

Research Article

Capital Misallocation, Financial Development and Technological Progress in China

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Abstract: In order to study the relationship between capital misallocation, financial development and technological progress, we did this research. Dual economy structure in China makes the capital allocation to no profit and the technological progress mostly depends on capital accumulation in modern China. Therefore, capital misallocation can restrict a technical progress in China. Financial development can ameliorate the capital misallocation by improving marketization of capital allocation and stiffening the budget line of state-own enterprises. Taking account of the gap between different areas of China economic development, this study empirically analyzes financial development accelerates the technological progress by ameliorating misallocation of capital utilizing the panel data of 30 provinces from 2005 to 2012 in China. The result reveals that pushing the financial development is a valid path of ameliorating misallocation of capital, accelerating the technological progress, developing the area economy, even the changing of the development of China economy from investment-driving to invention-driving.

Keywords: Capital misallocation, economic structure, financial development, financial repression, return of equity, total factors productivity

INTRODUCTION

China has experienced a high-speed increasing period which the average speed is beyond 9% since the Reform and Open. However, the economic increase which depends on factors putting in is becoming more and more unsustainable since the natural resources shortage, environmental confliction and improving human capital cost are urging in the modern China. The new leader group proposes a series of reforming policies which sacrifice the economic increasing speed to realize the long-term aspiration of changing China economic from investment-driving to innovation-driving since the 18th national meeting of China Communist Party.

The core of innovation-driving is the technological progress; actually, the research about a technical progress in China has already become the hot topic which the academia pays attention to it since the mid-1990s. Many types of research utilizing the TFP as the parameter of technological progress get the similar conclusion with Krugman (1994) since he claimed Eastern Asia area does not have technological advances in economic development (The Research Group of Economic Institute of CASS, 2010). However, the research from the viewpoint of capital accumulation macroeconomic reveals (Zhiyun *et al.*, 2007; Donglin *et al.*, 2011) that the previous thesis of non-existing

technological progress in China economic development obviously understates the quality of China economic development, as the estimating method's progress of eliminating embedding factors inside about the technological progress, especially the estimating method gradually matures and consummates based on capital accumulation exemplification of technological progress. Jianguo (2013) furthermore points out that economic development driven by technological progress of embedding capital accumulation the necessary experience throughout every country in the world. And the China technological advance is apparently showing out similar characteristic in economic development.

Since the capital accumulation is the primary source of technological advances in China, the efficient of capital accumulation is also a significant factor of the level of technical progress. The dynamic of capital accumulation can be expressed as technology useful and allocation efficient (He, 2012), the former is mainly about the loss of changing saving to investing in capital accumulation and the latter is the economic departments' allocation and adjustment of different margin profit of capital after the capital accumulation. Theoretically, the margin profit is a balanced condition of capital allocation, but as for China, which has the distinct dual economic structure, the gap between state-owned enterprises and private-operated enterprises

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makes the capital cannot allocation according to the margin profit to allocate, thus, capital misallocation has emerged. Since the capital cannot allocate according to margin profit, which inevitably weakens the acceleration of technological progress originating from capital accumulation (Jing and Jianhua, 2013). For instance, Deming *et al.* (2012) research reveals that the finance misallocation originated from dual economic structure has several repression to technological progress in China. Yu-Shu and Dong-Wei (2012) research from the viewpoint of anti-fact reveals that if we eliminate the resource misallocation, the actual level of technological progress will have more significantly improvement than nowadays.

The finance department is the particular channel of capital accumulation and allocation. The repression of the finance department is the fundament reason of economic resource misallocation and also the significant mechanism of slow technological progress in such developing countries, such as China, which has the distinct dual economic structure (Hsieh and Klenow, 2009). Even though in American and European developed countries, which do have the dual economic structure and finance repression, since the heterogeneity of the industries and imperfect finance market's attrition also can make the capital misallocation, furthermore, lead to the loss of productivity. In fact, under the bad condition of the finance department, China economic can achieve the rapid increase since the key point is the state-owned finance department's leakage and funding private development and this distorted finance development supports the technological progress in China. Therefore, pushing development of banking in China from the formal viewpoint is the sound strategy of advancing technology due to transfer misallocated capital. Furthermore, Liang and Jianhua (2011) analyze the path and mechanism of eliminating capital misallocation by the capital development due to the reformation of bank industry and marketization.

