Financial Development, Rural Resident Income Growth and Urbanization: Evidence for the China

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Abstract

Urbanization is an important and revolutionary project in the economic transition of China. This paper focuses on the dynamic relationship of financial development and urbanization, and the income of rural residents is regarded as an intermediate variable. While the literature on this topic is reviewed, a model of financial development, income of rural residents and urbanization in China is presented. Then an empirical analysis is conducted to validate the model above, and it is found that financial development could increase the income of rural residents and facilitate the urbanization in China.

Keywords: Financial Development, Income Increasing, Urbanization

Correlation research on financial development and economic growth has been relatively mature, but research on impact of financial development to urbanization progress of developing country is still poor. In this paper, China is taken as an example to discuss the dynamic evolution process of financial development's promoting urbanization process by increasing rural resident income growth. The paper at first briefly looks back the theoretical research achievement of financial development's promoting income growth of rural residents and pushing forward urbanization process; on the basis of existing theory, dynamic evolution model among financial development, income growth of rural residents and urbanization is established, and an empirical study is adopted to verify the model, finally, main conclusions are made.

1．Literature Review

1.1 **Financial Development and Urbanization**

During urbanization process, financial development plays a positive pushing role. Some Chinese researchers conduct empirical study by taking China as an example, and analyze mutual relation between financial development and urbanization via different viewpoints.

Zheng Changde (2005) proves that monetization degree of economy is one of important factors promoting urbanization. Huang Yong and Xie Chaohua (2008) find that, there is a direct causal relationship between bank loans and urbanization, and bank loans has an important support effect to the urbanization process. Wang Juan and Hu Wenbo (2013) conduct an empirical research on correlation data of financial development and urbanization rate of Gansu Province from 1977 to 2011, and they find that, there is a long term positive correlation relationship among urbanization level, financial development level, financial development efficiency, and economic growth level; financial development scale and financial development efficiency promote the development of urbanization.

After proving the significant correlation relationship between financial development and urbanization, some researchers discuss the interaction mechanism between financial development and urbanization process.

Zheng Changde (2007) analyzes the action mechanism between financial development and urbanization via viewpoint of production factor allocation, and deems that, developing financial intermediaries can promote transformation from deposit into investment, improve capital allocation efficiency, promote economic growth, reduce trading cost, and spread risk, etc, to promote concentration of production factors towards cities and towns and push forward the urbanization process.

Furthermore, improvement of urbanization level can also promote development of financial intermediaries by demand and supply via concentration of production factors, and expansion of market scale.

Some scholars deem that industrialization is the intermediate variable for impact of financial development to urbanization, and impact of finance to urbanization mainly depends on industrialization and upgrade of industrial structure. E.g., Xu Xiaolin, etc (2012) conducts case analysis to industrialization, urbanization and financial development situation of Guangrao City, and finds that optimization of financial ecological environment and perfection of financial system form the significant effect of capital depression, and greatly promotes industrialization process; while industrialization can change employment structure of rural residents, promote industrialization of agriculture and at the same time boost urbanization.

Zhou Zhanqiang and Qiao Zhimin (2011) incorporate financial investment into research on impact to financial development and urbanization. Within short term financial investment has an significant impact to urbanization, while financial development does not have an significant impact to urbanization; nevertheless, due to long term consideration, there is a balance relationship among three ones, financial development efficiency, financial investment both have an significant impact to urbanization, while financial development has a greater contribution to urbanization.

1.2 Rural Resident Income and Urbanization

Rural resident income is closely related to scale of surplus labor force migration of agriculture; a representation form of urbanization is the orderly flow of rural labor towards cities and towns. Therefore there is a mutual impact relationship between rural resident income level and urbanization process. Some researchers also analyze this issue.

Related scholars at first prove the long term balance relationship between rural resident income and urbanization process. Song Yuanliang and Xiao Weidong (2005) establish VAR (vector auto-regression) model to research dynamic correlation between urbanization development and rural resident income growth. The study proves the fairly strong positive interaction response effect between China's urbanization development and rural resident income growth. Liang Chunmei and Xiao Weidong (2010) research co-integration between per capita net income of rural household and proportion of urban population in total population (1978-2008), and find that there is a long term dynamic balance relationship between two ones, together with a bidirectional casual relationship.

