Wage determination and fixed capital investment in an imperfect financial market: the case of China

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Abstract

The purpose of this paper is to examine how wage decisions and fixed asset investments are determined under China's imperfect financial market. In addition, we also investigate what kind of interrelationship exists between wage determination and fixed asset investment. To test the hypothesis, we collect aggregate data on wages, the financial market, and fixed asset investment by province, sector, and ownership type from several statistical yearbooks. The main results are (1) while the rise in financial market maturity has led to rising wage levels for state-owned enterprises, this phenomenon is not observed in the private sector, (2) retained earnings are positively correlated with capital investment, indicating that China's financial market is incomplete. Furthermore, in the private sector, there is a strong reliance on internal reserves that is not observed in the state-owned sector, suggesting that the private sector is differentially treated in the financial market. (3) In the state-owned sector, wage growth has a positive correlation with fixed assets, while in the nonstate-owned sector this relationship is not observed. This implies that in the nonstate-owned sector the underpayment of wages may be used as a survival strategy to conduct business if under financial constraints.

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1. Introduction

The Chinese economy has achieved high economic growth since its reform and opening policy began in 1978. According to the China Statistical Yearbook, China's average per capita growth rate of gross domestic product (GDP) was 8.6% between 1978 and 2017. Thus, it is no exaggeration to say that China has experienced a miracle in terms of its economic growth. As a result, living standards have risen dramatically. For example, compared with 1978, real household consumption expenditure in 2017 had increased by a factor of 11 and 13 in urban and rural areas, respectively. Over the same period, the real per capita disposable income of households increased 15 times for urban households and more than 18 times for rural households. In addition, the industrial structure has changed significantly over the last 40 years, in line with the trends experienced by developed countries. In 1978, primary industry accounted for 27.7% of GDP, secondary industry accounted for 47.7%, the tertiary industry accounted for only 24.6%. By 2017, in contrast, tertiary industry accounted for 51.6% of GDP and primary industry accounted for less than 8%.

However, China's rapid economic growth path has resulted in certain distinctive economic features. First, China's financial markets remain immature (Allen et al., 2005). In particular, although the state-owned sector can easily obtain loans, the private sector is often discriminated against and finds it difficult to obtain loans (Knight and Ding, 2010, Poncet et al., 2010, Guariglia et al., 2011). As shown in Figure 1, domestic loans as a proportion of total investment financing were 20% in 1995 but by 2017 had fallen to 11%; and self-financing, which accounted for 52% of total investment financing in 1995, had risen to almost 70% by 2017. Furthermore, self-financing and "other sources" together accounted for 82% of investment financing in 2017, implying that Chinese corporations are not financing their investments using financial markets, but are relying heavily on internal reserves for fixed capital investments.

The second distinctive feature arising from China's rapid economic growth path is that fixed asset investment is very strong. Many studies have argued that China's economic growth is not due to total factor productivity growth but rather to external growth, supported by investment in factors such as capital (Islam et al., 2006, Zheng and Hu, 2006, Zheng et al., 2009). As Figure 2 shows, at the beginning of the economic reform period, household consumption accounted for only 48% of GDP. This proportion was already lower than that in developed countries, yet it has declined since the 1990s and even more sharply after the 2000s. Meanwhile, gross capital formation has been strong until recently. In particular, the ratio of gross capital formation to GDP has exceeded household consumption since 2004, indicating the possibility of an extensive growth pattern supported by capital investment. Not only does the state-owned sector maintain high capital investment levels, but private enterprises are also experiencing rapid capital formation. In Figure 3, the bar graph represents fixed asset investment in the state and nonstate sectors. The line shows the investment ratio in the state-owned/nonstate-owned sectors. Since 2001, the amount of fixed asset

investment in the nonstate-owned sector has exceeded that in the state-owned sector. In recent years, fixed asset investment in the state-owned sector has been less than 30% of that in the nonstate-owned sector. An empirical study conducted by Ding et al. (2019) showed that overinvestment is observed for all types of firms, even in the most efficient and profitable private sectors in China. However, this phenomenon is paradoxical when the financial market is imperfect. If the private sector finds financing difficult to obtain because of the imperfect market, capital investment will be restricted and high levels of investment will be not realized. In conjunction with the capital investment shifts, the labor force allocation has changed greatly between business units based on their ownership types. For example, in 1990, state-owned units were responsible for 60.7% of employment in urban areas (if collective-owned units are included, this percentage rises to 81.5%). Thereafter, however, the share declined, such that by 2017, state-owned units employed only 14.3% of the urban labor market (or 15.2% if urban collective-owned units are included), indicating that the private sector was becoming the main employer in urban China (Figure 4).

The third distinctive feature of Chinese economic growth is that the labor market is far from being in a state of perfect competition and remains immature, as evidenced by low wages for employees and the fact that wage growth has not kept pace with economic growth. For instance, Fleisher and Wang (2004), Fleisher et al. (2011), and Dong and Putterman (1996, 2000, 2002) investigated the underpayment of labor wages in China. The share of employees' compensation in GDP in China is lower than that in developed countries, and it has been declining rapidly since the 2000s (Figure 5). The lowest share recorded was only 47% in 2011. Figure 6 plots the real wage from 1994 to 2015, comparing the ratio between state-owned, collective-owned, and "other ownership" business units. Until 2002, the real wage of "other ownership" units was about 1.4 to 1.1, exceeding the wage level of the state-owned units. However, since 2005, the state-owned units have surpassed the others. The real wage level of collective-owned units is still only 80% of that of state-owned units. In other words, wage gaps are observed according to ownership, and the state-owned sector enjoys higher wages than the nonstate-owned sector (Zhao, 2002).

The main hypothesis of this paper is that in a situation where private enterprises are unable to obtain loans in an imperfect financial market, as a survival strategy they have created capital investment funds by underpaying wages and using the money saved for capital investment. We combine the imperfection of financial and labor markets into one fixed capital investment equation to investigate the interrelationship between wage determination and fixed asset investment. To our knowledge, ours is the first study of the interrelationship between wage determination and fixed asset investment in an imperfect financial market in China using unique merged provincial data.

To test our hypothesis, we collected aggregate data on labor wages, the financial market, and fixed asset investment at the province level and by ownership type from several statistical yearbooks. The main findings are as follows. First, although the increase in financial market maturity has led to

rising wage levels for state-owned enterprises, this phenomenon is not observed in the private sector. Second, retained earnings are positively correlated with capital investment, indicating that China's financial market is incomplete. Furthermore, in the private sector, there is a strong reliance on internal reserves that is not observed in the state-owned sector, suggesting that the private sector is treated differently in financial markets. Third, in addition to examining the financial market situation, we undertook an estimation that includes previous wage growth in the fixed asset investment equation. In the state-owned sector, wage growth is positively correlated with fixed assets, whereas in the nonstate-owned sector, this relationship is not observed. This implies that the underpayment of wages may be a survival strategy for the nonstate-owned sector if the firms in this sector are operating under financial constraints in conducting their business.

