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The influence of economic institution on finance sector credit allocation in China

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ABSTRACT

Since the supply-side reform, the credit allocation from the finance sector is more concentrated in state-owned enterprises (S.O.E.s). It results in a mismatch between the credit allocation and the economic contribution of private enterprises (P.E.s). In China, we find that government intervention in the finance sector to allocate credit to S.O.E.s helps to achieve sustainable growth. Because of the ownership relationship, the credit allocation to S.O.E.s will also produce social or political interests for the finance sector. Based on the stylised facts, this article builds the finance sector credit allocation dual objective mechanism in the framework of the neoclassical economic growth model. It also analyses the influence of government intervention and ownership relationship on economic growth in the mixed economy represented by the socialist market economy with Chinese characteristics. The empirical analysis found that government intervention and ownership relationship were the main factors affecting the efficiency of capital allocation. Further research into whether there is an optimal parameter of government intervention and optimal mixed proportion in the stated-owned enterprise mixed-ownership reform is needed.

1. Introduction

Since the reform and opening-up, China has continued to grow. However, state-owned enterprises (S.O.E.s) and private enterprises (P.E.s) have always faced a mismatch between credit allocation and economic contribution. According to the data of total loans to different types of enterprises from 2010 to 2016 released by the People's Bank of China, the total loans to S.O.E.s and P.E.s in 2016 were 38.2 trillion and 24.4 trillion, respectively. The latter is about 0.64 times the former. Figure 1 shows that the total amount of loans of S.O.E.s and P.E.s have a synchronous growth trend from 2010 to 2016. While the proportion of loans of S.O.E.s and P.E.s show a different tendency. From 2010 to 2013, the proportion of loans to S.O.E.s decreased from 61.63% to 54.78%, while loans to P.E.s increased from 38.37% to 45.22%. From 2014 to 2016,

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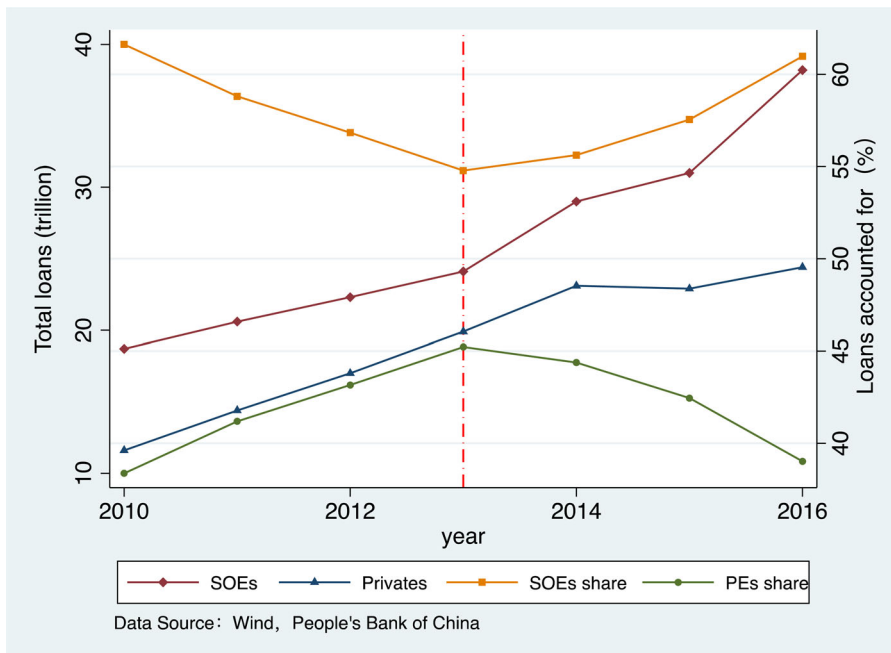
Figure 1. The credit allocation between S.O.E.s and P.E.s.
Source: Wind and People's Bank of China.

the proportion of loans to S.O.E.s showed a significant upward trend, while P.E.s continued to decline. The credit allocation from the finance sector is more concentrated in S.O.E.s. What factors lead to the persistent problem that the financial sector credit allocation does not match the economic

contribution of different ownership enterprises, even though China has carried out supply-side reform and mixed ownership reform?

Using the policy command to solve credit allocation differences between S.O.E.s and P.E.s, the effect is often not significant, even produce adverse financial innovation and increase the risk of financial chaos (Chen et al., 2020). From the perspective of the economic institutions, it can figure out the institutional factors of the credit allocation differences between S.O.E.s and P.E.s and helps to eliminate the mismatch problem. With the background of China's economic institutions, the finance sector is not a completely independent market entity and its credit allocation along with strong government preference (Huang et al., 2020). Government intervention and ownership relationship affect the credit allocation in the finance sector. Based on the factors of government and market, the finance sector tends to allocate credit to S.O.E.s. This makes capital-rich S.O.E.s get a lot of credit funds, and capital scarce P.E.s are lack credit funds. S.O.E.s and P.E.s face different credit constraints when financing in the finance sector.

Most of the existing literature studies the finance sector credit allocation based on the information asymmetry theory and analyses it as a profit-making enterprise from the perspective of loan risk-return. With micro-data to explore the differences in finance sector credit allocation or the differences in capital allocation efficiency between S.O.E.s and P.E.s. The conclusion is that credit allocation differences hurt

economic growth. However, with the credit allocation mismatch, China's economy has maintained a relatively long-term sustained economic growth. To explain it, we have to study it from the institutional factors and try to build a multi-sector dynamic general equilibrium economic growth model that includes the household sector, finance sector, and heterogeneous enterprise sector. In the context of China's economic institutions, the finance sector is not an independent market entity. The credit allocation provided by the finance sector has a strong government preference, and it plays a certain intermediary role in financial services. The finance sector has dual-target financial services and pursuing profit maximisation. The contribution of this article is that it added the finance sector into the neoclassical economic growth model, explore the influence of the dual-target mechanism of finance sector credit allocation on economic growth, and analyses the influence of government intervention and ownership relationship on economic growth. The findings can explain the effect of government intervention and ownership relationship on capital allocation in the mixed economy by the socialist market economy with Chinese characteristics, but also enrich the micro-basic theory of the credit allocation mechanism of the finance sector.

This article is structured as follows; the second section is a literature review, the third section builds a financial sector credit decision model, which derives the mechanism of 'price discrimination' in financial markets under the Chinese characteristics economic institutions and characterises the equilibrium. The fourth section gives the empirical analysis, and the final section concludes.