For interactive relationship between rural resident income level and urbanization process, Liang Chunmei and Xiao Weidong (2010) deem that, within short term, rural resident income growth shall push forward development of urbanization, nevertheless, due to long term consideration, urbanization development shall further promote growth of rural resident income. Through demonstration research Fan Aijun and Wang Lili (2007) find that, there is a long term positive and stable co-integration relationship between China's urbanization development and net income per capita of rural resident, but the impact extent to each constituted part of net income is different, although the impact of urbanization development to rural resident income growth is fairly small within short term, with time past, the effect shall be gradually significant and stable.

1.3 Financial Development and Rural Resident Income

The comments on relationship between financial development and rural resident income level are not fully consistent.

According to viewpoint of incompleteness of financial market, financial development's helping poverty crowd to improve capability of risk resistance, and financial deepening, some scholars deem that financial development can significantly improve income level of poverty crowd. According to incompleteness of financial market, Galor and Zeira (1993), and Aghion and Bolton (1997) deemed that financial development and reduce income distribution inequality. The research of Holden and Prokopenko (2001) also proves that, financial development can help the poors to deal with fluctuation of income in the future, and promote the financial system to provide better service

and capital support to poverty family. Beck and Demirguc Kunt, etc（2007）research financial deepening effect and deem that financial development can shorten income distribution gap, and in some extent help the poverty crowd. In the demonstration research they find that, among income growth of poorest people, 40% thereof can attribute to impact of financial development shortening income gap. The research result of Wang Hu, etc (2006) also proves that, financial development can promote peasant income.

Qian Yongkun and Zhang Weibing (2007) analyze the relationship between financial development and rural resident income level by taking Jiangsu Province of China as an example, and prove the significant positive correlation between financial development and rural resident income level.

Differing from above viewpoints, it is mentioned in some studies that, market failure shall incur the injustice of people's acquiring credit capital, the poverty crowd cannot make investment to production activity due to insufficiency of mortgage or incomplete information of financial intermediaries. It deems that main beneficiary of financial development is also the rich because they have sufficient mortgage and keep good relationship with financial institution, thus financial development shall further expand the gap between the rich and the poor. Wen Tao, etc (2005) adopts China's time sequence data to conduct demonstration research to impact of financial development to China's peasant income, and find that China's financial development does not significantly increase peasant income and is not in favor of rural economic development.

2．The Model and Indexes

2.1 The Model

Existing research result shows that, growth of rural resident income is the main factor impacting urbanization; at the same time, high quality and sustainable urbanization process also mainly bases on improvement of rural residents income level. Therefore, in this paper rural resident income level is deemed as an intermediate variable to erect a dynamic evolution model for impact of financial development to urbanization process by increasing rural resident income.

First, linear function between urbanization level UB and rural resident income level Y is established as below:

$$UB = a + bY \tag{1}$$

Second, Cob-Douglas production function is adopted to establish expression of rural resident income level, i.e., rural resident income is composed of two production factors as capital and labor under condition of technical progress:

$$Y = AK^{\alpha}L^{1-\alpha} \tag{2}$$

Wherein, Y is per capita income level of rural resident; A is technical progress index; K is capital stock; H is labor capital stock. For expression 2 the logarithmic form is adopted to derive:

$$LnY = LnA + \alpha LnK + \beta LnL \tag{3}$$

In the model, ST, RE, LE, etc are respectively adopted to measure technical progress, capital stock and labor capital stock, and the following expression can be derived:

$$Y = c_0 + c_1 ST + c_2 RE + c_3 LE \tag{4}$$

Next, the impact of financial development to three production factors determining rural resident income growth shall be further investigated, and financial development level shall be delineated via three dimensionalities as financial deepening FD, financial intermediaries scale FI and financial performance FP. The following function can be established:

$$ST = c_{10} + c_{11}FD + c_{12}FI + c_{13}FP \tag{5}$$

$$RE = c_{20} + c_{21}FD + c_{22}FI + c_{23}FP \tag{6}$$

$$LE = c_{30} + c_{31}FD + c_{32}FI + c_{33}FP \tag{7}$$

2.2 Index Selection and Data Source

2.2.1 Urbanization Dynamic Coefficient (UB)

At present correlation research all adopts proportion of urban population in total population as index of urbanization rate.

