

The policy arrangements of financial deepening in rural China

LIN HE¹, CALUM G. TURVEY², DONGSHENG LIAO³

¹*College of Management, Zhongkai University of Agriculture and Engineering, Guangzhou, China*

²*Applied Economics and Management Department, Cornell University, Ithaca, U.S.A*

³*College of Business, Guangxi University for Nationalities, Nanning, China*

Abstract: Financial deepening has been successfully tested by many countries, which is also an optimal developing track in practice in rural China. Chinese government has implemented a variety of policies to alter the finance environment in rural areas to get to the financial deepening. These policies include making the multiform financial institutions, making a fair legal environment and clarified property rights. Based on the McKinnon-Shaw model, we test whether there exists the financial deepening in rural China to judge the policy efficiency and we find that no proof can demonstrate the financial deepening in rural China, which means policies of the financial deepening, should be improved.

Key words: policy arrangements, financial deepening, McKinnon-Shaw Model

Financial deepening means the financial development and the positive effect on economic growth. In practice, multi-financial institutions, a more competitive market and a flexible interest rate are described as the financial deepening. The most famous theory about the financial deepening was from the McKinnon-Shaw's research, which focused on the inner link between monetary finance and economy development, based on the developing countries' sample (McKinnon 1973; Shaw 1973). Financial institutions play an important role in the financial deepening (Kapur 1976; Fry 1982; King and Levine 1993). Some ratios are used to measure the financial deepening such as the FIR (Goldsmith 1969), M2/GDP (McKinnon 1973; Shaw 1973), the ratio of liquid liabilities to GDP, the ratio of credit issued by the banking system to private enterprises to GDP, the ratio of domestic credit issued by the deposit banks to domestic credit issued by the deposit banks and the central bank, and the ratio of claims on the non-financial private sector to domestic credit (King and Levine 1993; also see Cox et al. 1985). The practice in developed countries identified this theory about the importance of the financial deepening. For this reason, there was an extensive of literature concerning financial deepening, such as the research on the financial deepening and economic development (Zhang and Yao 2002), the financial deepening and

savings (Subal 1977), the financial development and the financial intermediary (DeYoung et al. 2001), the financial development and financial market (Arestis et al. 2001), the financial development and economic development (Mathieson 1980; Einarsson and Marquis 2001), the financial deepening and long-term economic increasing in De Gregorio and Guidotti (1995), the financial repression and deepening in view of the macro-policies in a country (Singh 1997; Wang 2001), which provided the most important methodology to study the financial deepening area, although nothing concerning the rural China.

The purpose of this paper is to speculate on the policies about the financial deepening implemented in rural China during 1990 to 2005 and test the policy efficiency to promote financial deepening in rural China.

This paper uses the Functional-analysis methodology to conduct policies and the McKinnon-Shaw Model to test the financial deepening policy efficiency. This paper is organized as follows: In the section one, we review the literature on financial deepening. Section two depicts the financial repression in rural China based on the rural financial market. Policy arrangements of the financial deepening in rural China are explained in the section three. Section four provides an empirical test in the McKinnon-Shaw Model theorem frame.

THE REPRESSION OF FINANCIAL DEEPENING IN RURAL CHINA

There is only a kind of bank financial institution (such as the RCCs and PSBC) in rural China¹ and no other kinds of financial institutions as insurance companies, so far a monopoly and a lower supply of financial service as S_1 (Figure 1) is pervasive to restrict the financing demand.

Beyond the level r_1 , potential competitors will occupy the market share if the monopoly bank financial institutions raise the interest rate of loans. No other competitors, however, exist in the market; as a result r_1 keeps at a comparatively low level. If the interest rate of loans is lower than the expected revenue of financial institutions, the depositors will be plundered to compensate for the surplus revenue. D_1 means the financial demand on the condition of only formal institutions existing in the market and Q_1 is the equilibrium point.