2. Literature review

According to information asymmetry theory, faced with adverse selection and moral hazard, the finance sector allocated credit funds from the perspective of loan risks and benefits by their interests. It leads to some enterprises getting loans, but some have difficulty in getting loans or getting credit capital quantity to not be able to meet the investment demand, which is called having credit constraints problems (Fazzari et al., 1988). In consideration of credit risks and returns, Dewatripont and Maskin (1995) proposed a credit decision model of financial institutions that considered the uncertainty of loan risks and returns of financial institutions. The phenomenon of difference in bank credit allocation considering market risks is a kind of market behaviour (Ashraf et al., 2017). Guo et al. (2018) found that when economic expansion was impacted, the implicit guarantee of the government to S.O.E.s enhanced the credit advantage of S.O.E.s. Cong et al. (2019) found that the stimulus-driven credit expansion was disproportionately in favour of the S.O.E.s and lower than average capital-output, which reversed the process that credit funds were allocated to P.E.s before 2008.

The difference in credit allocation originates from the government's intervention and the ownership relationship. Mickinnon (1973) believed that the biggest characteristic of the financial sector in the transition economy is the existence of financial repression. When banks are controlled by the government, S.O.E.s with political connections are more commonly provided with credit funds (Psillaki & Eleftheriou,

2015). When an S.O.E. is faced with the risk of bankruptcy caused by debt default, the government will help the S.O.E. to defuse the risk by providing financial subsidies or increasing bank loans for the consideration of employment and social stability (Berkowitz et al., 2015). In the bank loan market, state-owned property rights are equivalent to implicit guarantee contracts, which can eliminate banks' concerns about debt default of S.O.E. to a certain extent, thus reducing banks' risk expectation of loans to S.O.E. (Ji et al., 2018; Peng et al., 2016). With the transformation of government functions and the deepening of the reform of finance deepening, government intervention has become the main reason for credit discrimination (Beuselinck et al., 2017; Boubakri et al., 2018; Svilokos et al., 2019). S.O.E.'s access to credit funds is more of a result of government intervention, while P.E.s' credit funds are derived from market behaviour under the pressure of financing constraints (He & Kyaw, 2018; Wu, 2019). The government wants the banks to make politically advantageous loans, which, although they will reduce the bank's profits, will generate social or political benefits (Brandao-Marques et al., 2020; Sahin & Berument, 2019; Thakor, 2021). From the perspective of the influence of finance on the market behaviour of enterprises, it is found that the investment of non-state-owned economy is pro-cyclical, while the investment of state-owned economy has a small fluctuation and a certain degree of counter-cyclical, and the investment of state-owned economy plays a stabilising role in the macroeconomy (Nizam et al., 2020; Wang et al., 2020).

Based on the traditional theory of the single-sector model, interest rate liberalisation can be seen as a reduction of financial friction. After interest rate reform, capital can flow to producers with higher returns in the economic sector, optimise the efficiency of resource allocation, and improve the total social output and welfare (Buera et al., 2011; Midrigan & Xu, 2014; Moll, 2014). Bai et al. (2016) carried out an empirical study on the industrial enterprise database and found that after the international financial crisis, the growth rate of total factor productivity of S.O.E.s rose faster than that of P.E.s. Wu (2018) used the survey data of Chinese industrial enterprises from 1998 to 2007 to find that the marginal return on capital of S.O.E.s was 42% lower than that of P.E.s on average, and pointed out that the misallocation of capital among enterprises of different ownership caused by financial repression and policy distortions resulted in a 27.5% reduction in total factor productivity of the Chinese economy. Li et al. (2020) found that financial friction is an important factor affecting economic growth, and institutional quality can effectively solve financial friction. However, Liu et al. (2021) based on a single department heterogeneous enterprise model based on considering the two great branches of S.O.E.s and P.E.s, the study found that if in the economy there are other aspects of the distortion between departments, to eliminate poor loan interest rate's liberalisation impact on the economy without a definite answer, interest rate liberalisation does not necessarily improve overall productivity and social welfare.

3. Theoretical model

3.1. Household sector

A representative household consists of a single individual whose descendants continue indefinitely; the family derives its utility from consumption, and its preferences can

be expressed by the constant relative risk aversion utility function, as follows:

$$U(C_t) = \frac{C_t^{1-\theta}}{1-\theta} \tag{1}$$

Here, C_t denotes household consumption in period t; $1/\theta$ the replacement elasticity of the intertemporal consumption, $\theta > 1$.

The initial saving of the household sector is zero, and income is from wages, by providing effective labour to the different enterprises and the provision of monetary capital to the finance sector. The household problem is to maximise (1) subject to the following budget constraints:

$$\dot{M}_t = w_{t,S}H_{t,S} + w_{t,P}H_{t,P} + r_t M_t - C_t \tag{2}$$

where, $H_{t,\chi}$ denotes effective labour to different ownership firms; $w_{t,\chi}$ labour income; M_t currency capital lending to the finance sector at the interest rate r_t; C_t is consumption.

Maximisation of the household sector long-term utility and its consumption path is:

$$\frac{\dot{C}_t}{C_t} = \frac{r_t - \rho^H}{\theta} \tag{3}$$

As formula (3) shows, the main influencing factors affecting the consumption path of the household sector are the deposit interest rate r_t, the time preference ρ^H, and the intertemporal substitution elasticity θ of consumption.

3.2. Finance sector

To simplify, assume the finance sector to be an intermediary. It absorbs the deposit of the household sector and allocates them to different ownership firms without frictionless ($M_t = I_t$). As an agent of the household sector, it has dual objectives to balance between maximisation profit and financial services influenced by economic institutions factors[1]. To characterise the dual goals of the finance sector, this article constructed the profit utility function with constant elasticity of constant substitution:

$$U = \pi_{t,S}^{\mu+G_t}\pi_{t,P}^{1-\mu} \tag{4}$$

Here, $\pi_{t,S}$ and $\pi_{t,P}$ denote profits obtained from S.O.E.s and P.E.s, the corresponding utility evaluation weight are μ and $1-\mu$, $0 < \mu < 1$, which is related with rational market behaviour. G is the additional utility evaluation caused by the economic institutions factors: government intervention and owner relationship. $\pi_{t,\chi} = (1 - e_{t,\chi})r_{t,\chi}I_{t,\chi}$, $\chi = \{S, P\}$, S denotes S.O.E.s, and P P.E.s. $r_{t,\chi}$ indicates the loan interest rate. $I_{t,\chi}$ indicates the amount of credit funds from the finance sector. $e_{t,\chi}$ indicates the default rate of the firm sector. In China, it is easy to find that the probability of default of P.E.s is higher than that of S.O.E.s, $e_{t,P} > e_{t,S}$.