The remainder of this paper is organized as follows. Section 2 provides a brief literature review and Section 3 explains the data sources and regression variables. Section 4 presents the estimation models and Section 5 discusses the regression results. Finally, Section 6 concludes the paper.

2. Literature review

Many empirical studies have found that corporations face borrowing constraints under imperfect financial markets, which therefore hinder corporate growth (Stein, 2003 and Hubbard, 1998). Whited (1992) developed a dynamic model of finance and investment and tested a firm's optimal investment Euler equation. She found that including the effect of a debt constraint greatly improves the Euler equation's performance compared with the standard specification, and that the allocation of real investment expenditure over time will be affected when firms face the financing constraint. Bond and Meghir (1994) extended the standard neoclassical model of capital accumulation to include adjustment costs, where the firm faces a hierarchy of costs for alternative sources of finance. They used data on UK manufacturing companies to estimate the investment Euler equation, and claimed that current investment is positively related to lagged cash flow when firms are liquidity constrained. Others, including Allayannis and Muzomdar (2004), Fazzari et al. (2000), and Beck, Demirguc-Kunt and Maksimovic (2005), have used investment cash flow sensitivity as an indicator of credit constraints to investigate firms' fixed capital investments in imperfect financial markets.

Further, Love (2003) studied the effect of financial development on firms' investment via their ability to obtain external finance. Love found that small firms are disproportionately more disadvantaged in less financially developed countries than are large firms. Harrison et al. (2004) examined the impact of global capital flows (foreign direct investment) on host-country firms' financing constraints. They found that foreign direct investment is associated with a reduction in

financing constraints. Other studies investigating capital market imperfections and firm investments in transition and developing economies include those by Konings, Rizov, and Vandenbussche (2003), Lizal and Svejnar (2002), and Harrison and McMillan (2003).

In regard to the Chinese economy, Barnett and Brooks (2006) and Knight and Ding (2010) showed the importance of retained earnings and informal funds to Chinese enterprises by analyzing aggregated data. A number of studies have adopted a micro perspective and used firm-level data to study firms' capital investment behavior under imperfect financial markets. Ayyagari et al. (2010) used the World Bank Investment Climate Survey dataset and concluded that a relatively small percentage of firms in their sample obtained financing through the formal bank system, with the majority relying strongly on informal finance. Chow and Fung (1998) investigated the relationship between investment and cash flow using panel data on manufacturing firms operating in Shanghai. They found that firms' investments are constrained by cash flow, and that the sensitivity of investment to cash flow is highest for private firms and lowest for foreign-owned firms. Using panel data on Chinese firms, Guariglia et al. (2011) found evidence of discrimination in access to credit for private-sector firms. Poncet et al. (2010) used firm-level data for China from the Oriana data set and found that private Chinese firms depend more on internally generated funds for their investments than do state-owned firms, and that they appear to be more credit constrained, which impedes their growth.

Compared with the vast body of research on the relationship between financial frictions and firm-level investment, the literature linking imperfect financial markets with labor markets is sparser (Michaels, Page, and Whited, 2018). Michelacci and Quadrini (2005, 2009) built a long-term contract model to analyze how the financial conditions of the firm affect the compensation structure of workers, the size of the firm, and its dynamics. They found that firms offer long-term wage contracts when they are financially constrained. Thus, employees receive an increasing wage profile, in terms of lower wages today in exchange for higher future wages. Therefore, firms can effectively borrow from their employees to overcome their borrowing constraints. Their model predicted that younger and smaller firms will grow faster and pay lower wages. Using matched employer–employee data from Finland and the US National Longitudinal Survey of Youth, Michelacci and Quadrini (2009) showed that the data support the key dynamic properties of their model.

Pagano and Pica (2012) offered a simple model to explore the ways in which financial development can be expected to affect employment, wages, and the reallocation of jobs. Their model showed that although in normal times, financial development may foster output and employment growth, in a crisis it may exacerbate their contraction. In the empirical part of their study, they used international industry-level data for 1970–2003 and found that standard measures of financial development are indeed associated with greater employment growth and that the development of the financial market correlates negatively with the interindustry dispersion of employment growth.

Furthermore, they found some evidence of a "dark side" of financial development, that is, during banking crises, employment grows less in the industries that are more dependent on external finance and those located in the more financially developed countries.

Another closely related paper is by Michaels, Page, and Whited (2015). These authors attempted to explain how employment, wage setting, and financial frictions interact, and in particular how firms' financial decisions spill over to affect wage determination. They assembled a new, quarterly panel data set that links US firms' investment and financing decisions to their employment and wages. In their empirical exercise, they found a strong negative relation between leverage and average labor earnings, both in the cross-section and within firms, and the sensitivity was larger for firms likely to face financial constraints. Then, they constructed a dynamic model of labor and capital demand in the face of financial frictions to explain the mechanisms behind the empirical results. The main mechanism derived from their model was that firms bargain with workers and exploit higher leverage as a means to restrain wages, which induces a quantitatively relevant negative relation between leverage and labor earnings.

There are several papers that focus on the impact of financial frictions on labor markets during a financial shock. Chodorow-Reich (2014) and Duygan-Bump, Levkov, and Montoriol-Garriga (2015) analyzed the enormous increase in job loss immediately following the failure caused by the Lehman shock in 2008. Meanwhile, Cantor (1990), Sharpe (1994), Matsa (2010), Bakke and Whited (2012), Benmelech, Bergman, and Enriquez (2012), and Agrawal and Matsa (2013) demonstrated that financing frictions affect labor demand and wage setting in normal times, not just during extreme credit market failures.

There is already a huge amount of academic research on the Chinese labor market and wages. Yang et al. (2010) used macro data from multiple sources to examine changes in Chinese labor wages during the period 1978–2007. Ge and Yang (2011) discussed the "Lewis turning point" in the Chinese labor market in recent years, using two different economic theories. Ge and Yang (2014) used the unique Urban Household Surveys microdata to examine changes in the wage structure in the rapidly developing Chinese labor market. Other well-regarded studies include those by Démurger, Li, and Yang (2012), Lee (2012), and Zhu (2016). However, there are comparatively few discussions about the relationship between imperfect financial markets and labor payments. Shao, Bao, and Ye (2013) examined the causal effect of firms' financial constraints on labor income based on a World Bank enterprise survey on Chinese manufacturing firms. Their main finding was that firms subject to greater borrowing constraints tended to pay lower wages to their employees. A closely related paper by Lin and Zhao (2015) investigated the influence of financial stress on the labor share of income. Their empirical results showed that financial stress significantly suppressed this share for nonstate and nonforeign firms, implying the existence of "ownership discrimination" in the Chinese economy. Furthermore, they found that the negative impact was more severe for smaller firms and for firms in

traditional manufacturing sectors, indicating the possibility of both “scale discrimination” and “sector discrimination”.

