дипломом бакалавра, одинаково хорошо владеющего всеми ее направлениями. В связи с этим представляется целесообразным сосредоточение отраслевых университетов, имеющих в своей структуре регионоведческие подразделения, на подготовке специалистов (бакалавров) по направлениям регионоведения, отражающим специфику вуза, с учетом состояния соответствующего рынка труда.

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## FINANCIAL DEVELOPMENT, INPUT OF PUBLIC FINANCE AND URBANIZATION IN CHINA

ABSTRACT. This paper studies the effects of financial development and input of public finance on urbanization in China. It shows that the input of public finance has an obvious influence on the urbanization, but the financial development does not in the short run, that in the long run there is a relationship of equilibrium among them and the effects of the efficiency of financial development and the input of public finance are obvious, and that the contribution of the financial development to the urbanization is relatively greater in the longer periods.

KEYWORDS: Financial development; Input of public finance; Urbanization; Vector error correction model

### 1. Introduction

Urbanization requires a lot of financial support. Financial departments and the government are the main sources of urbanization funds, which have a great influence on the urbanization process through the support for the infrastructure, public service system construction, industrial structure adjustment and upgrade, enterprise development and the daily life of the residents. Thus, it has a vital significance to empirically analyze the extent of the influence for mobilizing the urbanization construction and optimizing the capital structure in the urbanization construction.

There are many valuable studies on the relationship between urbanization and the funds provided by financial sectors and the government. Changde Zheng [10] and Yan Wu [8] think that there is an interaction mechanism between the development of the financial intermediary and urbanization. Using the unstructured VAR model, Chaohua Xie and Yong Huang conclude that China's bank loans have a direct causal relationship with the urbanization and greatly support the urbanization [2]. Mei Zheng and Qiang Fu focused on Chongqing Province and find that financial development is an important factor affecting the urbanization. And they believe that the premium income, deposits, loans and cash incomes of financial institutions have contributed to the urbanization [11]. Qichun Niu and Xiang Liu, with the 1980—2007 data in the western regions of China, using the error-correction model, show that financial development can promote urbanization in the long run while not in the short term [5]. With the help of error-correction model on the base of 1986—2005 data, Pengyong Liang and his partners make their findings that it shows significant regional differences between China's financial development and urbanization. And in the long run, financial development doesn't promote urbanization in the eastern, central and western regions [3]. Using the vector auto-regressive model, Hongyan Yu study the national data from 1978 to 2006 and concludes that there is a cointegration relationship between urbanization and the financial revenue and expenditure, so the government can affect the development of urbanization by the financial leverage [9]. Qing Liu and Zhiyong Zhang analyze the public input of the urbanization process in Guizhou Province, and finds that in the long term, the increasing financial input has a positive effect on the process of urbanization ,while the short-term effect is quite small [4]. Kaike Wang, who adopts time-series data of Fujian Province and uses the vector error correction (VEC) model, Granger tests, supports that urbanization has a long-run equilibrium relationship with the input of public finance and is the Granger cause of the financial capital investment [7]. It can be seen that these studies generally use the vector auto regression (vector) error correction model, Granger tests and other measurement methods and adopt the research data in 1978 and beyond. Since their study only focus on the relationship between urbanization and financial development or the input of public finance, they have not studied the impaction of financial development and financial inputs on urbanization, and also have not compared the relative contribution extent on the urbanization.

This paper, on the base of the longer-term national data from 1952 to 2009, using the vector error correction model, simultaneously study the impaction and the extent of financial development and input of public finance on urbanization.

## 2. Data and models

### 2.1. Data Description

The data range used in this study is 1952—2009, including the data of 1952—2008 from the «Sixty years of New China Statistical Information» and the 2009 data from «China Statistical Yearbook 2010.» The retail price index used in this study has been adjusted to reduce data distortion caused by inflation.

### 2.2. Selection of indicators

Indicators used in this study are as follows:

(1) Urbanization indicators. Just like many other studies, this paper use the urbanization rate (UR) to indicate the urbanization, namely the proportion of urban population to total population. Although the urbanization will be underestimated, there is no better alternative indicator because China's urban population statistics are based on the household registration system and then many urban residents without the household can't be counted.