The credit capital constraint equation for the financial sector is as follows:

$$M_t = I_{t,S} + I_{t,P} \tag{5}$$

Maximising the utility of the financial sector, then the investment[2] are:

$$I_{t,P} = M_t \frac{1-\mu}{1+G_t} \tag{6}$$

$$I_{t,S} = M_t \frac{\mu+G_t}{1+G_t} \tag{7}$$

Under the condition of limited interest rate fluctuations in the Chinese finance market, Equations (6) and (7) showed the credit funds to S.O.E.s and P.E.s were neither affected by the interest rate, nor default rates. The finance sector credit allocation based on comparing the default risks were rational market behaviour. However, Equations (6) and (7) also indicated that the credit allocation of S.O.E.s and P.E.s were affected by government intervention and owner relationship. The scale of credit funds of S.O.E.s was positively proportional to government intervention and owner relationship. While for P.E.s was reversed. In other words, the more the government intervention and owner relationship tendency toward S.O.E.s, the more credit funds were biased toward S.O.E.s. For credit allocation in China, there was indeed a phenomenon that government intervention and owner relationship affected credit allocation. It is consistent with the situation of 'zombie firms' in which the S.O.E.s had a large number of loans to survive, and the P.E.s faced 'difficult and expensive in financing'.

Proposition 1. *When the economic institutions are gradually improved and the government intervention and ownership relationship in the finance sector will be close to zero, that is, the parameter G, the credit funds allocation of the finance sector will be fully regulated by the market, and will be allocated by marginal replacement rate in the evaluation of the utility of the finance sector between S.O.E.s and P.E.s. At the time, the development of financial markets tends to be perfect.*

3.3. Firm sector

Under the Chinese economic institution's environment, there are two types of property ownership, state-owned and private-owned, with different business objectives. This section separately constructed investment decision models for them. In order to simplify, assumed that the products produced by S.O.E.s and P.E.s are homogeneous, and the total human capital stock is constant. The proportion of human capital in S.O.E.s and P.E.s are φ and $(1-\varphi)$, respectively.

3.3.1. Private firm
Assuming that the input–output relationship of P.E.s (*P*) satisfies the Cobb-Douglas form, it can be expressed as:

$$Y_{t,P} = K_{t,P}^{\alpha_P}((1-\varphi)H_t)^{1-\alpha_P} \tag{8}$$

where, in period t, $Y_{t,P}$ indicates the output; $K_{t,P}$ the capital stock; $(1-\varphi)H_t$ the human capital investment; α_P and $1-\alpha_P$ represent the output elasticity of physical capital and human capital, respectively.

As the agent of the owner, the operators of the P.E. are committed to maximising the profit in the operation period. The objective function of P.E.s is:

$$\pi_{t,P} = Y_{t,P} - r_{t,P}I_{t,P} - r_{t-1,P}K_{t-1,P} - w_{t,P}(1-\varphi)H_t \tag{9}$$

where, in period t, $\pi_{t,P}$ indicates the profit; $I_{t,P}$ the investment scale; $r_{t,P}$ is the loan interest rate; $w_{t,P}$ is the unit income of human capital.

To simplify, this article ignores physical capital depreciation, but it does not affect the basic conclusion. Physical capital accumulation meets the following conditions:

$$K_{t,P} = I_{t,P} + K_{t-1,P} \tag{10}$$

The first-order conditions for P.E.s to maximise profits are:

$$I_{t,P} = \frac{\alpha_P}{1-\alpha_P} \frac{w_{t,P}(1-\varphi)H_t}{r_{t,P}} - K_{t-1,P} \tag{11}$$

Equation (11) showed that the main factors affecting the investment scale $I_{t,P}$ of the PEs were capital-output elasticity α_P, loan interest rate $r_{t,P}$, and unit human capital wage $w_{t,P}$.

It can be seen in Equation (11) that the main factors affecting the investment scale $I_{t,P}$ of private firm include capital-output elasticity α_P, loan interest rate $r_{t,P}$, and unit human capital wage $w_{t,P}$. The greater the capital-output elasticity α_P, the more P.E.s tend to adopt a capital-intensive production mode. At this time, the P.E.s will expand investment; otherwise, the investment will decrease. $r_{t,P}$ has a negative effect on the investment, while the rise of $w_{t,P}$ prompted the investment scale.

3.3.2. State-owned firm
Similar to private firms, the production function of state-owned firms can be expressed as:

$$Y_{t,S} = K_{t,S}^{\alpha_S}(\varphi H_t)^{1-\alpha_S} \tag{12}$$

$Y_{t,S}$ indicates the output; $K_{t,S}$ indicates the capital-stock input; φH_t indicates the human capital; α_S and $1-\alpha_S$ represent the output elasticity of physical capital and human capital, respectively.

S.O.E.s have to balance the objectives of 'profit' and 'sociality':

1. profit is that S.O.E.s purchase maximisation profits in terms of their development;
2. sociality is that S.O.E.s as the foundation of the socialist economy with Chinese characteristics has also played the role of policy tools. Therefore, they also pursue

the expansion of total assets. The investment objective function of S.O.E.s in period t can be expressed as:

$$\pi_{t,S} = Y_{t,S} - r_{t,S}I_{t,S} - r_{t-1,S}K_{t-1,S} - w_{t,S}\varphi H_t + \varphi(I_{t,S} + K_{t-1,S}) \tag{13}$$

Here, $\pi_{t,S}$ is the profit; $I_{t,S}$ is the investment scale; $r_{t,S}$ is the loan interest rate; $w_{t,S}$ is the wage of human capital. Relative to the profit target, the weight of evaluation of the asset size is φ; when φ rises, the firm will pay more attention to the expansion of asset scale; the change of φ also reflected that the business objectives of the S.O.E.s may be affected by economic institutions.

Similar to the treatment of P.E.s, the physical capital accumulation of S.O.E.s meets the following conditions:

$$K_{t,S} = I_{t,S} + K_{t-1,S} \tag{14}$$

Here, $I_{t,S}$ represents the investment of S.O.E.s in period t.