The financing demand curve is more cliffy and the monopoly situation is broken through after the multi-financial institutions show up, while the demand is not repressed the by monopoly interest rate. S_2 means the aggregate financing supply and the equilibrium point moves down to Q_2 . The financing amount will increase the financing needed and supply increase as well.

Although the RCCs and PSBC could provide a more compatible fund supply, the suppliers in rural areas are not enough to support the financing needed from the rural China.

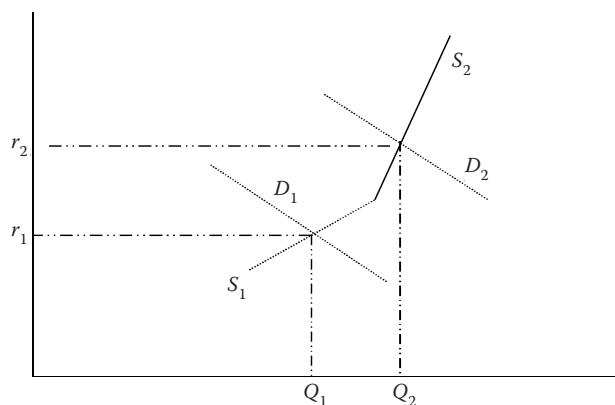


Figure 1. Financial supply: from monopoly to competition

¹Agricultural Bank of China, Agricultural Development Bank of China, Rural Credit Cooperatives and Postal Savings Bank of China are the main bank financial institutions for the purpose of satisfying the financing needed by the rural areas. The RCCs and PSBC, however, is the only financing supplier in the level of farm households because of the off-farm financing service trend development for the ABC and ADBC. Especially, the commercial insurance companies have no plan to do the rural business which makes a shortage supply of financial services in the rural China.

The moral risk and the adverse selection make the RCCs and PSBC incompatible in the rural China.

The curve 1–3 in Figure 2 denote the loan supply in the level of the loan interest from r_1 – r_3 respectively, the higher risk with a higher level of r . Borrowers 1 are at the lowest level of risk, while borrowers 2 higher and borrowers 3 highest. The expected revenue of each loan is relative to the interest rate of loan. Theoretically, borrowers 3 will make the maximal expected revenue to compensate for a higher level of cost. However, the highest risk borrowers have a motive to alter the application in contract to acquire the highest revenue. In the rural China, it is difficult to supervise these borrowers because farmers decentralize to live in a wide area and the ambiguous property rights of the formal institutions, both RCCs and PSBC, which lessens the revenue and misallocates the capital in the formal financial institutions while it hinders the real and lower level of risk borrowers to get access to the financial service.

POLICY ARRANGEMENTS OF FINANCIAL DEEPENING IN RURAL CHINA

Making the multiform rural financial institutions

Multiform financial institutions in rural area are the innovation alternatives to break the binary structure of financial institutions and make for each financial

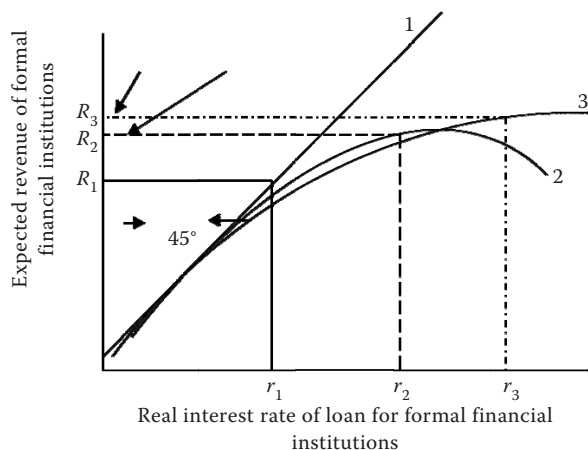


Figure 2. The risk of formal financial institutions

institution an equal status to form a modern enterprise institute. There would be two important factors in this process.