3. Data

For our exercise, we require information on financial markets, fixed capital investments, and the labor market. To test the hypothesis discussed above, we collected data from several statistical yearbooks, the “Almanac of China’s Finance and Banking”, the “Statistical Yearbook of the Chinese Investment in Fixed Assets”, the “China Labor Statistical Yearbook”, the “China Industry Statistical Yearbook”, and the “China Statistical Yearbook”. All data are aggregate data at the provincial level. To examine the effects of ownership, we collected data from three categories of business units based on ownership: the state-owned sector, the collective sector, and the “other ownership” sector.Details on how we collected and defined the variables are provided below.

3.1.Labor wage

The average wage index includes the average wages of employees and of incumbent employees. This paper uses the average wage of incumbent employees. In the “China Labor Statistics Yearbook”, ownership is classified into the state-owned sector, the collective sector, and the “other” sector. To investigate wage decisions in the private sector, we collected average wage data for employees of private enterprises for 2009 to 2015 from the “China Statistical Yearbook”. All average wages were nominal variables, which we converted into real terms using the provincial-level urban consumer price index, with 2000 as the base year.

3.2.Fixed asset investment

Fixed asset investment data were extracted mainly from the “Statistical Yearbook of the Chinese Investment in Fixed Assets”. We collected aggregate data by ownership at the provincial level. However, data were not available for 2014 because the 2014 “Statistical Yearbook of the Chinese Investment in Fixed Assets” has not been published. Thus, we used the 2013 data supplemented by the “China Statistical Yearbook”. Fixed asset investment was converted into real terms using the provincial fixed asset investment price index, with 2000 as the base year.

3.3.Financial market development

For variables representing the development status of China’s financial markets, we collected statistical data from the “Almanac of China's Finance and Banking”, the “Statistical Yearbook of the Chinese Investment in Fixed Assets”, the “China Industry Statistical Yearbook”, and the “China Statistical Yearbook”.

Three sets of variables are used in this paper to represent imperfections in financial markets. First, the main economic indicators of industrial enterprises are recorded in the "China Industry Statistical Yearbook", including interest expenditure, which indicates interest payments for loan funds. If this variable is large, we consider that dependence on external funds is high. To control for the scale of production in considering ease of access to the financial market, we use interest expenditure/sales for the estimation. In addition, the "China Industry Statistical Yearbook" has a statistical table for each type of company ownership, separated according to the state-, collective-, and private-owned sectors, and total ownership.

Next, the "Statistical Yearbook of the Chinese Investment in Fixed Assets" has data on the financing sources of capital investment funds. In this paper, we use self-procured funds/total investment funds and self-funds/total investment funds for the estimation. If the proportion of self-raised funds and self-funded investments is large, it indicates that firms find it more difficult to access financial markets. Therefore, internal funds or funds raised through routes other than financial markets are more important for capital investment.

In addition, some major economic and financial statistics for provinces recorded in the "Almanac of China's Finance and Banking" show the development status of financial markets in the region. For our research, we extracted the deposit balances and loan amounts of all financial institutions to develop an index of financial market maturity. In addition, to control for the production scale, the variables are divided by the provincial GDP. Thus, we use the deposit balance of financial institutions/GDP and loan amount of financial institutions/GDP in the estimation exercise.

3.4.Other control variables

To capture the influence of factors other than the financial indicators on wage determination and fixed capital investment, we add three further control variables in this exercise: the total profit/sales value of industry (profit), the natural logarithm of real fixed assets/the number of enterprise units (fixed assets), and the total liabilities/total assets (liabilities). All data were collected from the "China Industry Statistical Yearbook". Table 1 reports the selected descriptive statistics.

4. Estimation models

4.1.Fixed effects model (level and first-differenced)

We estimate two fixed effects regression models, one based on level variables and the other on growth variables, using the first difference of the natural logarithm, respectively, as follows:

$$Y_{i,t} = \alpha + \beta F_{i,t} + \boldsymbol{\gamma}' \boldsymbol{X}_{i,t} + Year_t + \eta_i + \varepsilon_{i,t}. \quad (1)$$

$$\Delta Y_{i,t} = \alpha + \gamma \Delta F_{i,t} + \boldsymbol{\gamma}' \boldsymbol{\Delta X}_{i,t} + Year_t + \eta_i + \varepsilon_{i,t}. \quad (2)$$

Subscript i indicates the province and t is the time index. $Year_t$ is a year dummy that controls time fixed effects, η_i is province-specific effects, and $\varepsilon_{i,t}$ is an idiosyncratic error term. The growth of variables (the first difference of the natural logarithm) is represented by Δ.

$Y_{i,t}$ is the natural logarithm of the real wage or real fixed asset investment at the provincial level and $F_{i,t}$ are financial indicators. We collected five indicators: interest expense/sales value of industry (interest), self-raised funds/total of sources of funds (self-raised), own funds/total of sources of funds (own funds), total deposits/GDP (deposits), and total loans/GDP (loans). $\boldsymbol{X}_{i,t}$ are control variables, as discussed above.

4.2.Generalized method of moments estimation (dynamic panel data)

Next, a dynamic panel is introduced to consider the dynamic environment. We adopt a generalized method of moments (GMM) estimation, which has been applied widely in recent years, especially in the literature evaluating the impact of financial development on economic growth. As the lagged dependent variable is correlated with the fixed effects in the error term, inconsistent estimators may be produced: a problem known as "dynamic panel bias" (Nickell, 1981). Further, financial indicators and control variables may be correlated with idiosyncratic error terms, resulting in an endogeneity problem. To address these issues, the GMM panel estimators use lagged observations of the explanatory variables as instruments (internal instruments). Therefore, we can reliably investigate the impact of the exogenous component of financial development on wage or fixed capital investment growth in China.

4.2.1. The first-differenced GMM estimators

Consider the following regression equation:

$$Y_{i,t} = \alpha + \rho Y_{i,t-1} + \beta F_{i,t} + \boldsymbol{\gamma}' \boldsymbol{X}_{i,t} + Year_t + \eta_i + \varepsilon_{i,t}. \quad (3)$$

As η_i is correlated with the lagged dependent variable $Y_{i,t-1}$, the within-group estimators are inconsistent, even if $\varepsilon_{i,t}$ is not serially correlated. Taking the first difference of Eq. (3), we obtain:

$$Y_{i,t} - Y_{i,t-1} = \rho\left(Y_{i,t-1} - Y_{i,t-2}\right) + \beta\left(F_{i,t} - F_{i,t-1}\right) + \boldsymbol{\gamma}'\left(\boldsymbol{X}_{i,t} - \boldsymbol{X}_{i,t-1}\right) + (Year_t - Year_{t-1}) + \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right). \quad (4)$$

According to Eq. (4), there are two kinds of endogenous issues that need to be instrumented: first, the endogeneity of the regressors (the financial indicators and control variables), and second,

the correlation between $\varepsilon_{i,t} - \varepsilon_{i,t-1}$ and $Y_{i,t-1} - Y_{i,t-2}$ in Eq. (4).

