Analysis on Dynamic Relationship between Equity Financing and Agricultural Integration

Based on VAR Model and Impulse Response

Kun Song, Xiaoqian Liu
School of Economics, Sichuan Agricultural University, Chengdu 611130, China

Keywords: Agricultural Integration; Equity Financing; Vector Auto-Regression Model; Impulse Response.

Abstract: Equity financing of agricultural firm is one of financing methods encouraged by the government. Research on the relationships is the key problem of how equity financing supports agricultural integration. Based on VAR model, cointegration analysis and Granger causality test is done to study the equilibrium relationship and the dynamic impact is analyzed by using impulse response. Results show that size and efficiency of equity financing have a positive relationship with agricultural integration. But size is more useful than efficiency, and structure of equity financing and agricultural integration move in the opposite direction. Thus, only equity financing with large size, efficiency, reasonable structure and right investment will actually have an active impact on agricultural integration. Meanwhile, the development of agricultural integration has not played a leading role on equity financing, and they have been in a low collaborative degree.

1 INTRODUCTION

As agricultural integration is the "short slab" of China's socialist modernization，Chinese government attaches great importance to the structural contradiction. From 2014 to 2016, "agricultural modernization" has been written in the title of No.1 Central Document for consecutive three years. Reform and Innovation are required by accelerating the agricultural modernization, one of the key is to develop the agricultural integration, which is the developing direction of modern agriculture. But reform needs capital support greatly. At present, the fund investment of agriculture integration in China can't meet the demand of the development of the agricultural integration: (Cuifang Wu, 2009) roughly estimates that rural capital supply and demand gap in 2012 is 18.8489 trillion Yuan, not to mention the lack and serious insufficient of services in securities, insurance and trust organizations; (Peng Jia, etc, 2011) etc find even areas where the development of agricultural integration are better, financing difficulty is still prominent; (Cheng Zhao and Zhihong Huang, 2011) point out that the financial repression exists in the process of agricultural integration in our country, so (Zheng Hong, 2011) puts forward obtaining financial support by the rural financial innovation, has become an important support for the development of agricultural integration.

Thus, research on the correlation is the key problem of how equity financing supports agricultural integration. The following three problems must be answered: Firstly, what is the actual impact about the expanse of the absolute scale of equity financing to the promotion of agricultural integration? Secondly, the absolute scale of agricultural integration or efficiency, which is more important? Thirdly, the increase of the proportion of equity financing to bank credit whether can play a positive role in promoting the agriculture integration? Currently no scholars study the above problems.

2 VARIBLE AND DATA SOURCES

2.1 The development of agricultural integration

Use AL to indicate agricultural integration. To quantitatively depict the development of agricultural integration per year in our country, using Weng Yao's discriminant analysis method as reference, construct discriminant index system: per capita GDP

277

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(X_1), GDP proportion in the first industry (X_2), the second industry labor proportion (X_3), per capita grain output (X_4) and the Engel's coefficient (X_5), and get the started stage of agricultural integration (F_1), growth stage(F_2) and mature stage's (F_3) discriminant value. These data are from *"China Agricultural Yearbook", "China Rural Statistical Yearbook", "China Statistical Yearbook" and "China's State Administration of Foreign Exchange"*.

2.2 Setting the equity financing variables

To reveal the relationship between the equity financing development and agricultural integration, this paper builds three sets of indicators to comprehensively measure the development of equity financing: equity financing scale index (SIZE=raised total funds by agricultural firm through issuing stocks within the territory/nominal agricultural GDP), equity financing efficiency index (EFF=raised total funds by agricultural firm through issuing stocks within the territory /rural fixed asset investment) , equity structure index (STR= raised total funds by agricultural firm through issuing stocks within the territory /agricultural loans).

2.3 The data source

(1) Agriculture GDP. Select the first industry as nominal agriculture GDP, data from *"China Statistical Yearbook"*. (2) Agricultural loans. Data is from *"Almanac of China's Finance and Banking"*, *"China Compendium of Statistics"* and *"China's Rural Financial Report"*. (3) Rural fixed asset investment. The data is from *"Rural China Statistical Yearbook"*. (4) This paper chooses the ecological-economic enterprises and agricultural product processing industry. Raising funds by issuing stocks in the main board, the small and medium-sized board, the "New Three Board", as well as in the national regional equity trading center is equal to that by agricultural firm. In 1992, the earliest agricultural firm went public in Shanghai and Shenzhen stock exchange, so this paper sample time spans from 1992 to 2015, 24 years in total. This part of the data is from Wind information.