Firstly, the property entity should be clarified because of the principle role to supervise the proxy in efficiency and to maximize the economic organization utility. The property rights of informal financial institutions belong to the capitalists and farmers' individual, while the property rights of the RCCs belong to farmer shareholders who participate in the shares of the RCCs. However, it is more complicated to clarify the property rights in practice because of history factors. At present, the reform of the RCCs is still starting from upside to downside and the representative of property rights exerts the administrative power the same as before, which will result easily in an abuse analogous to the state-owned enterprises in China. For this reason, it is better to express the right of participating and making decision of farmer shareholders.

Secondly, the proxy entity should be selected strictly to alter the abuse of the administrative option, which will be analyzed to use the basic analytic frame of the principal-proxy theory (Zhang 2002).

Assumptions: $v(\pi - s(x))$ and $u(s(\pi) - c(a))$ are the expected utility functions of the principal and proxy respectively. And

$$v' > 0, v'' \leq 0, u' > 0, u'' \leq 0, c' > 0$$

Both action and status θ cannot be observed. The principal hope of the proxy is to endeavour their job, while the proxy trend to truant unless is being impelled by the principal. As a result, the maximization of the expected utility for the principal will face two constraints: the participation constraint and the incentive compatibility constraint.

$$\begin{aligned} \max \int v\{\pi(a, \theta) - s(x(a, \theta))\}g(\theta)d\theta \\ \text{s. t. (IR)} \int u\{s(x(a, \theta))\}g(\theta)d\theta - c(a) \geq u \\ \text{(IC)} \int u\{s(x(a, \theta))\}g(\theta)d\theta - c(a) \geq \\ \int u\{s(x(a, \theta))\}g(\theta)d\theta - c(a'), \forall a' \in A \end{aligned} \quad (1)$$

a is the action alternatives for the proxy and d is another action alternative. Only if the expected utility from action a is higher than that from action d , the proxy would select a .

The cadre organization department could not observe the definite numeric area of a and θ , the reform they cannot decide rightly for the true behaviour. The utilization maximization of the cadre organization department is as follows:

$$\max \int v\{\pi(a, \theta) - s(y(\theta'))\}bg(\theta')d\theta' \quad (2)$$

y is the reaction of high authorities; b is the evaluating mathematic set from high authorities. Both θ' and θ are the natural status which is an exogenous variable to be out of control. For that reason, the utilization maximization relies on the proxy and the evaluation from high authorities other than the attempt of the proxy, which provides the rent-seeking convenience for that who has information advantage and confines the proxy in a narrow scope. After the reform, the principal are the shareholders themselves in the multifarm rural financial institutions, who will endeavour to select the proxy in the maximization information set for no administrative determinants. The market competition from downside-to-upside will make it more transparent for the proxy and easily to be discerned.

Making a fair legal environment

Levine (1997) finds out that a well-developed bank system would result from a well-done debt contract and a strict law to protect the bank debt in developed countries, so that the law institution is a key factor for the economic increment in a long run. An active stock market and a fine law institution help the companies to acquire the external capital by debt and equity to promote the development of companies (LLSV 1998).

Let us consider a simple model. A consuming financing demander owns to assets worth a and fund suppliers own to assets worth $1 - a$. The demander acquires funds c (the amounts worth h) to mortgage his/her assets worth a and will not repay all funds worth h at the end of time to seize the funds worth S ($S > 0$). The expected loss of demanders will be as follows:

$$C(S) = nS^2/2K \quad (3)$$

Strong K means a weaker law institution and a higher level of n denotes that the less game times are between the demanders and suppliers, in this condition, the perfidious cost of demanders will be decreased. In addition, the marginal value would be decreased with the more funds of S .

