

An Empirical Analysis of the Relationship between Capital Markets and Economic Growth in China

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Abstract

Using CD production function model, this paper focuses on the analysis of the relationship of capital markets and economic growth in China. Because the capital markets usually consist of the three main markets, i.e. the stock market, medium to long-term bond market and medium to long-term credit market, the relevance and importance of the relationship between the capital markets and economic growth are studied respectively in this paper on the basis of China's actual condition.

Key words: *capital markets; economic growth; empirical analysis; CD production function*

1 Introduction

Capital markets are a broad category of markets which are distinct from money markets in that they are limited to the trade of financial instruments with maturities exceeding one year. Also known as medium to long-term capital market, capital markets consists of the stock market, medium to long-term bond market and medium to long-term credit market. Since the founding of new China, China's capital markets have developed gradually. Now the capital markets play a more and more important role in the economic life in China. This paper makes an empirical study on the relationship between capital markets and economic growth in China and seeks the reasonable answers to the questions whether the development and growth of China's capital markets promote the economic growth or not. This research will have practical significance for the healthy development of China's capital markets and promoting economic growth.

2 Literature review

Both the classical economic growth theory and modern economic growth theory emphasize the promoting effects of capital on economic growth, despite they have different emphasis. In addition, economists have used empirical data to prove the relationship between economic growth and capital markets through empirical analysis. Goldsmith (1969) has used the empirical method to prove that there has been a positive correlation between the development of the financial markets and economic growth. By using the data of 80 countries during the period from 1960 to 1989, King and Levine (1993) consider that financial markets with high liquidity play an active role on economic growth and are an important condition for economic growth, along with the establishment of risk dispersion mechanism of high risk project financing and increasing long-term financing possibility. Later, Levine and Zervos (1998) further verify the positive effects of the stock market's development on the long-term economic growth. The study of Rajan et, al. (1998) indicates that the development of financial markets and financial institutions can help the markets to reduce the adverse selection

behaviour and make those enterprises who rely on external financing to reduce the moral risk and the cost of external finance, which is conducive to economic growth.

3 Variable selections

In this paper, the gross domestic product (GDP) is selected to measure the economic growth. The situation of capital markets can be described from two aspects, i.e. financing scale and structure. To measure the financing scale and structure of capital markets, there are two kinds of methods. One is incremental method, and the other is the stock method. In view of the former can reflect the dynamic change trend of the capital markets, this paper adopts the former. Because the capital markets can be divided into direct financing market and indirect financing market. The direct financing market mainly includes the stock market and bond market, while indirect financing market mainly refers to the medium to long-term credit market. Therefore, changes in the financing scale of the capital markets, also known as the total annual amount of new financial assets, can be measured by summing three variables, i.e. the annual amount of equity financing (STOCK), the annual amount of medium to long-term bond issue (BOND) and the annual new medium to long-term loans amount (MLLOAN). The annual direct financing amount is formed by the sum of the former two variables, while the annual indirect financing amount can be shown by the last variable. Then the proportion of the annual direct financing amount in the total annual amount of new financial assets is used to measure the financing structure of capital markets (F) in this paper.

The sample interval of this paper is from 1997 to 2014 and all kinds of data are annual data coming from the website of National Bureau of Statistics of the People's Republic of China and China's bond information network (www.chinabond.com.cn). All the analysis presented in this paper is performed by using Eviews 5.0 statistical software package.

4 Preliminary data analysis and the establishment of the model

4.1 Preliminary data analysis

Fig.1 and Fig.2 can be used to analyze the development and changes of the financing methods in China's capital markets.

