The Nonlinear Relationship between Bank Credits and Agricultural Employment in Mazandaran Province

Alireza Keikha [1], Farshid Alipour [2] and Hamid Mohammadi [3]*

Abstract

Mazandaran province is one of the most important agricultural areas in Iran. Researches findings show that the role of bank credits is really important due to the lack of available funds in agricultural sector. In this study, the relationship between allocation of Agricultural Bank credits of Iran as professional bank section and agricultural employment was studied in the Mazandaran province based on a threshold error correction model during 1981-2011. The results show that the impact of credits on agricultural employment has been significantly different in upper and lower level of estimated threshold. The estimated threshold is about 44 percent for bank credits. The impact of bank credits on agricultural employment will be significantly negative when they exceeds from the threshold point. The results confirm transfer of capital from agriculture to other sections, resulting in a lack of integrated management for credit allocation system.

International Journal of Agricultural Management and Development, 4(4): 309-312, December, 2014.

[1] *Lecturer, University of Zabol.*

[2] *Young Researchers and Elites Club, Babol Branch, Islamic Azad University, Babol, Iran.*

[3] *Assistant Professor, University of Zabol.*

* *Corresponding author's email: alirezakeikha@uoz.ac.ir*

309

INTRODUCTION

Agricultural sector has a major role in the economic development of under developing countries. It plays an important role in food production, employment creation and trade exchanges. (Audinet and Haralambous, 2005). Bank credits are main prerequisite for growth and development of various economic sectors. (Gershon and Lawrence, 1990; Carter and Wiebe, 1990; Meyar, 1990). From the perspective of World Bank the aim of credits is reducing poverty, increasing in welfare level and making environmental sustainability for villagers. (ESSAP, 1996).

Senanayake (2002) has shown that credits have supported rural residents in order to increase their productivity and to improve the employment level in Vietnam in 2002. Rogg (2000) examined the effect of credits on the behavior of farmers in 2002. The results showed that increasing in credits have a negative effect on the investment of farmers. Mong and Hall (2003) investigated the impact of access to credits on manufacturing companies' performance in Cast Arica in 2003. The results showed that access to credits has a positive and significant impact on the performance of them. Access to the credits is examined by Jermy in Tunisia in 2004. The results showed inefficiency in the credit markets. Although credit is a determining factor in the investment of farmers but some factors such as land and labor markets could adversely affect credit market. Izhar and Tariq (2009) examined the impact of credits on the gross domestic products of agricultural sector in India in 2009. The results showed that there is a positive and significant relationship between GDP and bank credits. Agricultural bank of Iran as a government institution is the most important source of credit and investment in agricultural sector. This bank as the only specialized bank in agriculture sector provides credits for all agricultural activities such as gardening, fishing and etc.

In this study, the relationship between allocation of Agricultural Bank credits and agricultural employment was studied in the Mazandaran province based on a threshold error correction model during 1981-2011.

MATERIALS AND METHODS

The assumption that the economic relations have linear processes does not always create a good approximation of them. In some situations, nonlinear models are more appropriate for description of the behavior of economic variables relationships. Threshold autoregressive models Threshold Autoregressive Models (TAR) are generally related to the structure of nonlinear time series. (Bruce, 1997).

In this study, the following TAR-ECM model is used to estimate relationships between variables.

$$\Delta X_{1t} = \left(\alpha \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta X_{1t-i} + \sum_{i=0}^{p} \gamma_i \Delta X_{2t-i} + \dots + \sum_{i=0}^{p} \delta_i \Delta X_{mt-i} \right) I(q_t \leq \gamma) + \left(\alpha \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta X_{1t-i} + \sum_{i=0}^{p} \gamma_i \Delta X_{2t-i} + \dots + \sum_{i=0}^{p} \delta_i \Delta X_{mt-i} \right) I(q_t > \gamma) + e_t$$

(1)

Δx_{1t} Indicates dependent variable, $\hat{\varepsilon}_{t-1}$ is the residual of long run specification estimation, $\Delta x_{2t} \dots \dots \Delta x_{mt}$ are the independent variables of error correction model, p is length of lag, q_t is threshold variable and γ is the threshold parameter. According to the aim of this study, and model variables (employment, value-added and bank credits of agricultural sector), the appropriate TAR-ECM specification is shown below:

$$\Delta \ln EMP = \left(\alpha \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta \ln EMP_{-i} + \sum_{i=0}^{p} \delta_i \Delta \ln LON_{-i} + \sum_{i=0}^{p} \varepsilon_i \Delta \ln VAD_{-i} \right) I(q_t \leq \gamma) + \left(\alpha \hat{\varepsilon}^*_{t-1} + \sum_{i=1}^{p} \lambda^*_i \Delta \ln EMP_{-i} + \sum_{i=0}^{p} \delta^*_i \Delta \ln LON_{-i} + \sum_{i=0}^{p} \varepsilon^*_i \Delta \ln VAD_{-i} \right) I(q_t > \gamma) + e_t$$