Assuming that the return rate of investment will be as R ($R > 0$), the objectives of demanders maximize the equation (4).

$$\begin{aligned} \text{Max}_S U(S^*; S, k, a, n) = \\ = \text{Max}\{aR(h - S) + S - (nS^2/2k)\} \end{aligned} \quad (4)$$

The optimum funds seized by demanders will be as follows to make the first-order derivative and set it to be zero.

$$\partial U/\partial S = 1 - (nS^*/k) - ak = 0 \quad (5)$$

The result will be as follows:

$$S^*(R, k, a, n) = k(1 - aR)/n \quad (6)$$

To avoid the corner solution, the perfidy occupying funds will be S and $S < h$. The perfidy occupying funds will be positive relative to the extent of the unsound law institution and negative to the expected game frequencies and negative to the return on investment and assets value. To make the derivatives from the optimum occupying funds, we will get:

$$\partial S^*/\partial R = -ak/n \quad (7)$$

As equation (7), the perfidious occupying funds will be decreased with the ascended return on investment because of a higher level of the perfidious opportunity cost. A higher level of a and lower $\partial S^*/\partial R$ means less possibility of perfidy for demanders with higher value assets, while more possibility of perfidy with lower R . A higher level of K and lower level of $\partial S^*/\partial R$ will result in a higher probability of perfidy for demanders.

K will influence the game between financing demanders and suppliers, while a weaker law institution increases the funds acquired from the suppliers in a short time but decreases the financing amounts in a long run and damages the financing efficiency.

For this reason, the law institution will be innovated and substituted by a sane and fair law institution to ensure the investment revenue of suppliers and to lower the opportunism of demanders. Firstly, the credit system should be spread all over the rural areas in China. Secondly, to improve the opportunity cost of perfidy for one time means to avoid the opportunism of demanders. Lastly, it is necessary to unify the enforcement system to avoid the local protectionism.

Making property rights clarified

Assets capitalization will improve economic development and trigger the innovation of the superstructure, since it is a support of the financing demander to explore the funds. After that, financing suppliers respond by providing the innovated financial instruments, the trade boundary expands to force the financial institutions into innovations as well, in which the financial system will be deepened and it will result in the demand-following financial deepening mode.

Assets capitalization requires the clarified property arrangement which will solve the externality and the trading environment.

Assuming that the financing demander F and financing supplier I . F include different economic organizations and farmer household and I will be bank financial institutions and non-bank financial institutions. F acquires funds from I to get access to their objectives and I provides funds to F to gain the expected revenue. The cost function and the revenue function of F will be as follows respectively:

$$CF(F, i) \text{ and } \partial CF/\partial F > 0, \partial CF/\partial i < 0$$

$$RF = RF(F) = R + \beta_1 (\underline{R} - R)$$

The cost function and the revenue function of I will be as follows:

$$CI(I, f) \text{ and } \partial CI/\partial I > 0, \partial CI/\partial f < 0$$

$$RI = RI(I, F) = R + \beta_2 (\underline{R} - R)$$

F means the total factors which will influence the financing cost and i mean the total sum of funds amount and the due time, the more level of i , the higher the amounts from suppliers to demanders and the longer the due time. I denotes the total factors which cash outflows deduct cash inflows and also the time value of money involved. f means all factors including uncertainty, which will affect the investment revenue of I . β_1 and β_2 indicate the investment risk of F and I respectively, in which β_2 has to rely on the value of β_1 . Then I affords the funds to F and the investment revenue of I will depend on the investment revenue and risk of F .

The profit maximization of F will be:

$$\max RF(F) - CF(F, i)$$

and the first-order derivative will be as follows:

$$\partial CF(F', i')/\partial F = RF \quad (8)$$

$$\partial CF(F', i')/\partial I = 0 \quad (9)$$

The profit maximization of I will be

$$\max RI(I, f) - CI(I, f)$$

and the first-order derivative will be as follows:

$$\partial CI(i', F')/\partial I = RI'_I \quad (10)$$

$$\partial CI(i', F')/\partial F = RI'_F \quad (11)$$

F has the alternative to select his/her investment project and the risk will be determined, while I can only rely on the project of F . By the Coase theorem, the clarified property right of F could be mortgaged to I . I will gain the proportion worth the expected revenue of I by the contract if F cannot take back the

expected revenue, while I has the initiative to supply the funds to F .