Fig.1 reflects the changes in the financing scale of China's capital markets from 1997 to 2014. On the one hand, Fig.1 shows the annual amount of equity financing (STOCK), the annual amount of medium to long-term bond issue (BOND) and the annual new medium to long-term loans amount (MLLOAN) are on the rise overall. And various financing scales do not rise in a straight line, but in a wavelike way. On the other hand, there are significant differences in the growth rates of the three financing methods. The growth rate of equity financing is far behind the growth rates of the medium to long-term bond issue and the new medium and long-term loans. The data from 1997 to 2014 shows that the annual amount of equity financing had grown 5.5 times from 129.38 billion yuan to 708.74 billion yuan, while the annual amount of medium to long-term bond issue had grown 24.5 times from 208.46 billion yuan to 5108.42 billion yuan, and the annual new medium to long-term loans increased 21.7 times from 279.61 billion yuan to 6061.97 billion yuan. In this paper, the annual amount of medium to long-term bond issue includes not only the medium to long-term corporate bonds, but also the medium to long-term government bonds. And the proportion of latter is quite high due to including the medium to long-term treasury bonds. So it can be foreseen that

the proportion of direct financing scale will reduce obviously, once the government bond issue is deducted from direct financing scale. The proportion of direct financing will be significantly lower than the proportion of indirect financing which is represented by the new medium to long-term loans. It can be seen that the indirect financing plays a leading role in the China's capital markets and the direct financing scale lags far behind the indirect financing scale.

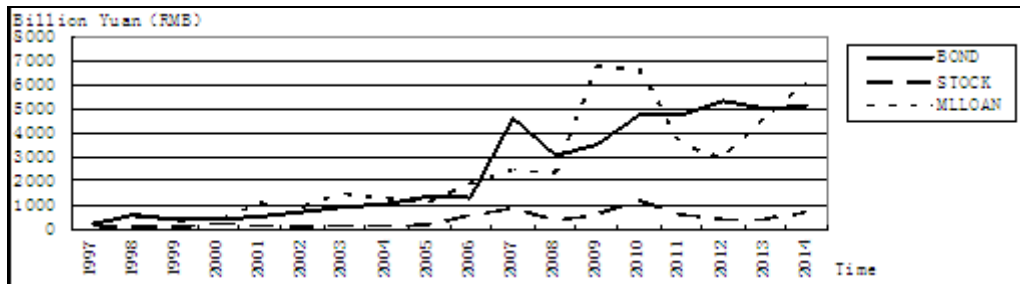


Fig. 1 The financing scale of the various financing methods in China's capital markets

Fig.2 presents the proportions of financing amount of various financing methods in the total annual amount of new financial assets and is used to reflect the changes of financing structure in China's capital markets. On the one hand, Fig.2 shows the proportion of equity financing is the lowest one amongst three kinds of financing methods in China's capital markets. During the past 18 years from 1997 to 2014, the mean of the proportion of equity financing is 8.9%, while the highest value is 21% and the minimum value is less than 4%. The proportion of medium to long-term bond issue and the proportion of new medium to long-term loans are roughly the same. The former one's mean is 44.2%, the maximum value is 61.6% and the minimum value is 29.7%. While the latter one's mean is 46.9%, the maximum value is 63.2%, the minimum value is 31.4%. On the other hand, the substitution effect of different financing methods can be observed from Fig.2. First of all, Fig.2 shows the obviously reverse relationship between the proportion of medium to long-term bond issue and the proportion of new medium to long-term loans. Secondly, there is a certain degree of reverse relationship between the proportion of medium to long-term bond issue and the proportion of equity financing. So there are complementary relationships between the various financing methods.

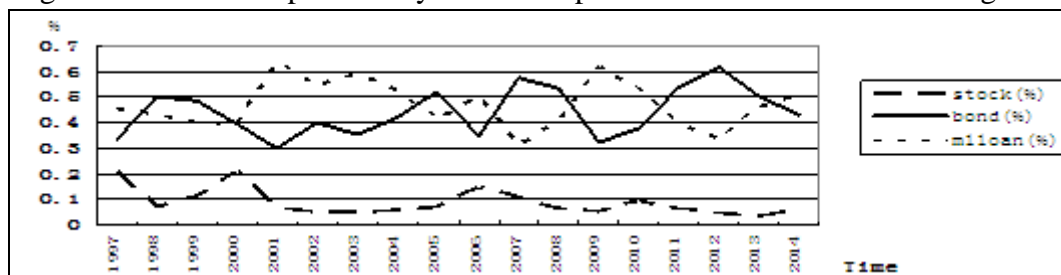


Fig. 2 The proportion of various financing methods in China's capital markets

4.2 Correlation test

Correlation test is one of simple statistical methods commonly used to study the relationship between variables. It is generally considered that there is no meaning to establish the model between the variables of low correlation. The degree and direction of correlation can be judged by the correlation coefficient r . When the numerical range of correlation coefficient r is between 0 and 1 (i.e. r is positive), the two variables are positively related. And the larger r is, the stronger the positive correlation between the two variables. When $r=1$, two variables