3 EMPIRICAL ANALYSES

3.1 Measurement of agricultural integration level

According to the set variables and collected data, from 1992 to 2015, the paper calculates the discriminant value of agricultural integration in the start, grow and mature stage and the level of agricultural integration (as shown in table 1).

Table 1:1992-2015 year value of Agricultural integration.

year	*AL*	year	*AL*
1992	0.9803	2004	0.9207
1993	0.9840	2005	0.9173
1994	0.9810	2006	0.9162
1995	0.9800	2007	0.9252
1996	0.9840	2008	0.9372
1997	0.9914	2009	0.9423
1998	0.9988	2010	0.9510
1999	0.9216	2011	0.9638
2000	0.9197	2012	0.9703
2001	0.9191	2013	0.9799
2002	0.9187	2014	0.9879
2003	0.9164	2015	0.9927

3.2 Equilibrium relationship of Equity financing and agricultural integration

3.2.1 The stationary test of variables

Figure 1 shows that ADF unit root test should contain intercept and trend items. Table 2 shows the original sequences of the variables are unstable; the first order difference sequences are stable under 1% significance level.

278

Analysis on Dynamic Relationship between Equity Financing and Agricultural Integration - Based on VAR Model and Impulse Response

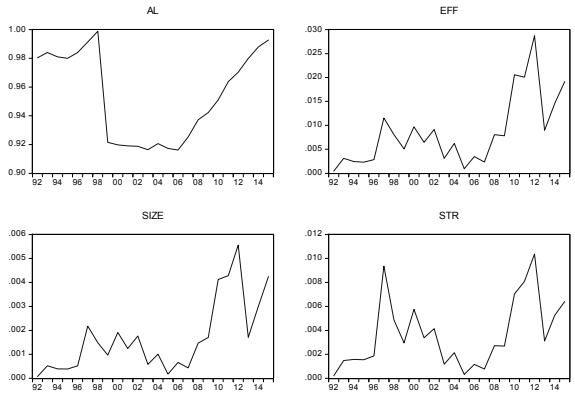

Fig1: The tendency of the variables.

Table 2: ADF results of Variable.

variable	Inspection type (c t p)	ADF	1% critical value	5% critical value	10% critical value	result
AL	(c t 0)	-0.91	-4.41	-3.62	-3.24	nonstationary *
SIZE	(c t 0)	-2.85	-4.41	-3.62	-3.24	nonstationary *
EFF	(c t 0)	-3.13	-4.41	-3.62	-3.24	nonstationary *
STR	(c t 0)	-3.04	-4.41	-3.62	-3.24	nonstationary *
D(AL)	(c t 5)	-6.85	-4.61	-3.71	-3.29	stationary***
D(SIZE)	(c t 0)	-6.24	-4.44	-3.63	-3.25	stationary***
D(EFF)	(c t 0)	-7.04	-4.44	-3.63	-3.25	stationary***
D(STR)	(c t 0)	-6.34	-4.44	-3.63	-3.25	stationary***

3.2.2 The optimum lag of VAR model

Table 3 shows that except the Log L, the rest clearly show that the optimum lag is 2 period, so VAR(2) model is established in this paper.

Table 3: Judgment of VAR lag phase.

	Log L	LR	FPE	AIC	SC	HQ
0	388.8426	NA	1.42e-21	-36.65	-36.45	-36.60
1	424.4957	54.32	2.27e-22	-38.52	-37.52	-38.30
2	464.2426	45.425*	2.89e-23*	-40.78*	-38.99*	-40.39*
3	478.7061	11.019	6.08e-23	-40.63	-38.05	-40.07

3.2.3 The stationary test of VAR model

Figure 2 indicates that the VAR model satisfy the stability condition.

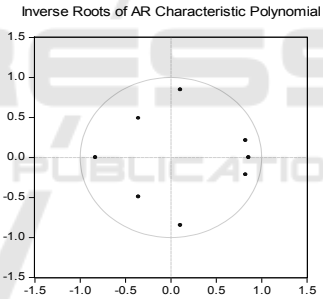

Fig 2: Test figure of AR root of VAR (2).