Although this index selection is simple and easy, it also has some shortcomings: on one hand, it cannot eliminate the impact of natural growth of urban and rural population to index; on the other hand, this index delineates the static population of urban population in total population and cannot present migration of population from rural area to urban area, and cannot actually reflect the dynamic process of urbanization. In order to resolve this problem, this paper shall adopt the dynamic variation of rural population and urban population after eliminating population natural growth rate to reflect the urbanization process.

$$Urbanization\ dynamic\ coefficient = \frac{(urban\ population\ annual\ growth\ rate - population\ natural\ growth\ rate)}{(rural\ population\ annual\ growth\ rate - population\ natural\ growth\ rate)}$$ The data source of urban and rural population as well as population natural growth rate is the China Statistical Yearbook.

2.2.2 Indexes of Production Function of Rural Resident

Rural per capita net income (Y): According to China statistical yearbook, rural resident family per capita net income data from 1985 to 2011 is adopted, while the inflation factor of the data is eliminated.

Technical progress ST: The technical progress adopts the proportion of primary industry in GDP as the index. Related data comes from China statistical yearbook.

Capital stock RE: Per capita capital adopts the proportion of rural individual fixed asset investment in current year rural population, i.e., rural per capita fixed asset. Related data comes from China rural statistics yearbook.

Labor stock LE: The labor capital index adopts the proportion of current year population with over junior high school education in total rural population. Related data comes from China agriculture development report.

2.2.3 Indexes of Financial Development

Financial deepening FD: The financial deepening index adopts the proportion of domestic credit in GDP. Related data comes from statistics database of World Bank.

Financial intermediaries scale FI; With gradual development of financial informatization, the scale of financial intermediaries is also spreading among users via geometrical progression, in this paper the post and telecommunication business volume is adopted as financial intermediaries scale index to stand out and reflect the diffusion effect of information technologies as Internet and mobile communication, etc to finance. Related data comes from China statistical yearbook.

Financial efficiency FP: The financial efficiency adopts financial industry increment of tertiary industry divided by financial employee quantity, to derive per capita financial increment. Related data comes from China statistical yearbook and China financial statistics yearbook.

3. Empirical Analyses

3.1 Unit Root Test

In order to determine whether above time sequence variables are stable, unit root test is conducted. The test result shows that, all original data of variables are instable, but the first order difference sequence thereof is stable, therefore, above variables abide by first order integration, and is ~I(1) process.

Table 1: Unit Root Test Result of Variable ADF

Variable	Test type (c,t,m)	ADF test value	Threshold			Stable or not
			1%	5%	10%	
UB	(c,t,0)	-3.0402	-4.3561	-3.5950	-3.2335	N
DUB	(c,t,1)	-5.6166	-4.3743	-3.6032	-3.2381	Y
LnY	(c,t,1)	-1.7039	-4.3743	-3.6032	-3.2381	N
DLnY	(c,0,0)	-3.5941	-3.7241	-2.9862	-2.6326	Y
LnST	(c,t,1)	-2.4247	-4.3743	-3.6032	-3.2381	N
DLnST	(c,0,0)	-3.1681	-3.7241	-2.9862	-2.6326	Y
LnRE	(c,t,2)	-2.7478	-4.3943	-3.6122	-3.2431	N
DLnRE	(c,0,0)	-3.2926	-3.7241	-2.9862	-2.6326	Y
LE	(c,0,0)	-1.6397	-3.7241	-2.9862	-2.6326	N
DLE	(c,t,0)	-6.3140	-4.3943	-3.6122	-3.2431	Y
FD	(c,t,0)	-2.3740	-4.3561	-3.5950	-3.2335	N
DFD	(0,0,0)	-4.4337	-2.6607	-1.9550	-1.6091	Y
FI	(c,0,0)	-1.7143	-3.7115	-2.9810	-2.6299	N
DFI	(0,0,0)	-1.9150	-2.6607	-1.9550	-1.6091	Y
FP	(c,t,0)	-1.1772	-4.3561	-3.5950	-3.2335	N
DFP	(c,t,4)	-4.1223	-4.4679	-3.6450	-3.2615	Y

3.2 Urbanization and Rural Resident Income

Since two variables (urbanization dynamic level and rural resident income level) abide by time sequence of ~I(1), Engle-Granger method is adopted for co-integration test.