(2) Financial development indicators. Considering that it starts late and has a very limited scale in China's securities and insurance industry, the state of banking development in this paper is used as the financial development indicator. Generally, we use two indicators to measure the state of the financial development: the scale and the efficiency of the financial development. The relevant financial ratios are commonly used to show the scale of the financial development, such as the total deposits and loans of all financial institutions / GDP. However, Arestis, who takes into account the domestic credit in developing countries, puts forward various types of loans / GDP to indicate the scale of financial development [1].Accordingly, we use the financial institution loans / GDP (LOAN) to reflect the scale of financial development. This indicator not only reflects the expansion of financial intermediations, but also shows the activity of the financial intermediations in the allocation of funds. As for the efficiency of financial development, it refers to the efficiency of

making the savings into loans by financial intermediations. And the ratio of the household savings / loans (LSVLN) is used to indicate the efficiency in the paper.

(3) Financial input indicators. The financial supports for agriculture expenditure and infrastructure expenditure are commonly used as the financial investment indicator. However, these indicators only focus on one aspect of the impaction of financial inputs on the urbanization, which are obviously not comprehensive. Considering that financial input affects many areas of the urbanization, we use the national expenditures / GDP as a measure of the financial input.

These four indicators are used in logarithmic form.

### 2.3. Introduction of models

To study the impact of the financial development, the input of public finance on the urbanization, we choose the following vector error correction model:

$$\Delta Y_t = \gamma + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \alpha \mathrm{ECM}_{t-1} + \varepsilon_t$$

Where $Y_t$ is the vector [UR, LOAN, LSVLN, GEXP], $\gamma$ reflects the deterministic linear trend parameter vector; p is the lag order, $\Gamma_i$ is the coefficient matrix, and the differential coefficients of the explanatory variables reflect the impaction of the short-term fluctuations of the variables on the short-term changes. $\alpha$ is the coefficient vector, reflecting the speed of adjusting to equilibrium when the variables deviate from the long-term equilibrium. $ECM_{t-1} = \beta' Y_{t-1} + \mu$ is the error correction term, reflecting the long-run equilibrium relationship in variables, and $\mu$ is the intercept term cointegration equation; $\beta$ is the cointegration vector; the vector $\varepsilon_t$ is a random disturbance term.

## 3 Empirical Analysis

### 3.1 Unit Root Tests

Because this study uses the time-series data, we firstly need to conduct the Stationary Test on each variable. ADF test method is used here for unit root test of variables stationary.In this test, the null hypothesis means that there is a sequence of unit root. Determination of lag order is based on Schwert's proposal.Firstly, we should determine the maximum lag order for the integer part of $12 \times (T/100)^{1/4}$,

where T is the sample size. Secondly, we should follow the «from the general to the specific» modeling approach to determine the lag order, according to the significance level of the final first-order regression coefficients in the ADF Test [6]. The test results can be seen in Table 1. At 5 % significance level, all the variables can not refuse the existence of unit root (the null hypothesis). So the variables are not stable. However, their first-order differential at the 1 % level of significance level have rejected the existence of unit root (the null hypothesis).This indicates that they are stable and they are all the first-order integrations.

*Table 1*

**RESULTS OF VARIABLE UNIT ROOT TEST**

| Variable name | Test form (C,T,P) | ADF Statistics | Critical value | Stationary |
|---|---|---|---|---|
| UR<br>ΔUR | (C, T, 1)<br>(C, 0, 0) | –1,745<br>–4,864 | –3,491□5 %)<br>–3,567□1 %□ | Unstable<br>Stable |
| LOAN<br>ΔLOAN | (C, T, 0)<br>(C, 0, 1) | –2,963<br>–4,975 | –3,493□5 %□<br>–3,573□1 %□ | Unstable<br>Stable |
| LSVLN<br>ΔLSVLN | (C, T, 1)<br>(C, 0, 0) | –2,319<br>–4,791 | –3,493□5 %□<br>–3,572□1 %□ | Unstable<br>Stable |
| GEXP<br>ΔGEXP | (C, 0, 0)<br>(C, 0, 1) | –1,279<br>–6,115 | –2,924□5 %<br>–3,573□1 % | Unstable<br>Stable |

Note. Test forms of C, T, P represent the constant, time trend term and the lag order in unit root tests, where 0 means the term without time trend or the lag term.