Assuming that in the financial market, the demander is permitted to purchase the funds from the supplier and the price is P , the funds quantity is Q , so the profit maximization of the supplier will be as follows:

$$\max PQ - CI(Q, I) \quad (12)$$

and the first-order derivative is

$$\partial CI(Q', F') / \partial Q = P \quad (13)$$

$$\partial CI(i', F') / \partial I = 0 \quad (14)$$

The profit maximization will be as follows:

$$\max RF(F, Q) - PQ - CF(F, Q) \quad (15)$$

and the first-order derivative will be the following:

$$RF(F, Q)' - P = \partial CF(F, Q') / \partial Q \quad (16)$$

$$RF(F, Q)' = \partial CI(i', F') / \partial F \quad (17)$$

The marginal cost of the supplier's funds is the market price and the marginal cost is zero to make the Pareto efficiency, while the demander will make the optimum financing efficiency to hold the marginal financing cost equal to the marginal investment revenue. For this reason, both the demander and the supplier will achieve the optimum investment and financing efficiency.

Therefore, the policy arrangements will be focused on the law system to make the property rights of farmers clarified to lessen the externality of the rural financial market. Another important policy arrangement is to keep the trading between the assets of farmers and the financial products in financial institutions in the rural market.

EMPIRICAL TEST

The McKinnon-Shaw model defines the financial deepening as (a) saving function that responds positively to both the real rate of interest on deposits and the real rate of growth in output; AND (b) an investment function that responds negatively to the effective real loan interest rate and positively to the growth rate (McKinnon 1973: 71–77; Shaw 1973: 81–87; Fry 1997: 755; see also He and Turvey 2009 for an analysis of financial repression in Chinese Agricultural Economy). Because our objective is to test the policy efficiency of the financial deepening in rural China, we apply a simple partial model of savings and investment. The econometric model most suitable for estimating the saving function and investment function with the data available to us

from the statistical yearbooks uses the real interest rate on deposits (r) (nominal interest rate minus inflation rate), the real interest rate on the RCC loans (i) and the income growth g_{inc} (real rate of growth) to substitute the output because of difficult access to farmer households' output. That is we define for savings a function which captures the growth rate of savings balances in the RCCs for farmers. $S_{growth} = f(r, g_{inc})$ and for investment function $I_{growth} = f(g_{inc}, i)$ which captures the growth rate of farmer's investment balance on fixed assets. More specifically, we use for the savings function

$$S_{growth} = \partial_0 + \partial_1 r + \partial_2 g_{inc} + \xi_1 \quad (18)$$

with error ξ_1 , and examine under the null

$$H_0: \alpha_1 = 0; \alpha_2 = 0$$

$$H_A: \alpha_1 \neq 0; \alpha_2 \neq 0$$

Because the criteria are based on savings and growth, we place no restriction on the signs of the coefficients. Rather, we are interested in the derivatives describing the financial deepening state as follows:

$$\frac{\partial S_{growth}}{\partial r} = \alpha_1 > 0 \quad (18a)$$

$$\frac{\partial S_{growth}}{\partial g_{inc}} = \alpha_2 > 0 \quad (18b)$$

Similarly the investment function is estimated as

$$I_{growth} = \beta_0 + \beta_1 g_{inc} + \beta_2 i + \xi_2 \quad (19)$$

with error ξ_2 and the null defined by

$$H_0: \beta_1 = 0; \beta_2 = 0$$

$$H_A: \beta_1 \neq 0; \beta_2 \neq 0.$$

The economic relationships consistent with the financial deepening state are obtained from the derivatives of (2) as follows:

$$\frac{\partial I_{growth}}{\partial g_{inc}} = \beta_1 > 0 \quad (19a)$$

$$\frac{\partial I_{growth}}{\partial i} = \beta_2 > 0 \quad (19b)$$

The regression results are provided in Table 3 along with the corresponding t -values. For the relationship between the growth rate of savings balance and real interest rate, as well as the growth rate of income, the coefficients are not statistically significant. In addition, while the investment regression holds the explanatory power at the 5% level ($F = 5.285, 3.59$), the savings function does not; a clear violation of the McKinnon-Shaw requirement for the financial deepening.