are completely positive correlation. When the numerical range of correlation coefficient r is between -1 and 0 (i.e. r is negative), the two variables are negatively related. And the smaller r is, the stronger the negative correlation between two variables. When $r = -1$, two variables are completely negative correlation. When $r = 0$, there is no relationship between the two variables.

Table 1 Variables' correlation coefficient matrix

	GDP	BOND	STOCK	MLLOAN	F
GDP	1.000000	0.938593	0.630147	0.804994	0.144513
BOND	0.938593	1.000000	0.774334	0.812547	0.258261
STOCK	0.630147	0.774334	1.000000	0.801747	0.077728
MLLOAN	0.804994	0.812547	0.801747	1.000000	-0.247156
F	0.144513	0.258261	0.077728	-0.247156	1.000000

According to the first column of data in table 1, the correlation coefficient between the gross domestic product (GDP) and all the other variables are all positive, which shows positive correlation. The correlation between the gross domestic product (GDP) and all the other variables is obvious, except of the correlation between the gross domestic product (GDP) and the financing structure of capital markets (F) which is the relatively weak.

4.3 Model

In this paper, the CD production function (Cobb-Douglas production function) is used to reflect the relationship between the gross domestic product (GDP) and various financing methods. The general form of CD production function is shown in the Eq.(1). In this equation, the variable Y represents output, and the variables X_i represent a variety of input elements ($i > 0, i=1, \dots, n$). Letter A is constant ($A > 0$). According to the CD production function, the gross domestic product (GDP, abbreviated as Y) is used as the dependent variable in the model. While the new medium to long-term loans amount (MLLOAN, abbreviated as L), the annual amount of equity financing (STOCK, abbreviated as S), the annual amount of medium to long-term bond issue (BOND, abbreviated as B) and the financing structure of capital markets (F) are independent variables. Then Eq. (2) can be obtained.

$$Y = Ax_1^{\alpha_1} x_2^{\alpha_2} \dots x_n^{\alpha_n} \tag{1}$$

$$Y_t = AL_t^{\alpha_1} S_t^{\alpha_2} B_t^{\alpha_3} F_t^{1-\alpha_1-\alpha_2-\alpha_3} \tag{2}$$

In order to simplify the study and reduce the non-stationary data, both sides of Eq.(2) are processed by natural logarithm methods. Then the multivariate linear regression model is constructed as the following Eq. (3).

$$\ln Y_t = \ln A + \alpha_1 \ln L_t + \alpha_2 \ln S_t + \alpha_3 \ln B_t + (1 - \alpha_1 - \alpha_2 - \alpha_3) \ln F_t + \mu \tag{3}$$

Using Eviews 5.0, the regression results of Eq. (3) can be obtained as shown in table 2. The value of the fitting effect R^2 is 0.96 and very close to 1. The adjusted fitting effect is 0.95 and very close to 1 too. The F-test of overall significance shows there is a significant relationship between the dependent variable and the set of all the independent variables in the model, while the t-test shows each of the individual independent variables is significant. All above indicate that the overall goodness fit of the model is good and each independent variable has a certain explanatory power to the dependent variable. Furthermore, the DW (Durbin-Watson) statistical value is 2.02. The DW test is commonly used to test the residual sequence

autocorrelation. When the DW value is close to 2, it means that there is no first-order autocorrelation. The specific form of the regression model is shown in Eq. (4) or Eq. (5).