At first, UB and Y are regressed by least square method (OLS method), to derive:

$$UB = 2.5057 + 0.3635*Y \qquad\qquad (8)\ ^{[1]}$$
$$(0.028285)$$
$$[12.84945]$$

After model adjustment the determination coefficient is 0.86, and fairly good fitting effect is acquired.

Then the residual error of model fitting is conducted by stationary test, For unit root test without intercept and trend term, and with 0 lag length, ADF value is -2.9604, and threshold is -2.6569 for less than 1% significance level. It can be seen that, model residual error is stable, and regression of above model is also stable.

Granger casual analysis is conducted to urbanization dynamic level and rural resident income level, to derive:

Table 2: Granger Casual Analysis of Urbanization and Rural Resident Income

Original hypothesis	F value	P value	Conclusion
Y is not Granger cause of UB	9.98345	0.00098	Reject
UB is not Granger cause of Y	0.13051	0.87839	Accept

It can be found that rural resident income level is the Granger cause of urbanization dynamic coefficient.

3.3 Production Function of Rural Resident Income Level

Since rural resident income level Y, technical progress ST, per capita capital stock RE, per capita labor capital stock LE are time sequence variable of first order integration, i.e., they abide by ~I(1), a vector auto regression model (VAR model) can be established to conduct co-integration analysis to above time sequence variables, to check whether there is a long term balance relationship among variables.

First, according to AIC and SC rule, optimal lag length of VAR model is determined as 2. AR root chart analysis is conducted to model, and it is found that all unit root is less than 1, which means VAR model is stable.

Second, in order to check whether there is a co-integration relationship among time sequence, the model is conducted by Johansen co-integration test, and the result is shown in table 2.

[1] Inside of round brackets is standard deviation, inside of square brackets is t value, the same below.

Table 3: Johansen Co-Integration Test Result of Rural Resident Income Production Function

| Hypothesis	Characteristic root	Trace statistics	5% Threshold	P value
0 cointegrated vector*	0.979623	133.1106	47.85613	0.0000
At least 1 cointegrated vector*	0.735101	43.56310	29.79707	0.0007
At least 2 cointegrated vectors	0.406385	13.00975	15.49471	0.1145
At least 3 cointegrated vectors	0.043158	1.014692	3.841466	0.3138

* It means that original hypothesis is rejected at 5% significance level, the same below.

It can be seen that, above time sequence at least has two co-integration relationships, and there is a long term balance relationship among Y, ST, RE and LE.