### 3.2. Cointegration Test

It may be stable for the linear combination of variables of first-order integration and we need to conduct a cointegration test to prove it. In this paper, we use Johansen's Maximum Likelihood Estimation with Multi-variable System to conduct the cointegration test. Since this method is based on the vector autoregression model, we have to determine the structure of VAR model, namely the optimal lag order, before conducting the co-integration test. Here we select 4 as the maximum lag order to begin the analysis of the appropriate optimal lag order. And we could depend on the information of AIC and SC criteria to make the decision of the optimal lag order. If AIC and SC become the minimum in the same lag, we can directly determine the lag period as the optimal lag. And we should consider the introduction of LR Test for options if not. Specific statistic value of the LR can be

calculated from the value of log-likelihood (LL) in different period lag. The values of different lag order of LL, AIC and SC are displayed in Table 2. It can be seen that the minimum of AIC and SC is –11,662 and –10,205, corresponding to the lag order of 3 and 1 respectively. Because those two are not in the same lag, we should consider the LR Test. LR = –2 × (315,433 – 366,877) = 102,888. On the base of the null hypothesis, the statistics show a asymptotic distribution and the degrees of freedom is the number of 24 from the VAR (3) to VAR (1) zero-imposed constraints in the model. The corresponding p-value is 0,000, indicating that we should reject the null hypothesis and use the model with 3 lag order.

*Table 2*

**THE CHOICE OF THE OPTIMAL LAG ORDER**

| lag order | LL | AIC | SC |
|---|---|---|---|
| 1 | 315,433 | –10,942 | –10,205 |
| 2 | 347,211 | –11,526 | –10,200 |
| 3 | 366,877 | –11,662 | –9,747 |
| 4 | 374,944 | –11,368 | –8,864 |

Results of Johansen Cointegration Test which uses lag order of 3 are shown in Table 3. The null hypothesis of the test is that the model has *r* (0 <=r <= 3) cointegration relationship, and the alternative hypothesis is that it has *r* + 1 cointegration relationship at most. The test starts with the null hypothesis till the null hypothesis is accepted .We can conclude that at the 5 % significance level ,there is a cointegration relationship between those variables, indicating that the long-run equilibrium relationship exists between them.

*Table3*

**THE RESULTS OF JOHANSEN COINTEGRATION TEST**

| Trace statistic | the critical value at 5 % significance level | the null hypothesis of maximum number of cointegrating vectors |
|---|---|---|
| 58,626 | 47,21 | 0 |
| 24,848 | 29,68 | 1 |
| 11,326 | 15,41 | 2 |
| 0,799 | 3,76 | 3 |

### 3.3. The estimate of Vector Error Correction Model

As the lag period of VEC model is equal to the lag period of unconstrained VAR variable first-order differential, according to the fact that the unconstrained VAR lag order is 3, the lag period of VEC model is determined to be 2. Model estimation results are as follows:

$$\Delta UR_t = 0.002 + 0.228\ \Delta UR_{t-1} - 0.128\ \Delta UR_{t-2} + 0.026\ \Delta LOAN_{t-1} - 0.032\ \Delta LOAN_{t-2}$$
$$(0.005)\quad (0.143)\quad (0.129)\quad (0.059)\quad (0.063)$$
$$+0.020\,\Delta LSVLN_{t-1} - 0.090\ \Delta LSVLN_{t-2} + 0.089\ \Delta GEXP_{t-1} - 0.102\ \Delta GEXP_{t-2} - 0.194\ ECM_{t-1}$$
$$(0.075)\quad (0.068)\quad (0.043)\quad (0.041)\quad (0.068)$$
$$R^2 = 0.708 \quad p = 0.000$$

$$ECM = UR - 0{,}047LOAN - 0{,}507LSVLN - 0{,}449GEXP - 0{,}131$$
$$(0{,}043)\qquad (0{,}031)\qquad (0{,}057)$$

The numbers in parentheses are standard errors. It can be seen that the coefficients of LOAN and LSVLN's short-term changes at 10 % significance level are not significant, indicating that the short-term changes of financial development have no significant effect on the short-term fluctuations of urbanization. The coefficient of GEXP's short-term changes is statistically significant at the 5 % significance level, indicating that short-term changes of financial input have a significant impact on the short-term fluctuations of urbanization. ECM is the error correction term, and its coefficient at 1 % significance level is statistical significant. According to the ECM, we can conclude that the long-run equilibrium relationship of financial development, the input of public finance and urbanization is:

$$UR = 0{,}047LOAN + 0{,}507LSVLN + 0{,}449GEXP + 0{,}131$$
$$(0{,}043)\qquad (0{,}031)\qquad (0{,}057)$$