REGRESSION RESULTS AND CONCLUSIONS

Though the policy arrangements of financial deepening have been implemented in rural China since the 1990s, it is obvious that the policy efficiency is at a lower level. Theoretically, multiform financial institutions emerging in rural China, such as the PSBC and RCCs, make it easier for the farmers to get access to the funds which will make the investment function compatible to the M-S model. From the equation 21, however, the coefficients are not statistically significant, as the investment regression holds the explanatory power at the 5% level. Also both the *t*-value and *F*-value could not stand the explanatory power as to the equation 20, which certify that the policy adjustments in rural China are urgent.

Possibly, a fair legal environment and clarified property rights are the reasons for the explanatory power of the investment regression at 5%, which is not enough to sustain the whole investment environment for farmers to invest. Though there is a big increase of the farmers' income, the coefficients are not statistically significant for the relationship between the growth rate of the investment balance and the real loan interest of the RCCs, as well as the growth rate of income.

The signs of the coefficients are important in the M-S Model to test the financial deepening. The parameter estimates from the regression into equation 20 give

$$\frac{\partial S_{growth}}{\partial r} = -0.16 < 0 \quad (22)$$

$$\frac{\partial S_{growth}}{\partial g_{inc}} = 0.182 > 0 \quad (23)$$

The parameter estimates from the equation 21 give

$$\frac{\partial I_{growth}}{\partial g_{inc}} = 0.547 > 0 \quad (24)$$

$$\frac{\partial I_{growth}}{\partial i} = -0.443 < 0 \quad (25)$$

The equation (24) and equation (25) denote that investment function responds positively to the real rate of growth in output and negatively to the real loan interest, which is consistent with the financial deepening state by the M-S Model.

We will now focus on the saving function. Equation (23) depicts that the saving function responds positively to the real rate of growth in output, while equation (22) denotes that the saving function responds negatively to the real rate of deposit interest which is inconsistent with the M-S Model.

The direct implication of these regression results is that the policy makers should think about the entire financial deepening process, which is by no means complete in rural China. There are many barriers in place that need to be removed in order to push toward a more efficient financial deepening in rural China.

APPENDIX

Table 1. The balance of savings and investment of farmers, population, the real deposit rate and the real loan interest rate

Year	Savings (billion Yuan)	Investment (billion Yuan)	People (10 thousand)	(%)	<i>i</i> (%)
1985	564	478.4	80 757	-2.36	-0.97
1986	766	574.82	81 141	0.66	1.81
1987	1 005	695.35	81 626	-0.09	-0.35
1988	1 142	865.23	82 365	-9.36	-8.62
1989	1 412	892.0	83 164	-5.83	-5.65
1990	1 841	876.5	84 138	5.37	7.85
1991	2 316	1 042.6	84 620	4.46	5.79
1992	2 867	1 005.5	84 996	1.09	3.07
1993	3 576	1 137.7	85 344	-4.5	-2.98
1994	4 816	1 519.2	85 681	-10.57	-8.81
1995	6 195	2 007.9	85 947	-5.23	-2.86

Continuation Table 1

Year	Savings (billion Yuan)	Investment (billion Yuan)	People (10 thousand)	(%)	<i>i</i> (%)
1996	7 670	2 544.0	85 085	0.84	4.64
1997	9 132	2 691.2	84 177	4.25	8.93
1998	10 441	2 681.5	93 153	5.88	10.43
1999	11 217	2 779.6	82 038	4.35	9.38
2000	12 355	2 904.3	80 837	1.84	7.46
2001	13 821	2 976.6	79 563	1.54	6.7
2002	15 405	3 123.2	78 241	2.85	6.79
2003	18 177	3 201.0	76 851	0.77	5.42
2004	20 766	3 362.7	75 705	-1.83	2.49
2005	24 606	3 940.6	74 471	0.44	3.71

