor productivity in unconstrained households. This reflects the fact that kids generally help household farm work although they are not counted as labor. The number of household members with chronic disease had negative significant effect on household labor productivity. This might be because other household member needed to spend time to take care of the member with chronic disease and consequently affected their productivity. By comparing to no effect of the number of dependents and members with chronic disease in credit constrained household, it implies that under credit constraints, increasing or decreasing help to labor would not matter to their productivity, reaffirming that input factors may be underutilized because of credit constraints. Interestingly, real estate value (*revalue*) had negative significant effects on the productivity in unconstrained households. *Saving* also had significant positive effects for credit unconstrained households. This result is unexpected because if the household was not credit constrained, saving should not matter to their productivity. This result implies that even without credit constraints, more liquidity in the household can still help improve the productivity perhaps through a self insurance mechanism. The number of college students in the household did not have significant effect on labor productivity.

The correlation coefficients $\rho_1$ and $\rho_2$ are both significant. Since $\rho_1$ is positive and $\rho_2$ is negative, the model indicates that individuals that were credit constrained had lower productivity than a random individual from the sample would have, and those who were not credit constrained had higher productivity than a random individual from the sample would have. The likelihood-ratio test for joint independence of the three equations that is reported in the last row of the table showed that these three models are not jointly independent and should not be estimated separately.

The results indicate that credit constraints affect productivity of Chinese farmers. Now estimate the magnitude of this impact on productivity to answer by how much would the productivity of each labor credit constrained increase if the constraint was removed. Following Guirkinger and Boucher (2008), the predicted impact for productivity in each constrained household is computed as:

$$\hat{\Delta}_{it} = X_{it}(\hat{\beta}^U - \hat{\beta}^C) \qquad (6)$$

where $\hat{\beta}^U$ and $\hat{\beta}^C$ are the parameter estimates for credit unconstrained and credit constrained households that are reported in table 2. The results indicate that productivity would increase from 9.883 thousand yuan to 13.008 thousand yuan if the household was not credit constrained, a 31.6% increase.

*Impacts of Credit Constraint on Household Income*

Same analysis on productivity was also conducted on household income. All variables included in the income equation were the same as those in the equation of productivity except that the number of dependent (*depnum*) was replaced by the number of labor in the household (*lbnum*) and household saving (*saving*) was excluded. The amount of labor in the household directly affects the total income of the household. The reason for excluding *saving* from the income equation is that income more likely affects saving instead of vice versa. The estimation results are shown in table 3.

Under credit constraints, no variables had significant effects on household income. Without credit constrained, households with older household heads would have lower household income than those with younger household heads. More household labor increased household income. In contrast to in the productivity equation, the number of members with chronic disease and the education level of household heads had no effect on household income. However, households with more college students had higher household income. This may indicate that college students worked while they were studying in the college to help earn income for their households. Generally, universities in China are located in urban area where wages are higher than in rural areas.

The coefficients $\rho_2$ for the correlation between the criterion equation and the income equation for credit unconstrained is significant while $\rho_1$ for the correlation between the criterion equation and the income equation for credit constrained is not. Since $\rho_2$ is negative and significant while $\rho_1$ is not significant, the model suggests that individuals who were credit unconstrained had more household income than a random individual from the sample would have, and those who were credit constrained did not have higher or lower household income than a random individual. The likelihood-ratio test for joint independence of the three equations which is reported in the last row of the table showed that these three models are not jointly independent and cannot be estimated separately.

The calculation of the predicted impact for household income using equation (6) showed that if the credit constraint was removed, household income could be improved by 12.46 thousand yuan, which is about 23.2% increase.

**Conclusions**

In this paper, we use an endogenous switching regression model that accounts for both heterogeneity and sample selection issues to examine the effects of credit constraint on agricultural productivity and rural household income. The results show that factors have different marginal contributions to productivity and income among credit constrained and unconstrained households. The productivity-enhancing effects of schooling only occur in credit unconstrained households. Young farmers may not be able to take advantage of their comparative advantage for physically intensive farm work under credit constraints.  In addition, increasing or decreasing help to household labor does not improve productivity. These results imply that under credit constraints, production inputs along with farmers' capabilities and education can not fully employed. By removing credit constraints, both agricultural productivity and rural household income can be improved substantially, by 31.6% and 23.2%, respectively. Moreover, the study suggests that individuals who were credit constrained had lower productivity than a random individual from the sample would have, and those who were not credit constrained had higher productivity than a random individual from the sample would have. In terms of income, individuals who were credit unconstrained had more household income than a random individual from the sample would have, and those who were credit constrained did not have higher or lower household income than a random individual.

This study provides important evidence on the negative effects of credit constraints on agricultural productivity and rural household income. Policy makers who aim to improve agricultural productivity and living standard of rural households may need to first reduce credit constraints in rural areas to have production factors function fully. With credit constraints, most production inputs may not be efficiently used.