The first-order conditions for S.O.E.s to maximise profits are:

$$I_{t,S} = \frac{\alpha_S}{1-\alpha_S}\frac{w_{t,S}\varphi H_t}{r_{t,S}-\varphi} - K_{t-1,S} \tag{15}$$

As is shown in Equation (15), similar to P.E.s, the investment scale of the S.O.E.s is not only affected by capital-output elasticity α_S, loan interest rate $r_{t,S}$ and wage rate $w_{t,S}$, but also affected by the target weight φ of the S.O.E.s' assets. The greater the target weight, the more S.O.E.s pay attention to the expansion of asset scale in the period t, and the corresponding increase in investment. At this time, the investment scale of S.O.E.s will be higher than the scale of investment when pursuing profit maximisation; on the contrary, the investment scale of S.O.E.s will approach the scale of investment with the objectives of maximising profits.

3.4. Comparative static analysis

Note: The '-' indicates negatively correlated; '+' indicates positively correlated.

According to Equations (11) and (15), then can conclude the main factors affecting the investment scale of S.O.E.s and P.E.s as Table 1 is shown.

Define $D\alpha^{PS} = \alpha_P(1-\alpha_S)/(1-\alpha_P)\alpha_S$ indicates the difference in capital-output elasticity; $Dw_t^{PS} = w_{t,P}/w_{t,S}$ the difference in unit human capital wage; and using $Dr_t^{PS} = r_{t,P}/(r_{t,S}-\varphi)$ the difference in unit financing cost. At this time, Equations (11) and (15) can be rewritten as:

$$Dk_t^{PS} = D\alpha^{PS}Dw_t^{PS}/Dr_t^{PS} \tag{16}$$

Equation (16) indicates that the difference of capital-output elasticity, unit financing cost, and unit human capital wage are three main factors affecting capital allocation efficiency. The more the difference in capital-output elasticity between the S.O.E.s and P.E.s, the more credit funds to the S.O.E.s from the finance sector. However, as the marginal

Table 1. Comparative static analysis results.

Exogenous variable Endogenous variable	α_P	$r_{t,P}$	$w_{t,P}$	
$l_{t,P}$	+	−	+	
Exogenous variable Endogenous variable	α_S	$r_{t,S}$	$w_{t,S}$	ϕ
$l_{t,S}$	+	−	+	+

Source: China Statistical Yearbook.

returns of S.O.E.s gradually decrease, the investment scale will reduce. At the same time, the investment of P.E.s will increase. Aftermarket regulation, the distribution of credit funds between S.O.E.s and P.E.s will reach the market clearing. The more the difference in loan interest rates between S.O.E.s and P.E.s, the more the credit funds to S.O.E.s from the finance sector. However, due to the objective of asset size by S.O.E.s, the marginal output will be lower than the loan interest rate of the finance sector. In China's socialist economic institutions, the S.O.E.s have to balance 'profit' and 'sociality'. As a result, S.O.E.s do have a rapid accumulation of physical capital, excessive investment, and low physical efficiency measured by the economic measurement indicators. The P.E.s were facing the difficulty of financing and limited capital accumulation.

Proposition 2. *Objective difference and loan interest rate difference are the main factors affecting capital allocation efficiency between the S.O.E.s and P.E.s. As long as the S.O.E.s have the weight of the asset size, the above-mentioned differences in capital allocation efficiency measured by economic indicators will always exist. Moreover, the marginal output of S.O.E.s will be lower than the lending rate of the finance sector. However, S.O.E.s' loss of capital allocation efficiency can be compensated by social welfare and political gain. This phenomenon is determined by the characteristics of the Chinese economic institutions.*

3.5. Economic equilibrium

As the finance sector played the role of intermediary services without friction, its function is to completely convert the monetary capital from the household sector into credit capital and allocate them to S.O.E.s and P.E.s with different loan rates. When the financial market is cleared, the finance sector's loan income from S.O.E.s and P.E.s are equal to the sum of the household sector's monetary capital interest income, which satisfies the following conditions:

$$r_t M_t = (1 - e_{t,S})\left(\alpha_S K_{t,S}^{\alpha_S - 1}(\varphi H_t)^{1-\alpha_S} + \phi\right) I_{t,S}$$
$$+ (1 - e_{t,P})\alpha_P K_{t,P}^{\alpha_P - 1}((1-\varphi)H_t)^{1-\alpha_P} I_{t,P} \tag{17}$$

Combining Equations (6), (7), (11) and (15) into (17), we can then obtain:

$$r_t = \frac{\mu + G_t}{1 + G_t}(1 - e_{t,S})\left(\alpha_S K_{t,S}^{\alpha_S - 1}(\varphi H_t)^{1-\alpha_S} + \phi\right)$$
$$+ \frac{1-\mu}{1 + G_t}(1 - e_{t,P})\alpha_P K_{t,P}^{\alpha_P - 1}((1-\varphi)H_t)^{1-\alpha_P} \tag{18}$$

When the finance market is clear, the marginal output of capital and the loan interest rate between S.O.E.s and P.E.s meet the following conditions:

$$r_{t,P} = r_{t,S} + \phi \tag{19}$$

The growth path of household sector consumption obtained by dynamic optimisation is:

$$\frac{\dot{C}_t}{C_t} = \left\{ \frac{\mu + G_t}{1 + G_t} (1 - e_{t,S}) \left(\alpha_S K_{t,S}{}^{\alpha_S - 1} (\varphi H_t)^{1-\alpha_S} + \phi \right) \right.$$
$$\left. + \frac{1-\mu}{1 + G_t} (1 - e_{t,P}) \alpha_P K_{t,P}{}^{\alpha_P - 1} ((1 - \varphi) H_t)^{1-\alpha_P} \right\} \frac{1}{\theta} - \frac{\rho^H}{\theta} \tag{20}$$

According to Equation (2) and the perpetual inventory method of physical capital accumulation, the capital accumulation equations of S.O.E.s and P.E.s are:

$$\dot{K}_{t,S} = \frac{\mu + G_t}{1 + G_t} \left(K_{t,S}{}^{\alpha_S} (\varphi H_t)^{1-\alpha_S} + K_{t,P}{}^{\alpha_P} ((1 - \varphi) H_t)^{1-\alpha_P} - C_t \right) \tag{21}$$

$$\dot{K}_{t,P} = \frac{1-\mu}{1 + G_t} \left(K_{t,S}{}^{\alpha_S} (\varphi H_t)^{1-\alpha_S} + K_{t,P}{}^{\alpha_P} ((1 - \varphi) H_t)^{1-\alpha_P} - C_t \right) \tag{22}$$