Sources: China Rural Statistic Yearbook (1986–2006), China Agriculture Statistic Yearbook (1986–2006), China Finance Yearbook (1986–2006), China Statistic Yearbook (1986–2006)

Table 2. The balance of savings, investment and income of farmers (per capita) and the growth rate of savings, investment and income

Year	Savings per capita (Yuan)	Investment per capita (Yuan)	Income (Yuan)	S_{growth} (%)	I_{growth} (%)	g_{inc} (%)
1985	698.39	59.24	397.6			
1986	944.04	70.84	410.32	35.17	19.58	3.20
1987	1 231.2	85.19	434.12	30.42	20.26	5.80
1988	1 386.5	105.0	565.32	12.61	23.25	30.22
1989	1 697.8	107.26	601.5	22.45	2.15	6.40
1990	2 188.1	104.17	686.31	28.88	-2.88	14.01
1991	2 736.9	123.21	708.6	25.08	21.16	3.25
1992	3 373.1	118.30	784.0	23.25	-3.99	10.64
1993	4 190.1	133.31	921.62	24.22	12.69	17.55
1994	5 620.8	177.31	1 220.98	34.14	33.00	32.48
1995	7 207.9	233.62	1 577.74	28.24	31.76	29.22
1996	9 014.5	299.10	1 962.07	25.06	28.03	24.36
1997	10 848.6	319.17	2 090.13	20.35	6.71	6.52
1998	11 208.4	287.86	2 161.98	3.32	-9.8	3.43
1999	13 672.9	338.82	2 210.34	21.99	17.70	2.24
2000	15 283.8	359.28	2 253.42	11.78	6.04	1.95
2001	17 371.1	374.12	2 366.4	13.66	4.13	5.01
2002	19 689.2	399.18	2 475.63	13.34	6.70	4.62
2003	23 652.3	416.52	2 622.24	20.13	4.34	5.92
2004	27 430.2	444.18	2 936.4	15.97	6.64	11.99
2005	33 041.0	529.15	3 254.93	20.46	19.13	10.85

Sources: China Rural Statistic Yearbook (1986–2006), China Agriculture Statistic Yearbook (1986–2006), China Finance Yearbook (1986–2006), China Statistic Yearbook (1986–2006)

Table 3. The results

$S_{growth} = \partial_0 + \partial_1 r + \partial_2 g_{inc} + \xi_1$	(20)
$S_{growth} = 19.412 - 0.16r + 0.182 g_{inc} + \xi_1$	
(5.348) (-0.270) (0.650)	
$R^2 = 0.091$	
$D-W = 1.572$	
$F = 0.856$	
$N = 20$	
$F_C = 3.59(5\%)$	
$Tc = 1.74 (5\%)$	
$I_{growth} = \beta_0 + \beta_1 g_{inc} + \beta_2 i + \xi_1$	(21)
$I_{growth} = 0.066 + 0.547 g_{inc} - 0.443i + \xi_1$	
(1.346) (1.690) (-0.801)	
$R^2 = 0.383$	
$D-W = 2.131$	
$F = 5.285$	
$N = 20$	
$F_C = 3.59(5\%)$	
$Tc = 1.74 (5\%)$	
r	= real deposit interest rate (nominal interest rate minus inflation rate)
g_{inc}	= growth rate of farmers income (per head)
S_{growth}	= growth rate of farmer's savings balance (per head)
I_{growth}	= growth rate of farmer's investment balance on fixed assets (per head)
i	= real loan interest rate

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Contact address:

Lin He, College of Management, Zhongkai University of Agriculture and Engineering, Guangzhou 510225, China
e-mail: lylvlh@gmail.com