3.2.4 The Cointegration Test

Table 4: Johansen's co-integration test of VAR（2）.

hypothetical data	characteristics value	Trace test	5%critical value	probability (**)
none	0.72	57.71	47.85	0.00
at most one	0.56	30.83	29.79	0.03
at most two	0.45	13.36	15.49	0.10
at most three	0.02	0.561	3.841	0.45

279

Statistics in table 4 illustrates there is long-term equilibrium relationships between the EFF, STR, SIZE and AL.

$$AL = \underset{(342.62)}{1616.33SIZE} - \underset{(70.93)}{331.13EFF} - \underset{(11.67)}{0.52STR} + \mu \quad (1)$$

The analysis of formula (1) is as follows: (1) Equity financing scale (SIZE) expending has played a positive role in promoting agricultural integration. (2)Improvement of the equity financing efficiency (EFF) also has played a positive role in promoting the development of agriculture integration. But coefficient shows that the positive promoting effect of the efficiency is weaker than the scale, which is due to relatively limited attractive of the agricultural investment environment, At present, agricultural firm is in small scale(Cuifang Wu, 2009), and the endogenous financing is extremely limited(Peng Jia, etc, 2011), which lead to general low efficiency of equity financing. (3) The structure of equity financing and agricultural integration moves in the opposite direction, indicating that the more proportion in credit funds equity financing takes, the worse the ascension of agriculture integration is.

3.2.5 Causality test

Table 5 shows that the probability values of statistics AL to SIZE, EFF and STR are 0.0435, 0.0536, 0.0000, illustrating SIZE, EFF and STR variable are the causes of Granger of AL, three variables need to be included in the corresponding equation of AL endogenous variable. From joint survey analysis of AL to SIZE, EFF and STR, probability value of statistics are 0.0000, showing that lags of SIZE, EFF and STR to AL are significant. In addition, SIZE, EFF and STR to AL individual factors are not significant, namely, SIZE, EFF and STR to AL are not significant: that is to say, the Granger cause of SIZE, EFF, and STR is not AL, and state that the development of agriculture integration does no good to equity financing.

Table 5:Grangertest of VAR(2).

explained variable: AL			
explanatory variable	Chi-sq	df	P value
SIZE	6.2694	2	0.0435
EFF	5.7437	2	0.0536
STR	65.7177	2	0.0000
total	81.4202	6	0.0000
explained variable: SIZE			
explanatory variable	Chi-sq	df	P value
AL	1.4185	2	0.4920
EFF	26.528	2	0.0000
STR	1.5211	2	0.4674
total	33.329	6	0.0000
explained variable: EFF			
explanatory variable	Chi-sq	df	P value
AL	1.3162	2	0.5178
SIZE	30.710	2	0.0000
STR	0.7756	2	0.6785
total	38.064	6	0.0000
explained variable: STR			
explanatory variable	Chi-sq	df	P value
AL	3.0809	2	0.2143
SIZE	11.948	2	0.0025
EFF	11.804	2	0.0027
total	17.225	6	0.0085

3.3 Dynamic effect analysis based impulse response function

3.3.1 Response of multi-factor to the development of agricultural integration

Figure 3(1) shows the following three aspects: (1) Disturbed by SIZE standard deviation, the initial response of AL is zero, in the second period, there is a slightly negative response, and then quickly into third period, reach a maximum 0.009. Namely, the equity financing scale changes in the third period has the strongest impaction on the agriculture integration. Although over time the impact gradually weakened, but the trend reached the maximum value 0.009, which illustrates that the increasing scale of equity financing can bring a positive influence to the agriculture integration. (2)Response of AL to one S.D. EFF innovation presents zero in the first period, in the second period，it begins to decline to a negative response, until the third period. Then it reaches the minimum negative response value. Soon,

Analysis on Dynamic Relationship between Equity Financing and Agricultural Integration - Based on VAR Model and Impulse Response

in the seventh period it begins to appear positive response and fiercely rise, until 12th period. This suggests that the promotion of the efficiency of equity financing brings negative impact on agriculture integration, but it is relatively short, in the long run. Probably it takes times to translate equity financing funds into agricultural fixed assets (eg, agricultural infrastructure construction). After the completion of the investment, it will continue to accelerate the process of agriculture integration naturally. (3)Response of AL to STR in the initial period is still zero, in the second period turns to a positive response, then in the third period rapidly dropped to zero, and kept negative response all the time. This shows that equity financing structure changes can bring positive influence to the agriculture integration in the short time, but be negative in the long run. This negative impact is undoubtedly caused by changing investment of agricultural funds.