Bibliographies above about the influence of finance development and capital misallocation all take the data of industry class as a sample, from the point of view of the equity of state-owned or private-owned, to analyze the derivation about the technological progress of different kinds of enterprise. Considering the reality of China economy development, China economy has taken shape apparent difference between areas from the Open and Reform. From the viewpoint of macroeconomic climate, China economic map can be stratified to East, West and Middle, which have different levels of the economy, from the administration route, the 31 provinces in China mainland also have a significant difference. One of these notable differences is the marked divergence between the level of dual economy structure and finance development in each province. Therefore, this change can make the

difference of capital misallocation and technological progress among provinces. Therefore, analyzing the acceleration of technological advances and remission of capital misallocation caused by finance development of dual economy structure from the viewpoint of province region economy, is not only the benefits addition to the current research but also reference to accelerating technological progress among provinces.

MATERIALS AND METHODS

When and where this study was conduct*: (DeFeng 2015), Hubei Polytechnic University, Huangshi City, Hubei Province, China

Capital misallocation is the phenomena that the capital cannot free allocate as per the principle of margin profit as talking above. Since the finance depression made by the institution, the state-owned enterprise can have priority of achieving capital. However, the private-owned enterprise can only depend on accumulating by itself or costing more than margin profit to make external capital in dual economy structure such as China. Since the contribution of technological progress from state-owned enterprise is lower than those from private-owned enterprise granted by all of us, capital leaning to state-owned enterprise inevitable obstructs technical advances in all economy. Taking account of the finance department is the main channel of capital resource allocation and the finance repression is the fundamental reason of capital misallocation. Therefore, finance development can ease the capital misallocation. From the theoretical analysis, there are some channels of capital misallocation relieved by finance development.

Finance Development Can Accelerate The Marketization of Capital Allocation: The aspiration of reform of economic structure is transferring from fully centralized state-owned economy to market economy by state-owned from 1994 when China first definitely proposes that develops the socialist market economy. Taking account of the stable of the fundament of the whole country economy, the government reforming the finance department always falls behind the marketization of substance economy, which causes the power of capital allocation owned by the administration. Although the development of private-owned enterprises is encouraged, the development space is given by state-owned enterprises. Therefore, the state-owned enterprises have advantages about the allocation of social, economic resource when they are born. In this background, the finance department, which the banks are the fundament, allocates the capital as per the parameter of the level of margin return which is only a reference parameter instead of a critical parameter. Making a contract of bank capital allocation differently singly depends on the

nature of the enterprise, but also on administration's serial society management aim. Therefore, the ownership discrimination in capital allocation causes the governments intermeddle thus it is different to marketize and leads to capital misallocation.

Although there is the finance repression, because of the lower level of economic development, in the finance department in new Open and Reform. However, this repression currently is more and more due to a planned institution. This purpose of the institution is to enjoy more privileges than the private-owned enterprise, thus, to ensure the competition of state-owned enterprise when they achieve the finance resource. If we remove these finance repressions planned by the institution, making administration reduce the government intermeddles, we will make the aspiration of marketization of capital allocation. Under the assumption of marketization of resource allocation, the level of margin profit of capital is the solo parameter when the finance department contracts with the substance economic about the capital allocation. This kind of arrangement of marketization of capital allocation comparing with that kind which participates in administration intermeddles, since both sides of the contract are due to economic aim and less considering society goal, both sides are the same economic body, thus, there is more flexible on the contents' negotiation and clause planning. Therefore, all of them are a benefit for the optimization allocation of capital seized by the finance department and eliminating the capital misallocation.

Finance Development Is an Interest For Capital Allocation By Stiffening Budget Line: Before the switching on reform of bank industry in China until 2004, the overloaded bad assets are the main obstruct in finance department development. The reason is also the institutional finance repression in China. In the system of dual economic structure, the government provides the most favorable condition and institution, in fact, also offers the hidden guarantee for the state-owned enterprise in the resource allocation of administration intermeddles. Under this new warranty, state-owned commercial department's budget restraint is not the critical condition whether they can achieve the capital. Therefore, whether or not the state-owned commercial unit has the ability of recompensing, the will of recompensing is precisely level. Furthermore, under the soften budget restraint, the state-owned commercial department still has the thrill of finance, since they do not need any cost of getting capital resource which can transfer to a private-owned enterprise which is urging to capital, thus, the state-owned company can get the benefit of finance loss. Facing the weak will of recompensing and great thrill of investment of the state-owned enterprises and hidden guaranteed by the government, the finance department does not have the power to stiffen the budget restraint of state-owned enterprises, thus, all of these problems accelerate the capital misallocation.