Define $c_t = C_t/H_t$ as the unit human capital consumption; $k_{t,S} = K_{t,S}/\varphi H_t$ S.O.E.s' unit human capital physical capital; $k_{t,P} = K_{t,P}/(1 - \varphi)H_t$ PEs' unit human capital physical capital. According to (20)–(22), we can then obtain:

$$\frac{\dot{c}_t}{c_t} = \left\{ \frac{\mu + G_t}{1 + G_t} (1 - e_{t,S}) \left(\alpha_S k_{t,S}{}^{\alpha_S - 1} + \phi_t \right) + \frac{1-\mu}{1 + G_t} (1 - e_{t,P}) \alpha_P k_{t,P}{}^{\alpha_P - 1} \right\} \frac{1}{\theta} - \frac{\rho^H}{\theta} \tag{23}$$

Then, the capital accumulation equations of S.O.E.s and P.E.s are:

$$\dot{k}_{t,S} = \frac{\mu + G_t}{1 + G_t} \left(k_{t,S}{}^{\alpha_S} + \frac{1-\varphi}{\varphi} k_{t,P}{}^{\alpha_P} - \frac{1}{\varphi} c_t \right) \tag{24}$$

$$\dot{k}_{t,P} = \frac{1-\mu}{1 + G_t} \left(\frac{\varphi}{1 - \varphi} k_{t,S}{}^{\alpha_S} + k_{t,P}{}^{\alpha_P} - \frac{1}{1 - \varphi} c_t \right) \tag{25}$$

The economic system can be described by three differential equations of Equations (23)–(25) containing $k_{t,S}$, $k_{t,P}$ and c_t.

3.6. Balanced growth path

The economic system satisfies the condition at a steady-state, $\dot{c}_t/c_t = 0$, $\dot{k}_{t,S}/k_{t,S} = 0$ and $\dot{k}_{t,P}/k_{t,P} = 0$. At this time, the solutions in equilibrium are the household sector consumption is c_t^*, the state-owned firm unit human capital physical capital stock is $k_{t,S}^*$ and the P.E. unit human capital physical capital stock is $k_{t,P}^*$:

$$k_{t,S}{}^* = \left(\frac{\alpha_S (1 - e_{t,P} + \frac{\mu + G_t}{1 + G_t}(e_{t,P} - e_{t,S}))}{\rho^H - \phi(1 - e_{t,P} + \frac{\mu + G_t}{1 + G_t}(e_{t,P} - e_{t,S}))} \right)^{\frac{1}{1 - \alpha_S}} \quad (26)$$

$$k_{t,P}{}^* = \left(\frac{\alpha_P (1 - e_{t,P} + \frac{\mu + G_t}{1 + G_t}(e_{t,P} - e_{t,S}))}{\rho^H} \right)^{\frac{1}{1 - \alpha_P}} \quad (27)$$

$$c_t{}^* = \varphi(k_{t,S}{}^*)^{\frac{\alpha_S}{1 - \alpha_S}} + (1 - \varphi)(k_{t,P}{}^*)^{\frac{\alpha_P}{1 - \alpha_P}} \quad (28)$$

Proposition 3. *Only when the parameter satisfies the following condition* $0 < \rho^H - \phi(1 - e_{t,P} + \frac{\mu + G_t}{1 + G_t}(e_{t,P} - e_{t,S}))$, *may there be a balanced growth path in the economic system.*

Proposition 3 states: (1) appropriate policy objectives can help resolve market failures and promote economic growth; (2) S.O.E.s should aim at the asset weights in coordination with policy objectives. If Proposition 3 is invalid, there is no stable equilibrium, or even if there is an economic equilibrium, and any slight disturbance will cause the economic system to deviate from the steady equilibrium.

According to Equations (26) and (27), the scale of investment $k_{t,\chi}{}^*$ in the equilibrium state is affected by the elasticity of capital-output α_χ, the default $e_{t,\chi}$, the financial market weight μ, and the government intervention and owner relationship weight G. The more the capital-output elasticity, the more the firm sector tends to adopt capital-intensive production mode and then will expand investment to accumulate capital. The higher the default rate, the higher the financing cost set by the finance sector, which will reduce investment scale and the effective human capital. The closer the weight of the finance market μ to 1⁄2, the less evaluation difference of the finance sector between S.O.E.s and P.E.s, which will reduce the difference in investment scale and capital stock. The higher the weight of the government intervention and owner relationship G, the more credit funds biased towards S.O.E.s from the finance sector. The investment scale of S.O.E.s will continue to expand.

The balance of human capital and physical capital will increase during the equilibrium, while the scale of investment obtained by P.E.s will continue to decrease, the stock of capital physical capital decreased. In addition to the above common factors, the weight of asset scale expansion of S.O.E.s' ϕ is also positive for the capital stock. If ϕ increases, S.O.E.s will expand the current investment, and the investment scale will be larger than the sole profit maximisation; on the contrary, S.O.E.s will reduce the current investment scale. From the perspective of economic indicators, there is indeed a loss of economic efficiency in S.O.E.s' capital allocation efficient investment. However, from the perspective of government intervention and owner relationship, the economic efficiency loss of S.O.E.s can be compensated by social welfare and political gain. It is worth noting that the scale of firm investment $k_{t,\chi}$ in equilibrium state has no relationship with the distribution share of human capital between the S.O.E.s and P.E.s. All the results are shown in Table 2.

Table 2. Comparative static analysis results.

Exogenous variable Endogenous variable	α_P	$e_{t,P}$	μ	G	
$I_{t,P}$	+	–	+	–	
Exogenous variable Endogenous variable	α_S	$e_{t,S}$	μ	G	ϕ
$I_{t,S}$	+	–	+	+	+

Note: The '-' indicates negatively correlated; '+' indicates positively correlated.
Source: China Statistical Yearbook.

Proposition 4. *Under the environment of the current economic institutions, when the market is clear, the physical capital stock of the P.E.s is equal to the capital stock when profit maximisation; while the S.O.E.s balances the profit maximisation and the asset scale expansion, the physical capital stock is larger than that of profit maximisation. From the economic indicators, the S.O.E.s do have economic efficiency losses, but from the perspective of policy and institutional indicators, the economic efficiency loss of S.O.E.s can be compensated through social welfare and political gain. When the parameters meet the following conditions: when the goal of S.O.E.s is gradually simplistic, that is, the pursuit of asset size approaches zero $\phi \to 0$. At this time, the investment objective of the S.O.E.s is consistent with that of P.E.s, and they are all pursuing profit maximisation. The model is a standard firm sector in new classic economic growth.*

4. Regression analysis

4.1. Econometric model

Based on the theoretical analysis in part 3, this article built two econometric models to verify theoretical analysis of financing constraint difference and capital allocation efficiency, respectively.