For the first-differenced GMM estimators, the following moment conditions are introduced:

$$\begin{aligned} &E\left[Y_{i,t-s}\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0, \text{ for } s \geq 2;\ t = 3, \ldots, T, \\ &E\left[F_{i,t-s}\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0, \text{ for } s \geq 2;\ t = 3, \ldots, T, \\ &E\left[\boldsymbol{X}_{i,t-s}\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0, \text{ for } s \geq 2;\ t = 3, \ldots, T. \end{aligned} \tag{5}$$

Therefore, the twice and further lagged explanatory variables are used as the instrumental variables.

4.2.2. The system GMM estimators

As Alonso-Borrego and Arellano (1996) and Blundell and Bond (1998) mentioned, the instruments available for the first difference equation are weak instruments when the explanatory variables are close to a random walk, because past levels convey little information about future changes. Weak instruments can result in serious finite sample biases. To solve the potential bias of the first-differenced GMM estimators, Arellano and Bover (1995) and Blundell and Bond (1998) introduced a system involving an equation expressed in levels combined with an equation in differences. The idea is that the past changes may indeed be more predictive of current levels than past levels are of current changes for random walk-like variables, so that the new instruments are more relevant. By estimating these two equations simultaneously, we obtain the so-called system GMM estimators. The moment conditions for the equation expressed in levels are as follows:

$$\begin{aligned} &E\left[\left(Y_{i,t-s} - Y_{i,t-s-1}\right)\left(\eta_i - \varepsilon_{i,t}\right)\right] = 0, \text{ for } s = 1;\ t = 3, \ldots, T, \\ &E\left[\left(F_{i,t-s} - F_{i,t-s-1}\right)\left(\eta_i - \varepsilon_{i,t}\right)\right] = 0, \text{ for } s = 1;\ t = 3, \ldots, T, \\ &E\left[\left(\boldsymbol{X}_{i,t-s} - \boldsymbol{X}_{i,t-s-1}\right)\left(\eta_i - \varepsilon_{i,t}\right)\right] = 0, \text{ for } s = 1;\ t = 3, \ldots, T, \end{aligned} \tag{6}$$

which confirm the additional assumption that the first differences of the independent variables are uncorrelated with the province-specific effects η_i. Therefore, the first lagged differences of $Y_{i,t-s}$, $F_{i,t-s}$, and $\boldsymbol{X}_{i,t-s}$ are used as additional instruments.

4.2.3. Techniques for reducing the issue of ‘‘too many instruments’’

When adopting the GMM estimation, the problem of “too many instruments” arises. The number of instruments grows easily when there is an increase in the time period T or in the explanatory variables. As noted by Roodman (2009), Windmeijer (2005), and Arellano (2002), among others, a large instrument collection that overfits endogenous variables may lead to biased estimators, even as it weakens the Hansen test of the instruments’ joint validity. To avoid this issue

of too many instruments, we follow the techniques applied by Roodman (2009). First, we limit the lags for instruments to only one or two, instead of all available lags, so the instrument count is linear in T. Second, we collapse instruments into smaller sets. We follow the suggestion of Roodman (2009) in using both approaches to reduce the instrument count[1].

5. Estimated result

Below, we report the results of the estimation. We first discuss the effects of financial development on wage determination, then verify the impact of financial circumstances on fixed capital investment. Finally, we investigate the interrelationship between wage determination and fixed asset investment in the imperfect financial market.

5.1.The effects of financial development on wage determination

Table 2-1 reports the fixed effect estimation results[2]. Interest indicates the interest expense/sales value of industry, with a higher value indicating that more interest must be paid. In China, the financial institutions treat state-sector and nonstate-sector enterprises differently. In particular, financial institutions lend funds to the state sector more actively and cheaply, which means that the state sector pays more interest to the commercial banks than do the nonstate sector institutions, which take out fewer bank loans. Therefore, we expect that the coefficient on interest will be positive in the state sector, whereas in the nonstate sector, it will be insignificant or negative. The results in Table 2-1 regarding the state sector confirm our prediction, as the coefficient of Δ interest is estimated to be significant and positive, meaning that easier access to financial markets has a positive impact on wage payments. Table 2-2 reports the GMM estimation results[3]. We find the same result: the first-differenced GMM, interest is positive and significant only for the state sector.

After it formally entered the World Trade Organization in 2001, China accelerated the reform of its financial markets, including undertaking more interest rate liberalization, removing restrictions on ownership takeovers, and offering greater freedom to foreign banks. The Chinese government pledged to remove banking regulations by 2006 (Zhang et al., 2012). Thus, by separately examining the data from 2007 onwards, we test the effect of financial development on wage determination in a relatively competitive financial market. Table 2-3 reports the GMM estimation results. As the table shows, our estimates for deposits and loans were significant and positive in the system GMM

[1] Previous papers that adopted this technique include Levine et al. (2000), Giedeman and Compton (2009), Demir and Dahi (2009), and Zhang et al. (2012).
[2] To save space, we report only the main estimated results of the parameters of interest.
[3] We limit our estimation to three lags for every explanatory variable and use the "collapse technique" to avoiding the too many instruments problem when conducting the GMM exercise in this paper.

estimation, indicating that the state sector has been favored by the financial markets following the liberalization from 2007 onwards. The evidence reveals that the state sector enjoys better access to financial markets and that, as a result, it can pay higher wages to employees. In contrast, the nonstate-owned sectors that are discriminated against in financial markets find it difficult to obtain finance and this has a negative impact on employee wage payments.

5.2.The impact of financial circumstances on fixed capital investment

Table 3-1 reports the estimation results from the fixed effects model regarding the impact of interest expenses on fixed asset investments. We find that in the state sector, the estimated coefficient of interest expenses is 9.431 for the level model. The coefficient is estimated to be significantly negative in the "other ownership" and private sectors, and its magnitude is two times larger in absolute value than the coefficient in the state sector[4]. Table 3-2 shows the estimation results of the fixed effects model for the impact of self-raised funds on fixed asset investments. The results show that only the state sector loses significance in the level estimation. The total province, urban areas, collective enterprises, the "other ownership" sector, and private enterprises all have significantly positive estimates.

Next, we discuss the GMM estimation results, which—given the endogeneity issues noted above—provide a more appropriate estimation. Table 3-3 reports the estimation results of the GMM estimation for the impact of interest expenses on fixed asset investments. Almost all the estimators lose their significance compared with the results of the fixed effects model. However, in the private sector, the interest expense is significantly negative in the first-differenced GMM and is estimated at –26.288, greater than in the fixed effects model. Table 3-4 shows the GMM estimation results for the impact of self-raised funds on fixed asset investments. With the exception of the collective-owned sector, the GMM estimation confirms that the results are significant and positive for the total province, urban areas, the "other ownership" sector, and private enterprises. In the state sector, we even find that the coefficient of self-raised funds is significantly negative in the first-differenced GMM estimation.