3.3.2 Response of development of agricultural integration to the multi-factor

Figure 3(2), (3) and (4) show that response of SIZE, EFF and STR to S.D.AL innovation are very similar. At first, there is biggest positive response. Then the response continues to decline, and be positive or negative continuously. But the trend is positive, and tends to zero at the 21st period. The above reality illustrates that agriculture integration may produce positive influence on rural equity financing scale, efficiency and structure, but the effect is weak and it is difficult to distinguish, which is caused by small shares of agricultural firms in the capital market.

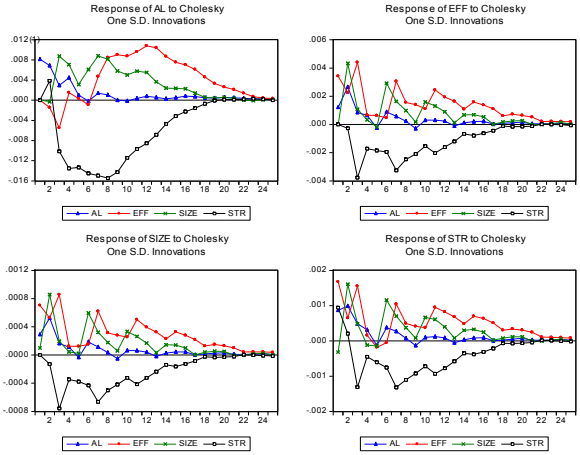

Fig3: Response to Generalized One S.D. Innovations ± 2 S.E.

4 CONCLUSIONS AND RECOMMENDATION

4.1 Main conclusions

4.1.1 Long-term equilibrium relationship

Equity financing in China and agriculture integration have a long-term equilibrium relationship, scale and efficiency of equity financing have a positive impact on agriculture integration. But expanding the scale of equity financing should be a dominant factor, and the efficiency has a limited role in promoting the agriculture integration. So vigorously developing equity financing can contribute to the promotion of agriculture integration, which is based on two conditions: firstly, increase the financing scale of agricultural firms; secondly, restrict agricultural firms changing direction of investment. Otherwise, the equity financing will not conducive to the development of agriculture integration.

4.1.2 Short term equilibrium relationship

Only equity financing with large size, efficiency, reasonable structure and right investment will actually have an active impact on agricultural integration. However, Agriculture integration is not the Granger reason of all variables, which is related to that equity financing takes too small shares in overall financing in our country, so they have been in a low collaborative degree.

4.1.3 Dynamic Relationship

Equity financing efficiency will begin to have a negative impact on agriculture integration, but it begins and always keeps a positive response in the seventh period, and this is related to the cycle of fixed assets projects of agriculture integration, presenting positive for a long time. As long term equity financing structure impacted, it restrains the development of the agriculture integration, still related to the listed firms changing funds investing direction. Only equity financing with large size, efficiency, reasonable structure and right investment will actually have an active impact on agricultural integration, but these influences show certain hysteresis. After agriculture integration hit, the impact on other variables is not sure. The reason is that shares of agricultural firms in the capital market are too small.

281

4.2 Policy recommendations

4.2.1 About enlarging the scale of equity

Speed up the listing process is a necessary method. The recognized standard of the government to leading enterprises of national agriculture integration is very strict, and it needs to reach both standard of business scale and indicators so that the company can have the qualification. For this kind of enterprises, as long as the relevant indicators meet the requirements of the listed company, regulators should ease stock reform time.

4.2.2 About changes investment of raised funds

Apart from strengthening the regulation of securities regulators, the government should play the government's coordination services, and give industry guidance to the listed agricultural firms on how to raise and use funds. In addition, government should optimize rural agricultural industry environment and soft financing environment, such as invest to rural public infrastructure, and innovate the operation mechanism of government, in order to attract more capital investment.

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282