We can see that LSVLN and GEXP's coefficients at the 1 % significance level are significantly positive, while LOAN's coefficient even at 10 % level is still not significant. This shows that in the long run, the efficiency of financial development and financial inputs has a positive impact on the urbanization. As the ECM coefficient estimate is significantly negative, the error correction mechanism is a negative feedback mechanism. When $ECM_{t-1} < 0$, and the value of UR is lower than the corresponding equilibrium value of LOAN, LSVLN and GEXP at the previous period, the error correction term is bound to reverse the ΔUR of the current period, leading to increasing the UR of the current period. When $ECM_{t-1} > 0$, and the value of UR is higher

than the corresponding equilibrium value of LOAN, LSVLN and GEXP at the previous period, the error correction term will decrease the UR of the current period. The adjustment is –0,194, which is very weak, when the short-term fluctuations of urbanization deviate from the long-run equilibrium.

The overall effect of the VEC model is good, and the log-likelihood function value is very large, equaling to 346,600, while the AIC and SC values are relatively small, equaling to –11,040 and –9,471 respectively. $x^2$ of the first and second lag of the residual autocorrelation test are respectively 24,566 and 17,226, and the null hypothesis without autocorrelation cannot be rejected at the 5 % significance level. $x^2$ of the test that whether the residuals for all equations are normally distributed is 8,847, thus the null hypothesis of normal distribution cannot be rejected at the 5 % significance level (any of the VEC model equation residual test at the 5 % significance level cannot reject the null hypothesis of normal distribution). In addition to the unit root hypothesis of the model itself, all eigenvalues of the adjoint matrix are located in the unit circle, so the VEC model is stable.

### 3.4. Granger Causality Test

In the establishment of vector error correction model, we can use the Wald Test to estimate the significance of the equation coefficients and determine the causal relationship between the variables. Granger Causality Test results are shown in Table 4. It can be seen that equilibrium error correction coefficients are statistically significant at 1 % significance level, indicating that in the long run, both financial development and financial inputs are the Granger causes of urbanization. And the joint test of ΔGEXP coefficient is statistically significant at 1 % significance level, indicating that in the short term, financial input is the Granger cause of urbanization. While neither the joint test of ΔLOAN nor that of ΔLSVLN coefficient is significant at the 10 % significance level, indicating that financial development is not the Granger causes of urbanization in the short term.

*Table 4*

**THE RESULTS OF GRANGER CAUSALITY TEST**

| | ΔLOAN | ΔLSVLN | ΔGEXP | ECM |
|---|---|---|---|---|
| ΔUR | 0,41 | 2,13 | 10,80*** | 8,06*** |

***Note. Means that it is statistically significant at 1 % significance level.

*Table 5*

**THE RESULTS OF UR VARIANCE DECOMPOSITION**

| Period | UR | LOAN | LSVLN | GEXP |
|---|---|---|---|---|
| 1 | 1,000 | 0,000 | 0,000 | 0,000 |
| 2 | 0,861 | 0,001 | 0,008 | 0,130 |
| 3 | 0,762 | 0,002 | 0,011 | 0,225 |
| 4 | 0,670 | 0,026 | 0,034 | 0,270 |
| 5 | 0,539 | 0,088 | 0,067 | 0,306 |
| 6 | 0,416 | 0,152 | 0,094 | 0,338 |
| 7 | 0,327 | 0,202 | 0,119 | 0,351 |
| 8 | 0,264 | 0,243 | 0,142 | 0,350 |
| 9 | 0,219 | 0,278 | 0,158 | 0,345 |
| 10 | 0,187 | 0,305 | 0,169 | 0,339 |

Note. Variance decomposition is taken as the order of URLOANLSVLNGEXP.

### 3.5. Analysis of variance decomposition

Johansen Cointegration Test and Granger Causality Test only show the relationship between variables, but can not explain the extent of this relationship. To analyze the relative contribution extent of financial development, financial inputs to urbanization at different times in detail, we need take a variance decomposition analysis. Table 5 gives us the results of Variance decomposition. It can be seen that, the inertia effect of urbanization continues declining as time goes on. Comparing financial development with financial inputs, we find that the contribution of financial development to urbanization gradually increases, while financial inputs increase firstly and then decreases over time and reaches its maximum, 35,145 %, in the seventh period. Before the seventh period, the contribution of financial inputs to urbanization is stronger than that of financial development, and after the seventh period, financial development is stronger than financial inputs.