For financing constraint difference, the econometric model is as follows:

$$Dk_t^{PS} = \alpha_0 + \alpha_1 Dr_t^{PS} + \alpha_2 Dw_t^{PS} + \alpha_3 G_t + \alpha_4 \phi_t + \varepsilon_t \tag{29}$$

For capital allocation efficiency difference, the econometric model is as follows:

$$lnY_t = \beta_0 + \beta_1 lnK_t^P + \beta_2 lnK_t^S + \beta_3 lnH_t + \varepsilon_t \tag{30}$$

4.2. Data

4.2.1. Data source

In the empirical analysis, the observations of S.O.E.s and P.E.s are all macro annual data from 1990 to 2020. Because the data of level of financial market development begun since 1990. The data are from the *China Statistical Yearbook*, *China Labor Statistics Yearbook* and *China Financial Statistics Yearbook*. The limitation of data is that the existing statistical yearbooks lack the monthly or quarterly data of S.O.E.s and P.E.s, only the macro annual data can be obtained, which means the sample

Table 3. Variables definition.

Variables	Definition
Dk_t^{PS}	The ratio of the per capita physical capital of PEs and SOEs
Dr_t^{PS}	The ratio of the total assets of state-owned commercial banks and joint-stock banks.
Dw_t^{PS}	The ratio of the per capita wage of PEs and SOEs
G_t	The inverse of the level of financial market development
Y_t	The total industrial added value of PEs and SOEs
ϕ_t	The government projected growth targets
K_t^P	The total capital stock of PEs
K_t^S	The total capital stock of SOEs
H_t	The human capital

Source: China Statistical Yearbook.

observations in this article only meet the minimum sample size of regression analysis. The detailed selection of relevant variables is shown in the following variable definition (Table 3).

4.2.2. Data description
The summary statistics are shown in Table 4. From 1990 to 2020, the total number of observations is 31, which also meets the minimum requirements for the next further analysis. Specifically, for Dk_t^{PS}, the mean is 0.2629 and it ranges from 0.02 to 0.67, with a standard deviation of 0.2183. Similar analysis for Dr_t^{PS} and Dw_t^{PS}. As for G_t, as the proxy variable of government intervention, the mean is −0.6542 and it ranges from −1.51 to −0.04, with a standard deviation of 0.3379. For ϕ_t, as the proxy variable of owner relationship, the mean is 7.6013 and it ranges from 6 to 9, with a standard deviation of 0.8026. All the standard deviation is small, compared with its mean values, which means that all the variables is efficient. As is shown in column 7, all t-test values are more than the critical value of 1.96, which means that all the data fall in the 95% confidence interval.

4.2.3. Pairwise correlations
The pairwise correlations results are shown in Table 5. In column 2, it showed that the correlation coefficients are −0.942***, 0.954***, 0.863***and −0.476***, respectively. The correlation coefficients are all significant at the 0.01 level (two-tailed), which indicates there is a significant correlation between of difference in capital stock and the four explanatory variables. Similar analysis for lnY_t, there is a significant correlation between of economic output and three explanatory variables.

4.2.4. Pre-estimation test
Variance inflation factor (V.I.F.) is a measure of the degree of complex (multiple) collinearity in multiple linear regression models. It represents the ratio of the variance of the estimator of the regression coefficient to the variance of the assumption that the independent variables are not linearly correlated. Generally speaking, V.I.F. is generally below 10, indicating that there is no multicollinearity problem. As is shown in Table 6, for both econometric models, the mean V.I.F. is less than 10, which indicates there is no multicollinearity.

Table 4. Descriptive statistics.

Variables	N	Mean	Std. Dev.	Min	Max	T-value
Dk_t^{PS}	31	0.2629	0.2183	0.02	0.67	6.7049
Dr_t^{PS}	31	3.4345	0.9751	1.9	4.63	19.6102
Dw_t^{PS}	31	1.0861	0.198	0.84	1.3	30.547
G_t	31	0.6542	0.3379	0.04	1.51	10.7782
ϕ_t	31	7.6013	0.8026	6	9	52.7282
lnY_t	31	8.7151	1.0086	7.4801	10.0836	48.1078
lnK_t^P	31	11.034	0.5444	10.4109	11.8732	112.8511
lnK_t^S	31	8.882	1.9509	6.2242	11.0445	25.3486
lnH_t	31	9.5786	0.541	8.6926	10.2766	98.5744

Source: China Statistical Yearbook.

4.3. Regression result

4.3.1. Financing constraint difference

The regression results of the first econometric model are shown in Table 7. The results of the gradual regression show that the four explanatory variables are all significant at a 1% statistical level. The goodness of fit is all above 90%, indicating that the overall interpretation of the model is better.

Among them, the difference of financing constraints has a significant negative impact on the difference of per capita capital stock. For the other three explanatory variables, the difference in per capita wages, government intervention and owner relationship, they all have positive and significant impact on the difference of per capita capital stock. The results verify the conclusions of the previous theoretical analysis. Concretely speaking, the slope coefficient of Dr_t^{PS} is -0.1056. It indicates that the difference in financing constraints decreased by 1 unit, the difference of S.O.E.s and P.E.s in per capita capital stock will be reduced by 0.1056. That is to say, the decrease of the difference in financing prices in financial markets helps to reduce the difference in per capita capital stock between S.O.E.s and P.E.s. The For Dw_t^{PS}, per capita wage difference increased by 1 unit, the difference in per capita stock between S.O.E.s and P.E.s will be expanded by 0.1056. It shows that if the per capita wage difference continues to expand, P.E.s will turn to capital-intensive investment, which will increase the per capita capital stock, which also reflected the substitute relationship between capital and labour. As for G_t, the intensity of government intervention increases by 1 unit, then the difference in per capita capital stock will be expanded by 0.1434. Government intervention has indeed expanded the gap of per capita capital stock between S.O.E.s and P.E.s. For ϕ_t, the weight of the asset expansion by S.O.E.s increases 1.unit, then the difference in per capita capital stock will be expanded by 0.0231. The pursuit of asset expansion by S.O.E.s has indeed expanded the gap of per capita capital stock. At present in China, government intervention has a greater impact on capital differentials than the weight of asset size.