Third, impulse response function IRF can be used to check the impact of one standard deviation (from random disturbance term) to current or future value taken of endogenous variable. In this paper the rural resident income level is adopted as a dependent variable to check the impact from random disturbance term of a standard deviation of technical progress, capital and labor lag value. The result is shown in Fig. 2-4.
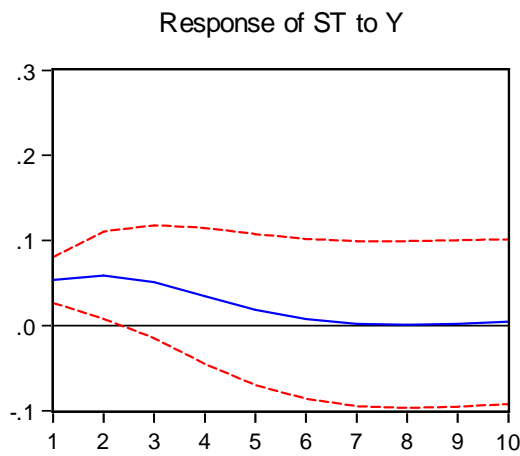
Fig. 1: Impulse Response Chart of ST to Y
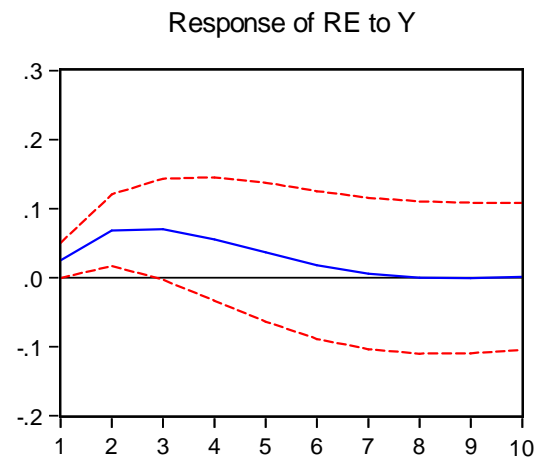
Fig. 2: Impulse Response Chart of RE to Y
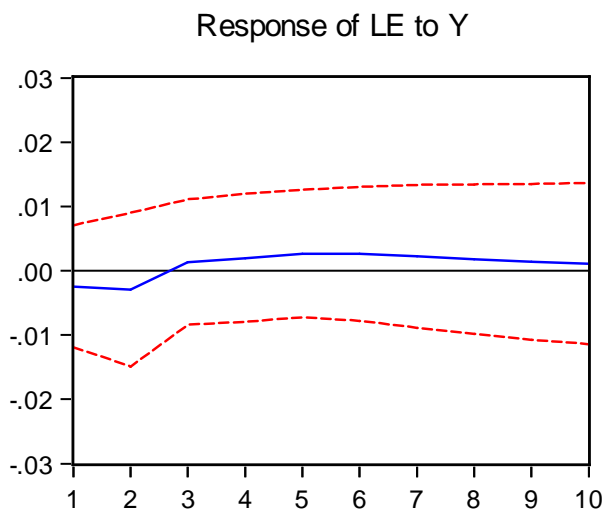
Fig. 3: Impulse Response Chart of LE to Y

Fourth, there is a co-integration relationship among variables, the vector error correction model VEC model can be exported via vector distribution lag model, and the following co-integration expression can be derived:

$$Y = 4.6514 - 3.2783ST + 1.8021RE + 3.3733LE \qquad (9)$$
$$(0.46498) \quad (0.34460) \quad (0.96260)$$
$$[\,7.05040] \quad [-5.22955] \quad [-3.50431]$$

3.4. Financial Development and Rural Resident Income

Same as test process of 3.3.3, demonstration research is conducted to expression (5)-(7).

VAR model is respectively established for (5)-(7), since two models of technical progress and financial development, and capital and financial development respectively have two unit roots over 1, the model has instability, variables of two models are conducted by difference reduced order treatment.

According to AIC and SC rule, optimal lag length of three models is determined as 2, unit root is less than 1, and the model is stable.

Three VAR models are conducted by Johansen co-integration test, and the result is shown in table3-5:

Table 4: Johansen Co-Integration Test Result of Technical Progress and Financial Development

| Hypothesis	Characteristic root	Trace statistics	5% threshold	P value
0 cointegrated vector*	0.880676	67.8165	47.85613	0.0002
At least 1 cointegrated vector	0.46039	21.04644	29.79707	0.3547
At least 2 cointegrated vectors	0.281862	7.474439	15.49471	0.5232
At least 3 cointegrated vectors	0.008617	0.190388	3.841466	0.6626

Table 5: Johansen Co-Integration Test Result of Capital and Financial Development

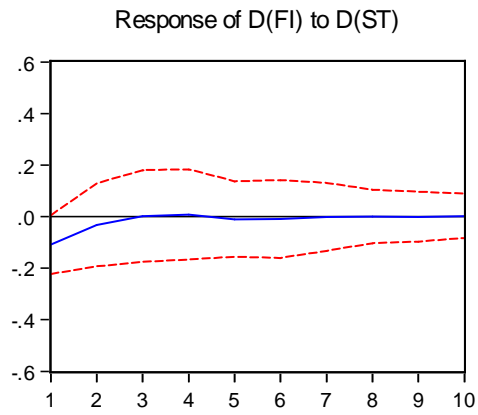| Hypothesis	Characteristic root	Trace statistics	5% threshold	P value
0 cointegrated vector*	0.811461	69.14914	47.85613	0.0002
At least 1 cointegrated vector	0.716416	32.44321	29.79707	0.0242
At least 2 cointegrated vectors	0.185446	4.717809	15.49471	0.838
At least 3 cointegrated vectors	0.009288	0.205291	3.841466	0.6505