## 4. Conclusions

Based on the National data of 1952—2009, using VEC model, this paper analyzes the impact to urbanization of financial development and financial inputs, and the following conclusions can be drawn:

1) In the short run, financial development is not the Granger cause of urbanization, and has insignificant impaction on the urbanization while the input of public finance is the Granger cause, affecting the urbanization significantly. This shows that the financial input should focus on the short-term effects of urbanization and analyse to stimulate the development of short-term effects.

2) In the long term, there is an equilibrium relationship between financial development, financial inputs and urbanization. Financial development and input of public finance both are Granger causes of urbanization, and the effect is significantly positive, which means that it is very important for urban construction to increase the efficiency of financial development and financial inputs. And we should increase financial input further and improve the efficiency of making savings into loans to promote urbanization. However, due to the fact that error correction mechanism is a kind of negative feedback mechanism, if other conditions remain unchanged, any attempt to promote rapidly urbanization in the short term may have been unrealistic.

3) In the view of the variance decomposition, the contribution of financial development to urbanization is weaker than that of financial inputs in the short term, while the result is contrary in the long run. This show that we should put more attention on the financial input in the short term, whiles the financial development in the long run.

## *Bibliography*

1. *Arestis P., Demetriades P. and B. Luintel* (2001), Financial Development and Economic Growth: the Role of Stock Markets, Journal of Money, Credit and Banking, No. 1, 16—41.

2. *Huang Yong, Xie Chaohua* (2008), the Effects of Financial Support for Urbanization in China, Theoretical Exploration. No.3:91—93.

3. *Liang Pengyong, Liang Ping, Ren Sihu* (2008), Study on the regional difference in the relationship between financial development and urbanization, Shanghai Finance, No.2:14—17.

4. *Liu Qinghe, Zhang Zhiyong* (2004), Public Financial Investment and Urbanization of Underdeveloped Areas in China, Social Sciences in Guizhou, No.4:20—22.

5. *Niu Qichun, Liu Xiang* (2008), Research on the Effects of Financial Development for Industrial Structure and Urbanization in Western of China, Finance & Economy, No.20:126—127.

6. *Schwert G*. (1989), Test for unit roots: A Monte Carlo investigation, Journal of Business and Economic Statistics, No.7, 147—159.

7. *Wang Kaike, Zhuang Peizhang, Guan Yang* (2010), Urbanization and Public Financial Investment in Infrastructure — Based on Fujian Province, Industrial Technology & Economy, and No.6:142—146.

8. *Wu Yan* (2005), Financial Support for Urbanization of Underdeveloped Western Regions in China, Journal of Southwest University for Nationalities, No.2:126—129.

9. *Yu Hongyan* (2008), Empirical Analysis to Urbanization and Financial Policy in China, Statistical Thinktank, No.11:60—64.

10. *Zheng Changde* (2007), Empirical Study of Financial Intermediation and Urbanization in China, Social Sciences in Guangdong, No.3:12—18.

11. *Zheng Mei Fu Qiang*(2008), Empirical Analysis of Financial and Urbanization in Chongqing City, China Economist, No.5:274—275.

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## РЕГІОНАЛЬНО-ПРОСТОРОВА СИСТЕМНА ОРГАНІЗАЦІЯ ГОСПОДАРСТВА: МЕТОДОЛОГІЧНІ ТА ПРИКЛАДНІ АСПЕКТИ

АНОТАЦІЯ. У статті проаналізовано методологічні основи регіонально-просторового розвитку господарства. Визначено основні проблеми створення ефективної регіонально-просторової моделі господарства в сучасних умовах. Проаналізовано основні проблеми диференціації економічного простору України та визначено концептуальні напрями удосконалення регіонально-просторового розвитку України.

КЛЮЧОВІ СЛОВА: регіон, економічний простір, регіонально-просторовий розвиток, системна організація, державна регіональна політика.

АННОТАЦИЯ. В статье проанализированы методологические основы регионально-пространственного развития хозяйства. Определены основные проблемы создания эффективной регионально-