The estimation results in this subsection indicate that China's financial market is imperfect and that the imperfections result in two differences between the state and nonstate sectors in terms of their fixed asset investment behavior. Interest expenses affect investment positively in the state

[4] The "Statistical Yearbook of the Chinese Investment in Fixed Assets" provides a more detailed classification of ownership status for the registration of fixed assets. For example, it separates investments according to state ownership, collective ownership, cooperatives, joint ownership, limited shareholding liability, private ownership, and other categories. Therefore, in the fixed capital investment regression exercise, we can directly estimate the private owned firms' investments. However, we do not have interest expense information for private firms, and thus we merge the interest expenses of the firms in the "other ownership" sector to conduct this regression for the private-owned units.

sector and negatively in the nonstate sector, indicating that not only does the nonstate sector find it difficult to obtain finance from the banking sector, but also that its rental cost is higher than that of the state sector. Instead of bank loans, self-raised funds are the critical source of investment finance for the nonstate sector. This result reconfirms the importance of internal reserves for the nonstate sector in China, in line with the results of the existing research, based on both macro and micro evidence.

5.3.The interrelationship between wage determination and fixed asset investment

In this subsection, we investigate the interrelationship between wage determination and fixed asset investment in the imperfect Chinese financial market. In perfectly competitive factor markets, entrepreneurs optimally choose their levels of fixed capital and labor, taking the factor prices as given. As mentioned above, many previous studies have pointed out the existence of imperfections in the capital and labor markets in China. One of the characteristics of the financial market imperfections is that although the state-owned sector has easy access to cheap loans, the nonstate-owned sector is treated differently, such that obtaining finance is difficult and lending costs are high. In addition, China's labor market is far from completely competitive and the existing literature strongly indicates that underpayment of wages occurs, particularly in the private sector. In part, this underpayment of wages can be attributed to the poor bargaining power of employees in the imperfect labor market and the lack of protection for the basic rights of workers. However, a key question is whether there are any other factors explaining the underpayment of wages. Although private companies cannot obtain sufficient loans in an imperfect financial market, capital investment remains indispensable for continuing in business. If the labor market is imperfect, private entrepreneurs may reduce wages so that they can generate more internal funds for capital investment. Thus, in China, the state-owned sector enjoys easy access to financial loans in the financial market and is not under pressure to generate internal funds by reducing employee wage levels for business expansion. Conversely, the nonstate-owned sector is discriminated against in the financial market and finds it difficult to obtain finance. Thus, it has a motivation to keep wages lower to generate capital investment for business survival.

In line with these ideas, we estimate a new model, adding a wage fluctuation—based on the previous wage growth—into the fixed capital investment equation. The state-owned enterprises are not confronted with capital investment financing constraints, and wage growth is considered to have a positive correlation with capital investment growth. However, in the nonstate-owned sector, the growth rate of wages is considered to be irrelevant to the growth of capital investment, because enterprises restrain the level of wages when they face borrowing constraints. Furthermore, if the degree of borrowing restrictions is very strong, wages will be reduced even further to enable firms to survive, and a negative correlation between wage growth rate and capital investment growth may be

observed.

Table 4-1 shows the results of the fixed effects model for the fixed asset investment equation, including interest expenses and previous wage growth. The wage growth in the state sector is significant and positive when estimated using both the level and growth variables. However, we do not find this result for the collective, "other ownership", and private sectors[5]. Interest expenses remain significant and positive in the state sector and significantly negative in the "other ownership" sector, even after controlling for previous wage growth. Further, the size of the estimated coefficients is almost the same.

Next, we substitute interest expenses with self-raised funds as our financial indicator (Table 4-2). In this fixed effects model, the coefficient of previous wage growth is significantly positive in the state sector, but not in the collective, "other ownership", and private sectors. On the other hand, self-raised funds are an aspect that is significant and positively affects the capital investment only in the nonstate sector. This confirms the hypothesis that the differences in access to financial markets lead to different wage and fixed capital investment decisions in the state and nonstate sectors.

We also examine the results of the GMM estimation considering the dynamic environment. In the interest expense case (Table 4-3), previous wage growth is significantly positive in the system GMM for the state sector, but significantly negative in the first-differenced GMM for the "other ownership" sector. Interest expense is only significant for the "other ownership" sector, where the estimated coefficient is negative and quite high. In the case of self-raised funds (Table 4-4), previous wage growth is still significantly positive in the system GMM for the state sector, but there is no significant effect in the collective, "other ownership", and private sectors. Further, the aspect of self-raised funds is estimated as significantly positive in the "other ownership" and private sectors in the system GMM. Finally, Table 4-5 presents the results with deposits used as the financial indicator. Again, in the state sector, the previous wage growth is significant and positive in the system GMM estimation. In the collective-owned and private sectors, the coefficients of previous wage growth were significant and negative.

6. Conclusion

In this paper, we examine how wage decisions and fixed asset investments are determined under the imperfect financial market in China. Further, we investigate the interrelationship between wage determination and fixed asset investments in such circumstances.

Although the rise in financial market maturity has led to rising wage levels for state-owned

[5] As average data for private units are available from 2009 onwards, we substitute the other sector average data for private wage data and run the regression again for the interval 2009–2015 as a robustness check. The estimated parameters on previous wage growth are consistent with the former regression. These results are available upon request.

enterprises, this phenomenon is not observed in the nonstate sector. In the nonstate sector, there is a strong reliance on internal reserves for capital investment that is not observed in the state-owned sector, suggesting that the two sectors are treated differently in the financial market. In the state-owned sector, previous wage growth is positively correlated with fixed assets investments, whereas this relationship is not observed in the nonstate-owned sector. This implies that the underpayment of wages may be used as a survival strategy in the nonstate-owned sector by businesses under financial constraints.

The results of this study have important policy implications. Labor market reform is indispensable for protecting the basic rights of employees and ensuring wages rise to an appropriate level. However, further improvement of the financial market is also essential. There is an urgent need to reduce funding costs, especially by promoting loans to the private sector, which would allow entrepreneurs to pay adequate wages to their employees. The construction and deepening of complete financial and labor markets are indispensable factors for ensuring the efficient growth of the Chinese economy.

There are several tasks required in future research. In this paper, we used aggregate provincial data. In future, an investigation based on micro-level data, especially firm-level data, is important. In addition, it would be interesting to examine our hypothesis using industry-level data, to determine whether there are different reactions between capital- and labor-intensive industries. Finally, we require a suitable theoretical framework to explain the optimal entrepreneurial behavior in imperfect financial markets and capture the interrelationship between wage determination and fixed asset investments.