Table 6: Johansen Co-Integration Test Result of Labor and Financial Development

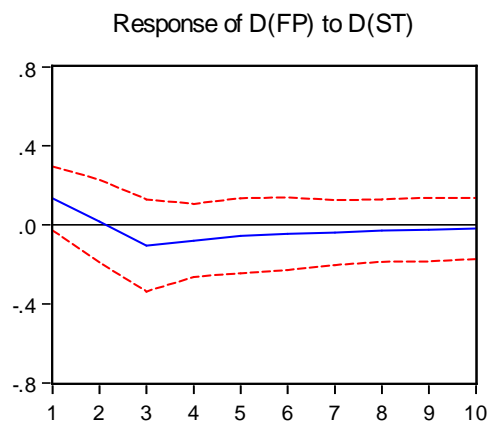| Hypothesis	Characteristic root	Trace statistics	5% threshold	P value
0 cointegrated vector*	0.937114	129.1332	47.85613	0
At least 1 cointegrated vector*	0.889106	65.50528	29.79707	0
At least 2 cointegrated vectors	0.47156	14.92412	15.49471	0.0608
At least 3 cointegrated vectors	0.010987	0.254106	3.841466	0.6142

It can be seen that, there is a co-integration vector among technical progress, capital and financial development, together with two co-integration vectors between labor and financial development. The technical progress, capital and labor all have a long term balance relationship with financial development. Therefore, technical progress, capital and labor are respectively adopted as dependent variable to check the impact from random disturbance term of a standard deviation of lag value of financial development.
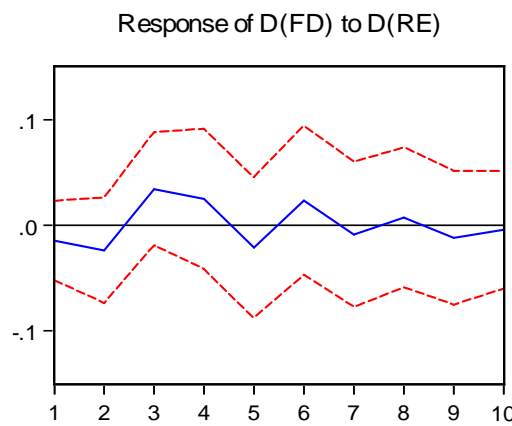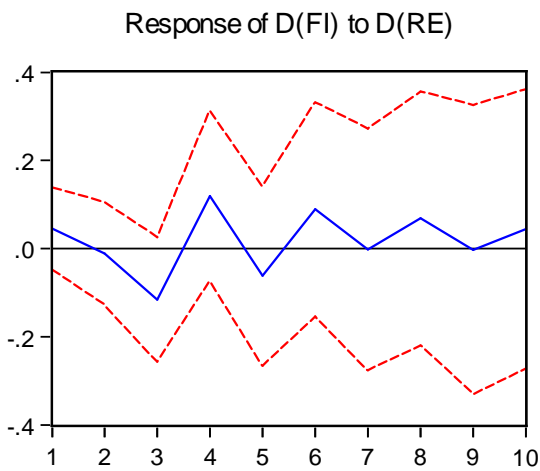
Response of D(FD) to D(ST)

Response of D(FI) to D(ST)
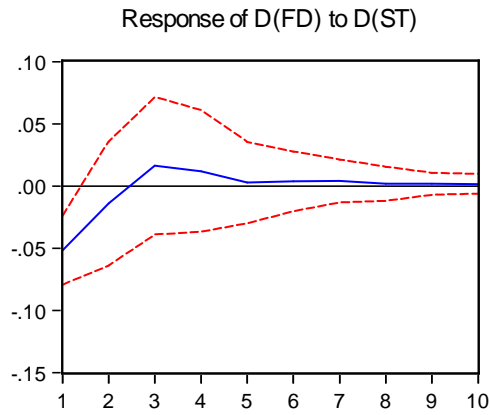
Fig. 5 Impulse Response Chart of FD to ST   **Fig. 6 Impulse Response Chart of FI to ST**