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Table 1. Descriptive Statistics

| variable | Description | N=511 mean | N=511 std |
|---|---|---|---|
| *age* | Age of household head in years | 45.52 | 10.21 |
| *age2* | Square of age of household head | 2176.37 | 981.18 |
| *edu1* | 1 if the farmer has formal education till elementary school and 0 otherwise | 0.16 | 0.37 |
| *edu2* | 1 if the farmer has formal education till junior high school and 0 otherwise | 0.79 | 0.41 |
| *edu3* | 1 if the farmer has formal education till high school and 0 otherwise | 0.05 | 0.21 |
| *hhnum* | Number of household member | 3.43 | 1.27 |
| *lbnum* | Number of household labor | 2.10 | 0.82 |
| *depnum* | Number of dependents | 1.34 | 1.10 |
| *revalue* | Real estate value in 1,000 Yuan | 65.95 | 43.33 |
| *saving* | Household saving in 1,000 Yuan | 25.04 | 21.77 |
| *income* | Household income in 1,000 Yuan | 53.71 | 42.59 |
| *chrdisnum* | Number of household member with chronicle disease | 0.10 | 0.33 |
| *colstdnum* | Number of college students | 0.05 | 0.24 |
| *chrdis* | 1 if the household has member with chronicle disease and 0 otherwise | 0.09 | 0.29 |
| *colstd* | 1 if the household has college student and 0 otherwise | 0.05 | 0.22 |
| *collateral* | 1 if the loan needs collateral and 0 otherwise | 0.44 | 0.50 |
| *preloan* | 1 if the household got loan before and 0 otherwise | 0.75 | 0.43 |
| *return* | 1 if the previous loan was returned in time and 0 otherwise | 0.81 | 0.39 |
| *constraint* | 1 if the household applied a loan but did not get it or just got part of it and 0 otherwise | 0.17 | 0.37 |
| *prod* | Productivity, Yuan per household labor | 13.59 | 13.73 |

Table 2. Maximum likelihood estimates of the endogenous switching regression model for productivity

| Variable | Criteria Equation (Credit constraint ) | | Productivity Equation | | | |
|---|---|---|---|---|---|---|
| | | | Credit Constrained (N=85) | | Credit Unconstrained (N=426) | |
| | Coef. | Std. Err | Coef. | Std. Err | Coef. | Std. Err |
| age | 0.116* | 0.041 | -0.561 | 0.649 | -1.554* | 0.267 |
| age2 | -0.001* | 0.000 | 0.005 | 0.007 | 0.018* | 0.003 |
| edu2 | 0.106 | 0.181 | -0.956 | 2.502 | 0.880 | 1.144 |
| edu3 | -0.277 | 0.379 | -5.558 | 6.138 | 3.894** | 2.118 |
| depnum | -0.216* | 0.060 | 1.610 | 1.049 | 2.565* | 0.383 |
| saving1 | -0.015* | 0.004 | 0.146* | 0.069 | 0.404* | 0.019 |
| revalue1 | 0.005* | 0.002 | -0.042 | 0.028 | -0.050* | 0.009 |
| chrdisnum | 0.252 | 0.192 | -2.574 | 2.956 | -3.249* | 1.251 |
| colstdnum | -0.359 | 0.352 | 8.788 | 7.485 | 2.169 | 1.649 |
| preloan | -1.178 | 0.287 | | | | |
| collateral | 0.402* | 0.273 | | | | |
| _cons | -2.549 | 0.950 | 12.553 | 16.554 | 33.814* | 6.441 |
| $\sigma_1$ | | | 11.440* | 1.438 | | |
| $\sigma_2$ | | | | | 8.474* | 0.312 |
| $\rho_1$ | | | 0.888* | 0.061 | | |
| $\rho_1$ | | | | | -0.963* | 0.020 |
| LR test for joint Independence of equations | | | $\chi^2$=37 | | | |

Note: * indicates statistically significant at 95%
** indicates statistically significant at 90%.

Table 3. Maximum likelihood estimates of the endogenous switching regression model for household income

| **Variable** | **Criteria Equation (Credit constraint )** | | **Income Equation** | | | |
|---|---|---|---|---|---|---|
| | | | Credit Constrained (N=85) | | Credit Unconstrained (N=426) | |
| | Coef. | Std. Err | Coef. | Std. Err | Coef. | Std. Err |
| age | 0.090* | 0.045 | -1.761 | 2.745 | -7.613* | 1.337 |
| age2 | -0.001** | 0.000 | 0.006 | 0.028 | 0.080* | 0.014 |
| edu2 | -0.017 | 0.203 | 3.703 | 10.843 | 0.566 | 5.842 |
| edu3 | -0.035 | 0.420 | -20.118 | 28.952 | 2.701 | 10.688 |
| revalue1 | 0.005* | 0.002 | 9.650 | 6.434 | 11.673* | 2.507 |
| chrdisnum | -0.195 | 0.216 | -0.160 | 0.123 | -0.140 | 0.048 |
| colstdnum | -0.598 | 0.468 | -0.809 | 11.823 | -0.043* | 6.268 |
| lbnum | 0.034 | 0.108 | 20.585 | 39.151 | 19.475* | 8.211 |
| preloan | -1.017* | 0.351 | | | | |
| collateral | -0.593** | 0.326 | | | | |
| _cons | -2.397* | 1.060 | 90.734 | 74.698 | 203.413* | 31.248 |
| $\sigma_1$ | | | 39.063* | 3.669 | | |
| $\sigma_2$ | | | | | 42.172* | 1.545 |
| $\rho_1$ | | | 0.331 | 0.276 | | |
| $\rho_1$ | | | | | -0.889* | 0.038 |
| LR test for joint Independence of equations | | | $\chi^2$=43.05 | | | |

Note: * indicates statistically significant at 95%;
** indicates statistically significant at 90%.