If we extend the repression of finance made by the institution, cancel the hidden guaranteed by the government when state-owned enterprises achieve the capital; the state-owned commercial department will stiffen the budget line. At this time, state-owned commercial agencies have to consider fully recompensing external financial capital to form enough credit, which has significant meaning for their development, thus, raise the will of recompensing. At the same time, the finance thrill bringing by hidden guarantee will decrease significantly. As for finance department, cancelling hidden guarantee, on the one hand, can equal the status of state-owned enterprises and private-owned enterprises, can allocate the capital as per the same standard and can ensure the equity and productivity of capital allocation; on the other hand, can decrease the thrill finance of state-owned enterprises, can increase the effective supply of finance department, also can reduce the average cost and condition of the whole society, therefore, can form the benign cycle of capital allocation.

RESULTS AND DISCUSSION

Since current bibliographies choose the data from the viewpoint of industry enterprises to practical, analyze the repression effect of technological progress made by capital misallocation. Considering the significant difference between technological advances and level of finance development and dual economic structure among provinces in China, this study chooses panel data of province-size macroeconomic to analyze empirically.

Data choosing:

- **The index of capital misallocation:** The nature of capital misallocation is the more beneficent condition of capital allocation for state-owned enterprises than private-owned companies under the fundament of dual economic structure, which reveals that state-owned enterprises can achieve capital facing less restraint of credit or lower price. When the institutional finance repression exists, state-owned enterprises have the great thrill of funding since they have the advantageous condition of capital allocation. According to this, current bibliographies have three methods to measure the capital misallocation. The first method directly utilizes the loan ratio of state-owned enterprises in bank department to denote the misallocation by Liu (2011). The second approach proposes that ratio of product elasticity of two factors of capital to labor denote overloaded level of capital allocation, furthermore, indirectly reveals the capital misallocation raised by Yu-Shu and Dong-Wei (2012). The third method utilizes the difference of capital rate of return to denote the degree of capital misallocation proposed by Ting (2010).

Comparing these methods, the first one is direct, but it 's hard to achieve the actual ratio of credit loan from the state-owned commercial department. Liu (2011) utilizing this method is only to estimate this rate using possibility model, apparently, which can lead to emerge the internal errors. The second approach using the ratio of product elasticity ignores environment technology effect to product elasticity, at the same time, the second method does not consider the main impact of capital misallocation about capital margin profit. Therefore, this study does not adopt. The third method's fundament logic is that the capital rate of return denotes the level of capital margin profit, if there is not capital misallocation, between the economic departments of different ownership does not have a divergence of capital rate of return, if not, this method can reflect the degree of capital misallocation. And, the calculation of the capital rate of return is uncomplicated and intuitive; therefore, this study consults this method to measure the degree of capital misallocation. Ting (2010) chooses the data of industry enterprises to calculate the capital rate of return. However, this study researches region macroeconomic. Taking account of the achievability of data, we change the capital rate of performance to deviation degree of capital efficiency. Define that the capital efficiency is the ratio of profit to cost and expenditure. Then define that A is the mean of capital efficiency of state-owned economic department and private-owned economic, that Z is the capital efficiency of the state-owned commercial unit and that D is the deviation degree of capital efficiency of state-owned economic:

$$D = \frac{|Z - A|}{A} \quad (1)$$

The data about the profit, cost and expenditure of state-owned and private-owned financial department used in Eq. (1) are all from China Statistic Yearbook.

- **Measure of technological progress:** This study utilizes Total Factors Productivity (TFP) as the index of technological advances which is used in common in current bibliographies. Calculation method uses Data Envelopment Analysis (DEA). The capital and labor input needed in the calculation is from China Statistic Yearbook.
- **Level of finance development:** In the early age, the financial structure is the index of the level of finance development proposed by Goldsmith. But as the elaboration of the theory of finance, the index of finance development level is also gradually consummate. Considering the achievability of data and objective of this research,

this study chooses the ratio of loan to GDP in the economic system to reveal the level of finance development in the region.