Response of D(FP) to D(ST)

Response of D(FD) to D(RE)

Fig. 7 Impulse response chart of FP to ST   **Fig. 8 Impulse response chart of FD to RE**

Response of D(FI) to D(RE)

Response of D(FP) to D(RE)

Fig. 9 Impulse response chart of FI to RE   **Fig. 10 Impulse response chart of FP to RE**
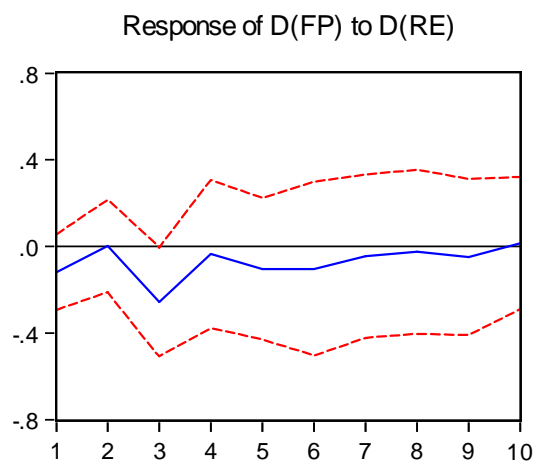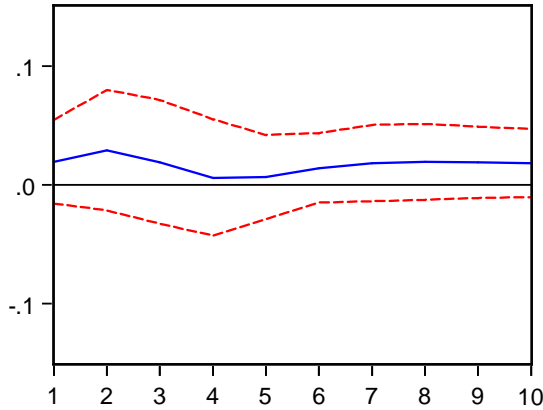
Response of FD to LE

Response of FI to LE

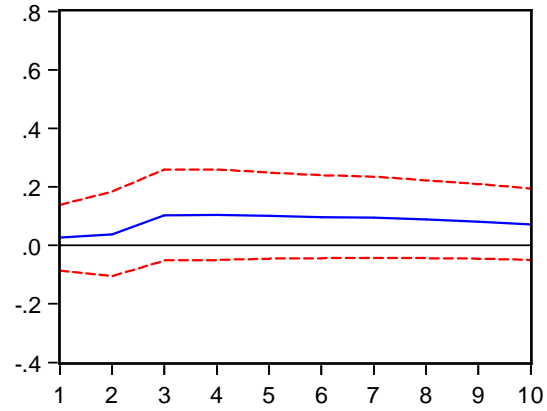**Fig. 11 Impulse response chart of FD to LE**   **Fig. 12 Impulse response chart of FI to LE**
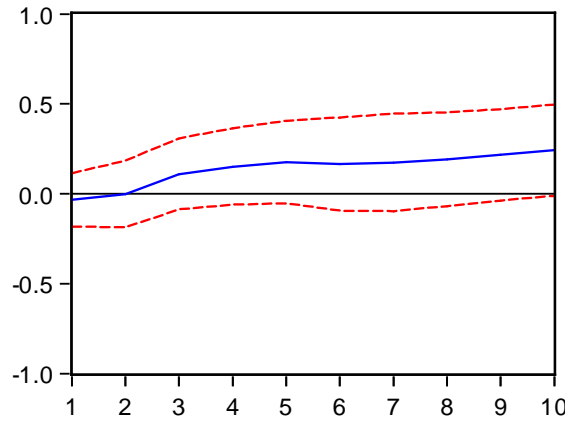
Response of FP to LE