(2)

I ($q_t > \gamma$) Can be defined as follows:

$$I(q_t > \gamma) = \begin{cases} 1 \, if \, q_t > \gamma \\ 0 \, if \, q_t \leq \gamma \end{cases}$$

(3)

LnEMP is the natural logarithm of employment, lnLON is the natural logarithm of credits bank and lnVAD is the natural logarithm of value-added. Regression coefficients are: $(\alpha, \lambda_i, \delta_i, \varepsilon_i)$ if $q_t \leq \gamma$ and $(\alpha^*, \lambda_i^*, \delta_i^*, \varepsilon_i^*)$ if $q_t > \gamma$. First and second coefficients belong to the low and high regimes respectively. The threshold value is unknown so it must be estimated. To obtain the threshold value, the model (2) is estimated for different values of lnLON and the sum of residuals squared (s(γ)) is calculated, so the threshold value is the value that make minimum s(γ).

The nonlinear model is estimated during three stages: a) specify a linear model for testing the linearity assumption b) the estimation of nonlinear model (2) c) linearity hypothesis and significant testing by using bootstrapping procedure.

International Journal of Agricultural Management and Development, 4(4): 309-312, December, 2014.

310

www.SID.ir

Table 1: the estimation results of ECM, dependent variable is D(lnEMP)

The short run relationships			
Variable	Coefficient	Standard deviation	t-statistic
LnLON	-0.447	0.155	-2.88**
LnVAD	-0.02	0.006	-3.31***
The long run relationships			
Variable	Coefficient	Standard deviation	t-statistic
DlnEMP	0.784	0.213	3.676***
DlnLON	0.055	0.068	0.9
DlnVAD	-0.005	0.0055	-0.968
ECM(-1)	-0.678	0.244	-4.409***
R^2=0.91	$\bar{R}^2 = 0.8$	DW=1.7	F=10.7***

***p<0.01 ** p<0.05, *p<0.1
Between independent variables and dependent variable in short run and long run.
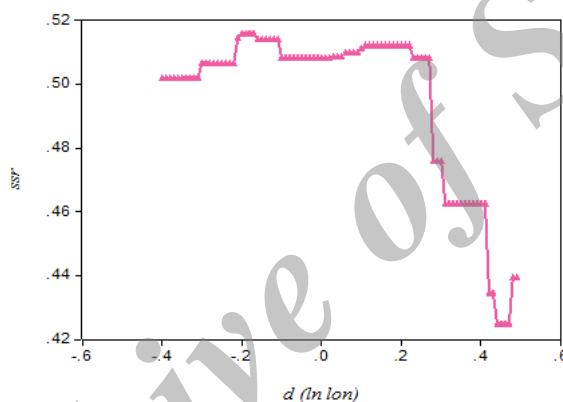

Figure 1: The residual sum of square of estimation model 2 for the various amounts of bank credits

RESULTS AND DISCUSSION

With regard to stationary tests, Model variables are stationary. Error correction model is estimated and it is used for linearity test. The results are shown in table 1.

As seen in the table 1, there are negative and significance effects between independent variables and employment of agricultural sector in long run period of time in Mazandaran province. Coefficients of bank credits and agricultural value-added respectively are -0.447 and -0.02. It showed that increasing in bank credits will decrease employment level in rural area in log run period of time. But the coefficient of bank credits is 0.055 in short run that indicates there is a positive and insignificant effect between employment and bank credits in short run period of time. Threshold autoregressive error correction model (TAR-ECM, model 2) is estimated by the

use of bank credits as a threshold variable. The results of model 2 are shown in figure 1 and table 2. The threshold variable is 0.44 for the growth of bank credits. Residual Sum of Square (SSR) will be minimized when the growth of bank credits is near to 0.44. This means that if the growth of bank credits exceed from 0.44 (the upper regime of bank credits), the coefficients and the importance of independent variables change significantly. In other words, the coefficients of VAD, LON and error term are different in up and down level of threshold value.

As seen in table 2, the coefficient of bank credits and agricultural value-added are 0.05 and -0.21 in down regime (the regime that the growth of bank credits is less than 0.44). Tangible difference is seen in the impact of bank credits growth on employment in the two regimes. Its impact will be negative when the growth of bank credits

International Journal of Agricultural Management and Development, 4(4): 309-312, December, 2014.

311

www.SID.ir

Table 2: The estimation results of model 2

Independent variables	Δln LON(-1)≤0.44	Δln LON(-1)≤0.44
Constant	0.096***	0.00
	(5.51)	(0.00)
E(-1)	0.42**	0.12***
	(-2.77)	(6.89)
$\Delta LNvad$	-0.21**	-0.39
	(-2.71)	(-1.67)
$\Delta lnLON$	0.05	-0.15
	(1.97)	(-1.89)

***$p<0.01$ ** $p<0.05$, *$p<0.1$

is greater than 0.44. In other words, the growth of bank credits has a positive impact on employment when it is less than threshold value. The coefficient of agricultural value-added is negative in both regimes so there is an inverse effect between the growth of agricultural value-added and employment. The bootstrapping test has rejected the linearity hypothesis of error correction model. F-statistic of this test is 9.01. In other words, the results of the estimation nonlinear model (2) are significance in 0.99 confidence level.