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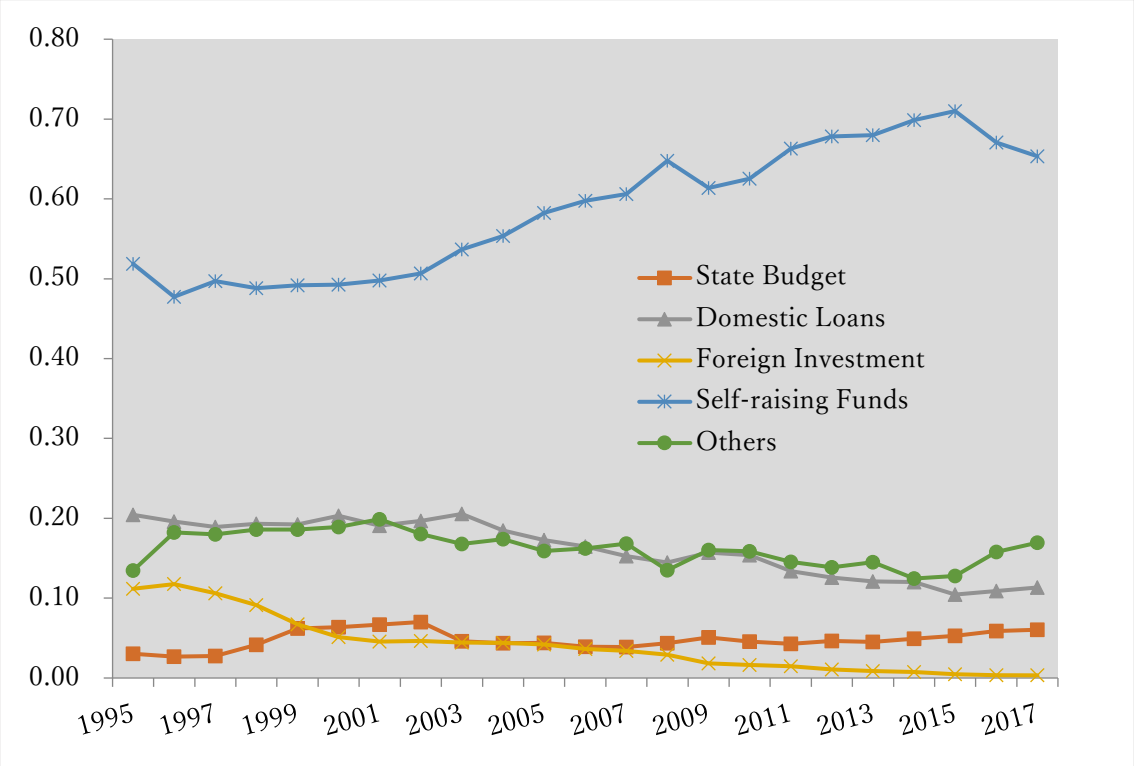

Figure 1. Sources of funds for investment in fixed assets in China. The data indicate the share of each source as a proportion of total funds. Source: China Statistical Yearbooks.

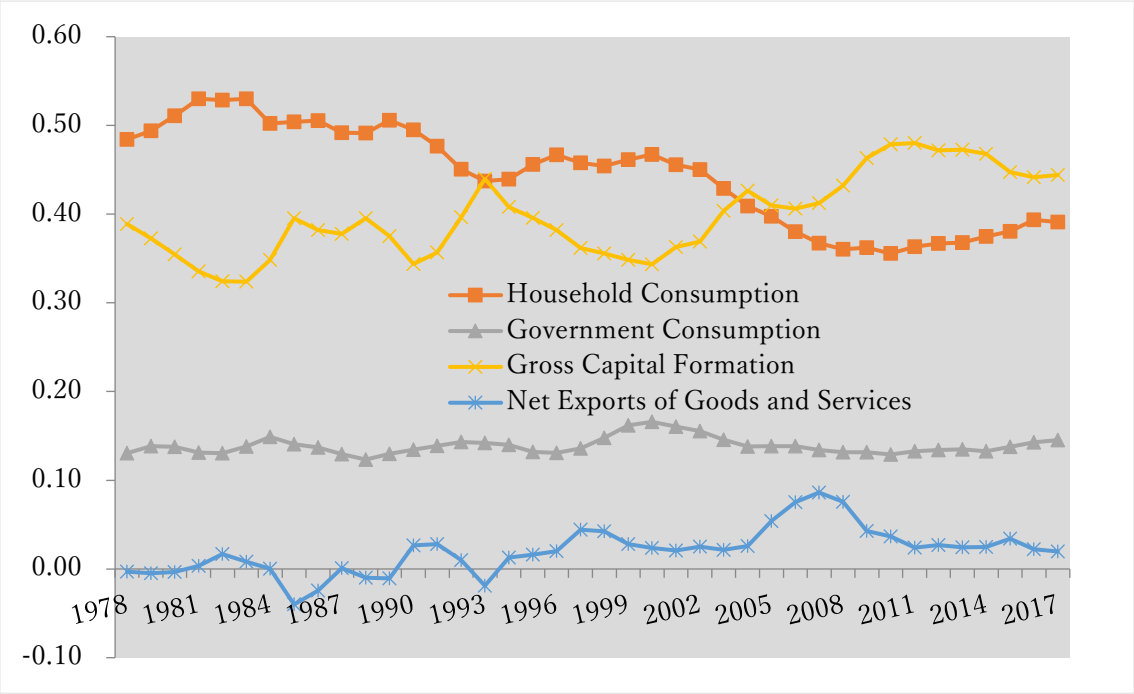

Figure 2. GDP using the expenditure approach. Data indicate the share of each element in GDP. Source: China Statistical Yearbooks.

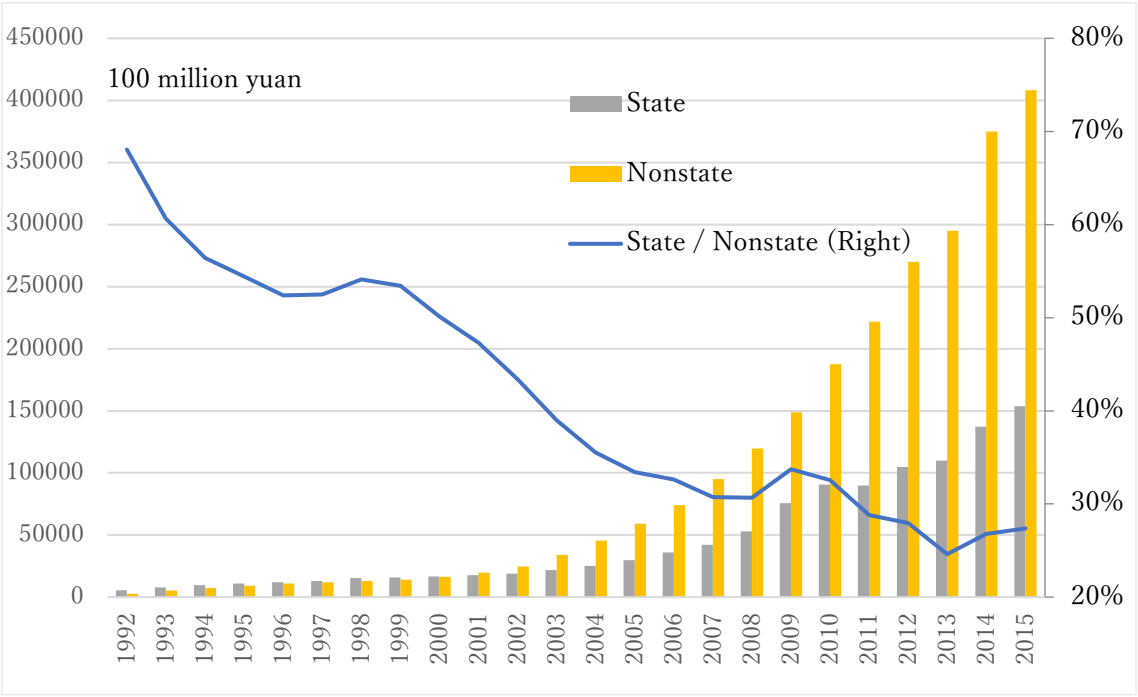

Figure 3. Fixed capital investment by state and nonstate sectors. Source: Statistical Yearbook of the Chinese Investment in Fixed Assets. The 2013 data is collected from the China Statistical Yearbook (2014), in which the coverage of ownership is different from the Statistical Yearbook of the Chinese Investment in Fixed Assets.