Fig. 13 Impulse response chart of FP to LE

Technical progress, capital and labor shall respectively establish VEC model with development to investigate the short term relationship, and derive co-integration equation:

$$D(ST) = 0.4529 - 4.6104D(FD) - 0.3459D(FI) - 0.2306D(FP)$$

$$(0.79028) \quad (0.39822) \quad (0.11869)$$
$$[5.83386] \quad [0.86866] \quad [1.94265]$$

(10)

$$D(RE) = -0.2939 + 1.8234D(FD) + 1.0773D(FI) + 0.2945D(FP)$$

$$(1.04508) \quad (0.44147) \quad (0.11968)$$
$$[-1.74470] \quad [-2.44013] \quad [-2.46045]$$

(11)

$$LE = 0.5622 - 0.3512FD + 0.0636FI + 0.0041FP$$

$$(0.13998) \quad (0.03377) \quad (0.00570)$$
$$[2.50870] \quad [-1.88338] \quad [-0.71850]$$

(12)

4. Conclusions

4.1 Financial Development has a Significant Pushing Effect to Urbanization Process

Although t value of some variables of expression 10-12 is not great which means that significance of individual variable is not strong, this impact can be omitted for VEC model of time sequence. For long term consideration, financial development can effectively decrease the proportion of primary industry in GDP and improve per capita fixed asset investment and rural labor quality. Expression 9 shows that, technical progress index (proportion of primary industry in GDP) is of negative correlation with rural resident income level, while capital factor (per capita fixed asset investment) and labor factor (rural labor quality) is of positive correlation with rural resident income level. Therefore, financial development is of positive correlation relationship with rural resident income level. According to expression 8, financial development is of significant positive correlation relationship with urbanization dynamic coefficient.

4.2 Financial Deepening Pushes Forward Urbanization Process via Improving Technical Progress and Capital

Expression 10-12 shows that, financial deepening is of negative correlation with technical progress and labor within short term, and is of positive correlation with capital, this means that credit and loan investment can significantly improve per capita fixed asset investment level of rural residents. The impulse response of Fig. 5, 8, 11 shows that, within 2 lag lengths of credit investment, it is of negative impact to proportion of primary industry to GDP, then the impact is converged to 0 via a fluctuation trend; for 2-5 lag lengths of credit investment to fixed asset, there is a significant positive impact which means that the credit investment has a lagging positive impact relationship with rural resident individual fixed asset investment; the credit investment is of slightly positive impact to rural labor quality at long term. Above analysis shows that, financial deepening (proportion of domestic credit and loans to GDP) can improve rural resident income level via the channel of technical progress and capital, and push forward the urbanization process.

4.3 Financial Intermediaries Pushes Forward Urbanization Process via Improving Capital and Labor Factors

At the background of high speed development of information technology and mobile communication technology, scale of financial intermediaries is also promptly expanded. Expression 11 shows that, financial intermediaries scale (post and telecommunication business volume) is of significant positive impact with capital factor (individual fixed asset investment), that is to say, with gradual advancing of financial informatization, individual can acquire financial resource more easily to expand fixed asset investment, and this also promotes the growth of rural resident income level. The impulse analysis chart of financial intermediaries scale to labor factor (rural labor quality) shows that, financial intermediaries scale is of long term positive promotion effect to improvement of rural labor quality.

4.4 Financial Performance Speeds up Urbanization Process via Improving Labor Factors

Financial performance reflects operation efficiency and profit earning capability of financial institution. According to impulse analysis chart of financial performance to technical progress, capital factor and labor factor, long term impact of financial performance to technical progress and capital factor is not significant, but financial performance is of long term positive balance relationship with labor factor (rural labor quality).

5. Future Research

An empirical study in this paper proves that financial development can significantly improve urbanization level by improving rural resident income. But this research only adopts rural resident income as the medium to discuss the boosting effect to urbanization and has some limitation. Next, the direct impact mode and action mechanism of financial development to urbanization level can be further researched, to horizontally broaden the vision, and research the impact mechanism of financial development to urbanization in some other countries of transformation period.

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