4.3.2. Investment effect difference between different ownership enterprise

The regression results of the second econometric model are shown in Table 8. The results of the gradual regression show that the explanatory variables are all significant at a 1% statistical level. The goodness of fit is all above 90%, indicating that the overall interpretation of the model is better.

Table 5. Pairwise correlation.

Variables	Dk_t^{PS}	Dr_t^{PS}	Dw_t^{PS}	G_t	ϕ_t
Dk_t^{PS}	1.0000				
Dr_t^{PS}	−0.942***	1.0000			
Dw_t^{PS}	0.954***	−0.902***	1.0000		
G_t	0.863***	0.773***	−0.792***	1.0000	
ϕ_t	−0.476***	0.630***	−0.449**	0.395**	1.0000
Variables	lnY_t	lnK_t^P	lnK_t^S	lnH_t	
lnY_t	1.0000				
lnK_t^P	0.985***	1.0000			
lnK_t^S	0.981***	0.939***	1.0000		
lnH_t	0.976***	0.944***	0.965***	1.0000	

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Source: China Statistical Yearbook.

Table 6. Multicollinearity test.

Variable	VIF	1/VIF	Variable	VIF	1/VIF
Dr_t^{PS}	8.56	0.116835	lnK_t^P	6.17	0.13210
Dw_t^{PS}	6.76	0.148026	lnK_t^S	5.22	0.19157
G_t	2.84	0.352329	lnH_t	7.57	0.13210
ϕ_t	1.91	0.524102			
Mean VIF	5.02			6.32	

Source: China Statistical Yearbook.

Table 7. Regression results.

Independent variable			ΔDk^{PS}		
Dr_t^{PS}	−0.2110*** (0.014401)				−0.1056*** (0.0203)
Dw_t^{PS}		1.0517*** (0.05728)			0.4307**** (0.0963)
G_t			0.5572*** (0.0648)		0.1434** (0.0583)
ϕ_t				0.1293 *** (0.02857)	0.0231** (0.0092)
Cons	0.9874*** (0.05822)	−0.87940*** (0.0514722)	−0.1016** (0.04206)	1.2461*** (0.2315)	−0.1116 (0.1473)
N	31	31	31	31	31
R^2	0.8878	0.9095	0.7439	0.2261	0.968
OLS	Robust	Robust	Robust	Robust	Robust
F	214.42	337.17	73.90	20.49	231.475

Notes: In parentheses it is standard deviation, ***, **, * are the 0.1%, 1% and 5% of the statistical significant level, respectively.
Source: China Statistical Yearbook.

As is shown in column 6, the output elasticity of human capital during the period 1990–2020 is 0.3109, the capital-output elasticity in S.O.E.s is 0.9087, and the capital-output elasticity in P.E.s 0.1858. The total output of capital is more effective than human capital, which also verifies the investment-driven economic development model of China in the past 30 years. Besides, the sum of human capital and capital-output elasticity is greater than 1, reflecting the current economic expansion is increased scale of returns. The economic output still has a certain expansion space. It can also explain nearly 40 years of sustained high growth in China, and the Chinese economy has some sustainability. However, in terms of subdivision, S.O.E.s have the highest capital-output elasticity, human capital in the middle, and P.E.s the lowest, which indicates that S.O.E.s adopt capital-biased production methods, which further

Table 8. Regression results.

Independent variable	lnY				
lnK^S	1.8254*** (0.04622)			1.0076*** (0.0502)	0.9087*** (0.0490)
lnK^P		0.5070*** (0.0152)		0.2431*** (0.0141)	0.1858*** (0.0129)
lnH			1.8203*** (0.0862)		0.3109** (0.0577)
Cons	−11.4262*** (0.5173)	4.2117*** (0.1319)	−8.7204*** (0.8498)	−4.5621*** (0.4421)	−5.9399*** (0.4010)
N	31	31	31	31	31
R^2	0.9706	0.9617	0.9533	0.9969	0.9985
OLS	Robust	Robust	Robust	Robust	Robust
F	1560.06	1115.17	445.50	7733.66	10826.75

Notes: In parentheses it is standard deviation, ***, **, * are the 0.1%, 1% and 5% of the statistical significant level, respectively.
Source: China Statistical Yearbook.

verify that S.O.E.s undertake more basic investment and strategic infrastructure to a stable economy. While P.E.s adopt human capital-biased production methods. The reason may be that P.E.s are more constrained under the condition that financing is strictly restricted. It tends to maximise short-term economic profits while human capital is the short-term optimal variable.

5. Conclusion

This article added the finance sector into the neoclassical economic growth model, explored the influence of the dual-target mechanism of finance sector credit allocation on economic growth, and analysed the influence of government intervention and ownership relationship on economic growth. In theoretical implication, the model not only extended the existing economic growth theory but also enriched the micro-basic theory of the credit allocation mechanism of the finance sector. In order to verify the theoretical analysis, this article used the data from 1990 to 2020 to make an empirical analysis. The study found that in addition to the usual two factors, the difference in financing constraints and per capita wage difference, government intervention and owner relationship are another two significant influencing factors, and the slope coefficients are 0.1434, 0.0231, respectively. Government intervention has a greater impact on capital differentials than the weight of asset size. Through the analysis of the efficiency of capital allocation, the study also found that the current economic expansion is the increased scale of returns and the Chinese economy still has a certain expansion space. The findings can not only explain the effect of government intervention and ownership relationship on capital allocation in the mixed economy by the socialist market economy with Chinese characteristics but also can be the starting point for a study that would analyse what happened and happens in the former socialist countries in Europe.

The limitation of this article is that the existing statistical yearbook lacks relevant variables microdata, which makes the sample observations are not detailed classified at the firm level. Future research needs to be verified with the help of other micro-enterprise databases. The detailed selection of relevant variables is shown in the following variable definition. Besides, for the findings that government intervention and

owner relationship are another two significant influencing factors, there is still some space to improve. The relationship between government intervention and ownership may have a nonlinear influence relationship, which is also needed to be further improved in the theoretical model. Further research whether there is an optimal parameter of government intervention and optimal mixed proportion in the S.O.E. mixed-ownership reform.

Notes

1. Refer to Becker (1957), economic agents are concerned about political demands in addition to profits.
2. For a long time, the floating rate of loan interest rates in China's financial sector has been controlled by the central bank, and it has not achieved full marketisation, and its floating range is limited. Therefore, the loan interest rate has a small elasticity to the loan scale, which can be approximated to 0, that is, $\varepsilon_\chi = 0$.