$$\text{LN}(Y) = 8.183 - 1.636 * \text{IN}(B) - 0.469 * \text{IN}(S) + 2.799 * \text{IN}(L) + 5.507 * \text{LN}(F) + u \quad (4)$$

$$Y_t = e^{8.183} B_t^{-1.636} S_t^{-0.469} L_t^{2.799} F_t^{5.507} \quad (5)$$

Table 2 The regression results of the CD production function

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN(BOND)	-1.635686	0.623586	-2.623030	0.0211
LN(STOCK)	-0.468973	0.171837	-2.729178	0.0172
LN(MLLOAN)	2.799224	0.777969	3.598117	0.0032
LN(F)	5.506759	1.575983	3.494175	0.0040
C	8.183183	0.752011	10.88173	0.0000
R-squared	0.963100	Mean dependent var		12.27819
Adjusted R-squared	0.951747	S.D. dependent var		0.722322
S.E. of regression	0.158670	Akaike info criterion		-0.613848
Sum squared resid	0.327290	Schwarz criterion		-0.366523
Log likelihood	10.52464	F-statistic		84.82679
Durbin-Watson stat	2.025504	Prob(F-statistic)		0.000000

5 Model analysis and countermeasures

According to the model above, the coefficient of the new medium to long-term loans and the financing structure of capital markets (i.e. the proportion of direct financing) is significant and positive, indicating that these two variables have promoting effects on economic growth.

On the one hand, the new medium to long-term loan has the function of promoting economic growth, which conforms to the principles of modern economics, i.e. capital has played an important role in promoting economic development. From the preliminary analysis of the above data, it can be seen the medium to long-term loans as an indirect financing method is one of the main capital sources of capital markets in China. Therefore, the indirect financing has a positive effect on economic growth.

On the other hand, according to the model above, the increasing of the proportion of direct financing in the total annual amount of new financial assets also has a positive effect on economic growth. This is also consistent with the principles of modern economics. Because it is generally believed that the close connection between suppliers and demanders of direct financing is conducive to the rapid and rational allocation of funds and the improvement of the efficiency of funds using. Therefore, with the increasing of the variable F (that is, the proportion of direct financing), the efficiency of using funds is improved and has a positive role in promoting economic growth. In view of the variable coefficients, the proportion of direct financing to promote the role of economic growth is greater than the new medium to long-term loans.

In addition, by observation of the model, it can also be seen the coefficients of the medium to long-term bond issue amount and the equity financing amount is significantly negative. It indicates that these two variables have negative impacts on economic growth. These two variables not only fail to play a role in promoting economic growth. Instead, they become obstacles to economic growth. This is a strange paradox. The increasing of the proportion of

direct financing in China's capital markets has a positive role in promoting economic growth, but considering the specific direct financing methods of capital markets respectively, both bond financing and stock financing's growth will hinder economic growth. The reasons are as follows.

Stock financing can't play the role of promoting economic growth, mainly due to two reasons. On the one hand, as mentioned above, the proportion of the stock market financing in China's capital markets is low and less than 10%. So its effect to promoting economic growth is limited. On the other hand, the internal mechanism and the system of the stock market are not perfect. The China's stock issue system, information disclosure system, stock trading mechanism and the market withdrawal mechanism of listed companies and so on are still in a process of continuous improvement, which resulted in the efficiency of capital use and allocation is low. The retail investors play the dominant role in capital markets structure, so that there is no efficient supervision or it is difficult to supervise due to the high monitoring costs. Then the capital usage efficiency problems are further aggravated. Thereby affecting the market mechanism of survival of the fittest, it cause the stock financing is difficult to achieve economic growth.

The main reason that bond financing can not play a role in promoting economic growth is that the proportion of treasury bonds in Chinese medium to long-term bond market is relatively high currently, while the proportion of enterprise medium to long-term bonds is low. Since fundraising through the issuance of government bonds will be converted into government spending and will have a certain degree of crowding out effect to economic growth, namely the increasing of government spending will cause the decreasing of private consumption or investment, thereby inhibiting economic growth. The issue of treasury bonds is one of the government means to regulate the allocation of resources. The government allocation of resources is a supplement to the market allocation of resources, and its efficiency is lower than the market allocation of resources. This makes the Chinese bond financing can not really play a role in promoting economic growth.

To sum up, in view of the increasing of the proportion of direct financing can promote economic growth, the direct financing market should be vigorously developed, especially the stock market and the enterprise bond market. Among this process, constantly establishing and improving the systems of direct financing market as well as their internal mechanism are the top priority in relation to whether can improve efficiency in the use of direct financing.

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