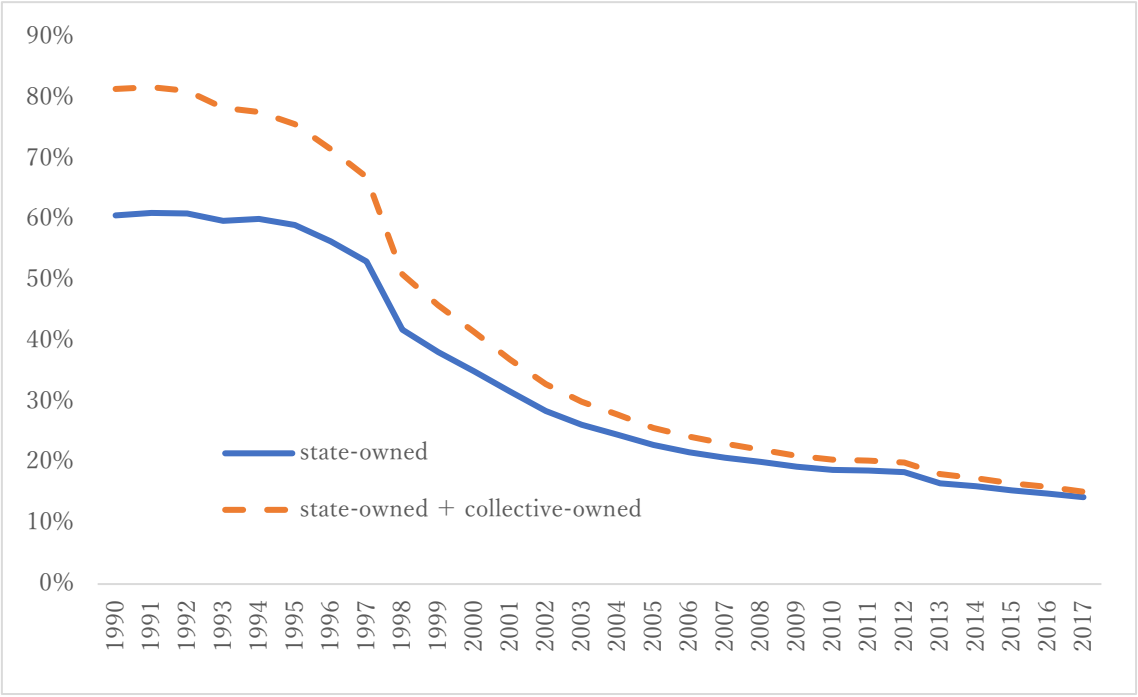

Figure 4. Employment share by ownership in urban units. Source: China Statistical Yearbooks.

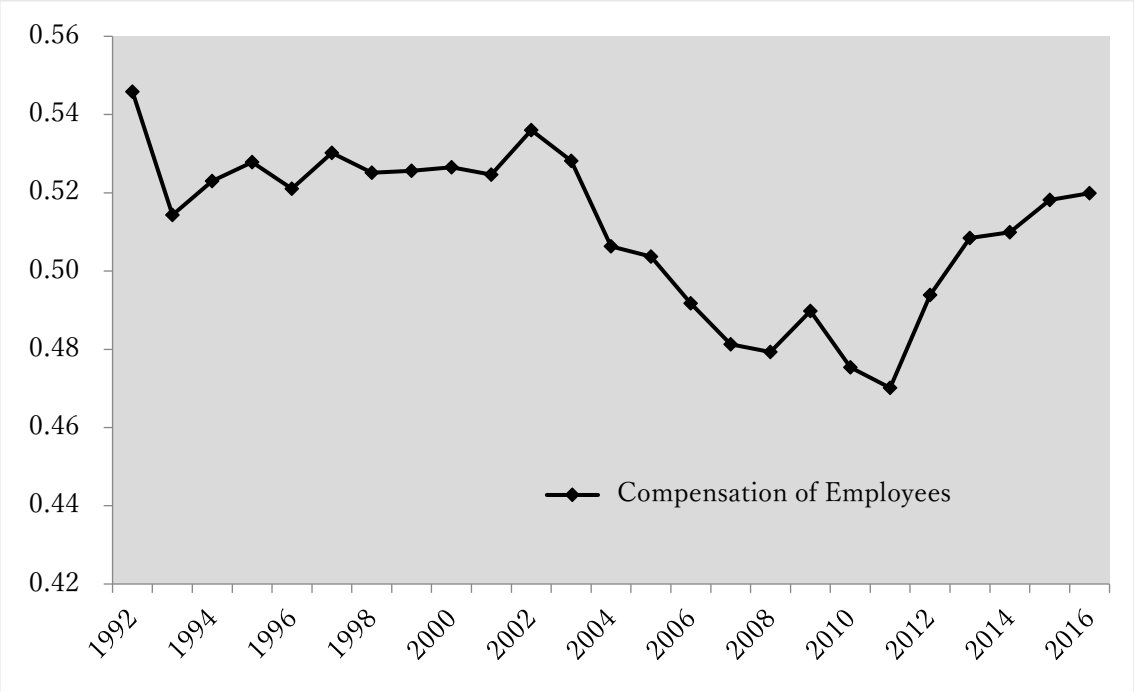

Figure 5. Compensation of employees as a proportion of GDP. Sources: China Statistical Yearbooks.