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Availability of data and materials

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References

Ashraf, Q., Gershman, B., & Howitt, P. (2017). Banks, market organization, and macroeconomic performance: An agent-based computational analysis. *Journal of Economic Behavior & Organization*, *135*, 143–180. https://doi.org/10.1016/j.jebo.2016.12.023

Bai, C. E., Hsieh, C. T., & Song, Z. M. (2016). The long shadow of a fiscal expansion (No. w22801). National Bureau of Economic Research. https://doi.org/10.1353/eca.2016.0027

Berkowitz, D., Lin, C., & Ma, Y. (2015). Do property rights matter? Evidence from a property law enactment. *Journal of Financial Economics*, *116*(3), 583–593. https://doi.org/10.1016/j.jfineco.2015.04.003

Beuselinck, C., Cao, L., Deloof, M., & Xia, X. (2017). The value of government ownership during the global financial crisis. *Journal of Corporate Finance*, *42*, 481–493. https://doi.org/10.1016/j.jcorpfin.2015.05.002

Boubakri, N., El Ghoul, S., Guedhami, O., & Megginson, W. L. (2018). The market value of government ownership. *Journal of Corporate Finance*, *50*, 44–65. https://doi.org/10.1016/j.jcorpfin.2017.12.026

Brandao-Marques, L., Correa, R., & Sapriza, H. (2020). Government support, regulation, and risk taking in the banking sector. *Journal of Banking & Finance*, *112*, 105284. https://doi.org/10.1016/j.jbankfin.2018.01.008

Buera, F. J., Kaboski, J. P., & Shin, Y. (2011). Finance and development: A tale of two sectors. *American Economic Review*, *101*(5), 1964–2002. https://doi.org/10.1257/aer.101.5.1964

Chen, Z., He, Z., & Liu, C. (2020). The financing of local government in China: Stimulus loan wanes and shadow banking waxes. *Journal of Financial Economics*, *137*(1), 42–71. https://doi.org/10.1016/j.jfineco.2019.07.009

Cong, L. W., Gao, H., Ponticelli, J., & Yang, X. (2019). Credit allocation under economic stimulus: Evidence from China. *The Review of Financial Studies*, *32*(9), 3412–3460. https://doi.org/10.1093/rfs/hhz008

Dewatripont, M., & Maskin, E. (1995). Credit and efficiency in centralized and decentralized economies. *The Review of Economic Studies*, *62*(4), 541–555. https://doi.org/10.2307/2298076

Fazzari, S., Hubbard, R. G., & Petersen, B. (1988). Investment, financing decisions, and tax policy. *The American Economic Review*, *78*(2), 200–205.

Guo, S., Jiang, Z., & Shi, H. (2018). The business cycle implications of bank discrimination in china. *Economic Modelling*, *73*, 264–278. https://doi.org/10.1016/j.econmod.2018.04.003

He, W., & Kyaw, N. A. (2018). Ownership structure and investment decisions of Chinese SOEs. *Research in International Business and Finance*, *43*, 48–57. https://doi.org/10.1016/j.ribaf.2017.07.165

Huang, Y., Pagano, M., & Panizza, U. (2020). Local crowding-out in China. *The Journal of Finance*, *75*(6), 2855–2898. https://doi.org/10.1111/jofi.12966

Ji, Y., Bian, W., & Huang, Y. (2018). Deposit insurance, bank exit, and spillover effects. *Journal of Banking & Finance*, *96*, 268–276. https://doi.org/10.1016/j.jbankfin.2018.09.013

Li, Z., Chu, Y., & Gao, T. (2020). Economic growth with endogenous economic institutions. *Macroeconomic Dynamics*, *24*(4), 920–934.

Liu, Z., Wang, P., & Xu, Z. (2021). Interest-rate liberalization and capital misallocations. *American Economic Journal: Macroeconomics*, *13*(2), 373–419. https://doi.org/10.1257/mac.20180045

Mickinnon, R. (1973). *Money and capital in economic development*. Brookings.

Midrigan, V., & Xu, D. Y. (2014). Finance and misallocation: Evidence from plant level data. *American Economic Review*, *104*(2), 422–458. https://doi.org/10.1257/aer.104.2.422

Moll, B. (2014). Productivity losses from financial frictions: Can self-financing undo capital misallocation? *American Economic Review*, *104*(10), 3186–3221. https://doi.org/10.1257/aer.104.10.3186

Nizam, R., Karim, Z. A., Rahman, A. A., & Sarmidi, T. (2020). Financial inclusiveness and economic growth: New evidence using a threshold regression analysis. *Economic Research-Ekonomska Istraživanja*, *33*(1), 1465–1484. https://doi.org/10.1080/1331677X.2020.1748508

Peng, M. W., Bruton, G. D., Stan, C. V., & Huang, Y. (2016). Theories of the (state-owned) firm. *Asia Pacific Journal of Management*, *33*(2), 293–317. https://doi.org/10.1007/s10490-016-9462-3

Psillaki, M., & Eleftheriou, K. (2015). Trade credit, bank credit, and flight to quality: Evidence from French SMEs. *Journal of Small Business Management*, *53*(4), 1219–1240. https://doi.org/10.1111/jsbm.12106

Sahin, A., & Berument, M. H. (2019). Asymmetric effects of central bank funding on commercial banking sector behaviour. *Economic research-Ekonomska Istraživanja*, *32*(1), 128–147. https://doi.org/10.1080/1331677X.2018.1552174

Svilokos, T., Vojinić, P., & Šuman Tolić, M. (2019). The role of the financial sector in the process of industrialisation in Central and Eastern European countries. *Economic research-Ekonomska Istraživanja*, *32*(1), 384–402. https://doi.org/10.1080/1331677X.2018.1523739

Thakor, A. V. (2021). Politics, credit allocation and bank capital requirements. *Journal of Financial Intermediation*, *45*, 100820. https://doi.org/10.1016/j.jfi.2019.03.005

Wang, H., Luo, T., Tian, G. G., & Yan, H. (2020). How does bank ownership affect firm investment? Evidence from China. *Journal of Banking & Finance*, *113*, 105741. https://doi.org/10.1016/j.jbankfin.2020.105741

Wu, G. L. (2018). Capital misallocation in China: Financial frictions or policy distortions? *Journal of Development Economics*, *130*, 203–223. https://doi.org/10.1016/j.jdeveco.2017.10.014

Wu, J. (2019). Financing constraints for R&D in China: The role of state ownership. *Applied Economics Letters*, *26*(14), 1162–1166. https://doi.org/10.1080/13504851.2018.1540839