CONCLUSION

Agricultural sector has a major role in the economic development of under developing countries. One of the most important agricultural areas in Iran is Mazandaran province. In this study, the relationship between allocation of Agricultural credit Bank of Iran as professional bank section and agricultural employment was studied in the Mazandaran province based on a threshold error correction model during 1981-2011. The estimated threshold is about 44 percent for bank credits. Tangible difference is seen in the impact of bank credits growth on employment in the two regimes. Its impact will be negative when the growth of bank credits is greater than 0.44.according to this results, the credit allocation process in agricultural sector of Mazandaran should rise slowly. Rent-seeking behavior might be an important problem that causes inverse effect of bank credits.

REFERENCES

1- Bruce, E. (1997). Inference in TAR models. *Nonlinear Dynamics and Econometrics,* 1, 119-131.

2- ESSAP. (1996). Showing the way, metrologies for successful rural poverty alleviation projects, Bangkok, pp 2-3.

3- Gershon, feder, & Lawrence, J. (1990). The relationship between credit and productivity in Chinese agriculture. A microeconomic model of disequilibrium. *American Journal of Agricultural Economics.* 72(5), 1151-1157.

4- Izhar, A., & Tariq, M. (2009). Impact of institutional credit on aggregate agricultural production in India during post reform period.

5- Meyer, R. L. (1990). Analyzing the farm-level impact of agricultural credit: discussion. *American Journal of Agricultural Economics,* 72(5), 1158-1160.

6- Carter, M. R., & Wiebe, K. D. (1990). Access to capital and its impact on agrarian structure and productivity in Kenya. *American Journal of Agricultural Economics*, 1146-1150.

7- Mong Naranjo, A., & Hall, L.J. (2003). Access to credit constraints on Costa Rican manufacturing firms. *Journal of Financial Economics*, 34, 187-221.

8- Rogg, C. S. (2000). The Impact of access to credit on the saving behavior of micro-entrepreneurs: evidence from three Latin American Countries. A paper on a Thesis submitted to the University of Oxford.

9- Senanayake, S.M. (2002). Which have more access to cheap credit in Vietnam? *India Journal of Agricultural Economic,* 57, 241-246.

International Journal of Agricultural Management and Development, 4(4): 309-312, December, 2014.

312

www.SID.ir

رابطه‌ی غیرخطی بین اعتبارات بانکی و اشتغال بخش کشاورزی در استان مازندران

علیرضا کیخواه[1]* ، فرشید علیپور[2] و حمید محمدی[3]

یکی از مهم‌ترین بخش‌های کشاورزی در ایران استان مازندران است. در مطالعه حاضر، وجود ارتباط میان اعتبارات تخصصی بانک کشاورزی ایران با محوریت بانک تخصصی این بخش بر اشتغال بخش کشاورزی استان مازندران در طی سال‌های ۱۳۵۹-۱۳۸۹، مبتنی بر الگوی تصحیح خطای آستانه‌ای مورد بررسی قرار گرفت. نتایج حاصل از تخمین مدل نشان می‌دهد که اثر اعتبارات بر اشتغال بخش کشاورزی در دو کران بالا و پایان حد آستانه محاسبه شده، دچار تفاوت معنی‌داری بوده است. حد آستانه تعریف شده برای اعتبارات بانکی ۴۴ درصد برآورد شده است. به‌طوری‌که اگر رشد اعتبارات بانکی از حد آستانه مذکور تجاوز کند، اثر مثبت خود را از دست داده و تأثیر معنی‌دار منفی بر اشتغال بخش کشاورزی خواهد داشت. علاوه بر آن، اثرگذاری منفی ارزش افزوده بخش کشاورزی در سطوح پایین اعتبارات بانکی به مراتب کمتر از سطوح تخصیص یافته اعتبارات در کران بالای حد آستانه تعیین شده می‌باشد. نتایج مذکور انتقال سرمایه از بخش کشاورزی به سایر بخش‌ها در نتیجه عدم مدیریت صحیح و یکپارچه در سیستم تخصیص اعتبارات را تأیید می‌کند.

[1] مدرس دانشگاه زابل، زابل، ایران

[2] باشگاه پژوهشگران جوان و نخبگان، واحد بابل، دانشگاه آزاد اسلامی واحد بابل، بابل، ایران

[3] استادیار دانشگاه زابل، زابل، ایران

* ایمیل نویسنده مسئول: alirezakeikha@uoz.ac.ir