Establishing model: According to theoretical analysis as above, this study establishes the panel model to test the relationship between finance development, capital misallocation and technological progress:

$$TFP_{it} = \alpha_0 + \alpha_1 D_{it} + \alpha_2 D_{it} * F_{it} + control + \varepsilon \quad (2)$$

The Eq. (2) above is a static equation, in fact, finance development and capital misallocation have the notable hysteretic effect to the economy, Which the current level of finance development and capital misallocation due to that not only affect current technological progress but also have the effect of technical advances later. And technological advances also have excellent "memory", hence, this study changes the Eq. (2) to dynamic panel model as below:

$$TFP_{it} = \alpha_0 TFP_{it-1} + \alpha_1 D_{it} + \alpha_2 D_{it-1} + \alpha_3 D_{it} * F_{it} + \alpha_4 D_{it-1} * F_{it-1} + control + \varepsilon \quad (3)$$

Finally, this study researches the relationship in Eq. (3) among finance development, capital misallocation and technological progress based on Eq. (3) above, i denote province, t indicates the time. Obviously, our concentration is the sign of α_1 , α_2 , α_3 and α_4 : α_1 , α_2 should be negative, which reveals the repression to technological progress from capital misallocation and this repression effect has continuous; however, the sign of α_3 and α_4 should be positive, which demonstrates finance development can relieve capital misallocation, thus, to upgrade the technology and this remission is also continuous. Control denote control variable; this study chooses per capita GDP (denoted by G_{it}) and opening degree (O_{it}) the two variables as the control, to control the characteristics difference among provinces. The opening level is indicated by the ratio of remote region business value to region GDP. In the estimating Eq. (3), we still control the effect of area and time. This study chooses the data of 30 provinces except for Tibet from 2005 to 2012 to analyze.

Empirical analysis: Equation (3) is a dynamic model since the data structure is a big N small t model, this study adopts systemic generalization GMM estimation method to estimate and the results are in the Table 1:

According to the empirical results in Table 1, firstly, we can see the significant repression to technological progress from capital misallocation; however, this suppression decreases rapidly as the time goes on. Then we can observe that finance development can relieve capital misallocation to improve technological progress and this improvement has effect in a long time. We discover that since the dual structure

Table 1: Estimation results of system gmm about dynamic panel

y	Coef.	Std. Err.	z	P> z
L1. y	-0.043971	0.010384	-4.23	0.000
D _{it}	-6.160642	1.191445	-5.17	0.000
D _{it-1}	-1.723476	0.886783	-1.94	0.052
D _{it} *F _{it}	1.31819	0.12794	10.3	0.000
D _{it-1} *F _{it-1}	0.6962719	0.164952	4.220	0.000
G _{it}	-0.059349	0.103441	-0.57	0.566
O _{it}	-0.131049	0.028483	-4.60	0.000
_cons	4.074666	1.645217	2.48	0.013
AR1 test	p = 0.1427			
AR2 test	p = 0.0087			
SARGAN test	$\chi^2(27) = 25.51631$			

of economic development causes an adverse impact on technological advances originating from capital misallocation in current economic development in China, however, finance development can relieve capital misallocation, furthermore, can accelerate the technological advancement significantly.

CONCLUSION

This study chooses panel data of 30 provinces in China from 2005 to 2012, utilizes generalization method of moments to research the effect of capital misallocation to technological progress and the impact of capital misallocation to technical advances by finance development in current economic development in China. The result reveals: current capital misallocation have repression effect of technological progress in China. However, finance development can improve the technology by relieving capital misallocation. Due to this, this study proposes advice as follow: since the capital misallocation is caused by the institution of dual economic structure in most degree, reducing the institutional finance repression is the critical path to develop investment in China currently. Firstly, realize the aspiration of marketization of resource of bank credit, the government should not restrain price and quota in loan resource allocation. Secondly, deepen the reform of state-owned enterprises, change the significant phenomena of state-increasing and private-decreasing in recent years. Over the past few years, state-owned enterprises have significant extrusion effect over private-owned businesses in many fields, which make not only state-owned economy occupy limited loan resource, but also, soften budget restraint since over-scale enterprises have super-national treatment when they negotiate with banks, eventually lead to allocating loan resource invalidly.

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