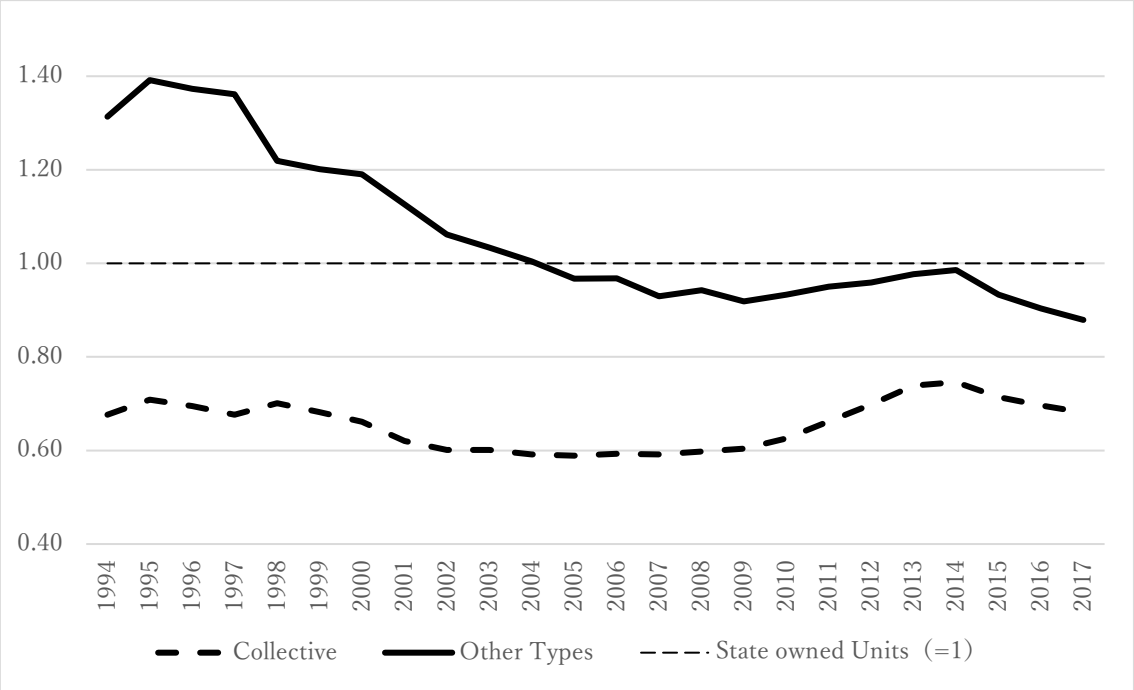

Figure 6. Average real wage of employed persons in urban units. The real wage is obtained by deflating the nominal wage by the consumer price index, using 1994 as the base year. Source: China Labor Statistics Yearbooks.

Table 1. Descriptive statistics (2005–2015)

	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
	Total					State-owned Units				
Log real fixed asset investment	341	3.781	1.039	0.486	5.811	341	2.672	0.810	0.260	4.208
Interest expense/sales value of industry	341	0.015	0.008	0.004	0.047	341	0.021	0.012	0.000	0.096
Log real wage	341	5.639	0.383	4.842	6.713	341	5.722	0.408	4.884	6.764
Previous wage growth	341	0.098	0.040	–0.079	0.352	341	0.099	0.045	–0.032	0.361
Total profit/sales value of industry (Profit)	341	0.075	0.036	–0.013	0.237	341	0.072	0.052	–0.186	0.291
Log (real fixed assets/number of enterprise units) (Fixed Assets)	341	–5.025	0.649	–6.458	–3.244	341	–3.242	0.538	–5.756	–2.011
Total liabilities/total assets (Liabilities)	341	0.577	0.070	0.229	0.760	341	0.597	0.088	0.182	0.765
	Collective–owned Units					Other Ownership Units				
Log real fixed asset investment	341	0.062	1.593	–4.458	3.128	341	3.309	1.215	–0.042	5.593
Interest expense/sales value of industry	322	0.006	0.004	0.001	0.036	340	0.009	0.005	–0.017	0.028
Log real wage	341	5.283	0.445	4.309	6.177	341	5.568	0.393	4.725	6.713
Previous wage growth	341	0.118	0.072	–0.173	0.519	341	0.100	0.101	–1.176	1.074
Total profit/sales value of industry (Profit)	334	0.061	0.045	–0.241	0.229	341	0.070	0.057	0.004	0.482
Log (real fixed assets/number of enterprise units) (Fixed Assets)	275	–6.875	0.642	–8.374	–4.494	341	–6.468	0.605	–7.584	–4.628
Total liabilities/total assets (Liabilities)	337	0.580	0.148	0.235	1.411	341	0.546	0.096	0.122	0.784
Financial market development status indicators										
Self-raised funds/total of sources of funds (Self-raised)	341	0.598	0.142	0.183	0.876					
Total deposits/GDP (Deposits)	341	1.632	0.712	0.822	5.587					
Total loans/GDP (Loans)	341	1.122	0.398	0.553	2.648					

Table 2-1 The effects of financial development on wage determination (Fixed-effect estimation): Interest payment.

	Wage	Δ	State	Δ	Collective	Δ	Other	Δ
Interest	−1.987		1.146		−6.346		−3.714	
	(1.811)		(1.177)		(4.346)		(2.516)	
ΔInterest		3.572		3.017*		−2.279		0.054
		(2.814)		(1.581)		(2.253)		(1.833)
Constant	4.673***	0.124***	5.125***	0.118***	4.511***	0.128***	5.056***	0.126***
	(0.202)	(0.005)	(0.178)	(0.008)	(0.311)	(0.008)	(0.263)	(0.009)
Observations	341	310	341	310	264	203	340	308
R−squared	0.974	0.292	0.965	0.403	0.943	0.149	0.967	0.190
Number of provinces	31	31	31	31	31	31	31	31

The fixed effect estimation includes year dummies. Only the main estimated results of the parameters of interest are reported. Wage indicates the total log average real wage. State, collective, and other in the column headings indicate the real average wages of state-owned units, collective-owned units, and other ownership units, respectively. The symbol Δ indicates the first log difference. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 2-2 The effects of financial development on wage determination (GMM estimation): Interest payment.

	Wage		State		Collective		Other	
	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS
Previous term	0.986***	1.049***	0.900***	1.050***	0.683**	0.898***	0.816***	0.879***
	(0.138)	(0.082)	(0.234)	(0.059)	(0.250)	(0.150)	(0.194)	(0.132)
Interest	9.181	–0.920	6.526*	2.549	–1.727	–3.578	5.047	2.754
	(9.131)	(3.182)	(3.640)	(2.289)	(3.567)	(4.464)	(3.892)	(2.986)
Constant		0.000		–0.412		0.563		0.396
		(0.000)		(0.427)		(0.817)		(0.683)
Observations	279	310	279	310	173	234	277	309
Number of provinces	31	31	31	31	31	31	31	31
Instruments	24	30	24	30	21	28	24	30
ar1p	0.015	0.134	0.003	0.057	0.034	0.002	0.028	0.007
ar2p	0.679	0.123	0.327	0.289	0.997	0.720	0.339	0.386
hansenp	0.141	0.177	0.128	0.179	0.046	0.521	0.274	0.308
A (p–value)		0.212		0.099		0.657		0.274
B (p–value)		0.299		0.320		0.869		0.273

DIF and SYS denote the first-differenced GMM and the system GMM, respectively. There is a limit of three lags for every explanatory variable and we use a collapse technique to avoid the “too many instruments” problem. Only the main estimated results of the parameters of interest are reported. Ar1p and ar2p are the p-values of a test for first and second-order serial correlation. Hansenp is the p-value for Hansen’s overidentification restrictions test. In the last two rows, A (p-value) and B (p-value) represent the p-values of the difference-in-Hansen test for system GMM instruments and a difference-in-Hansen test for instruments based on lagged growth, respectively. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 2-3 The effects of financial development on wage determination after 2007 (GMM estimation): Deposits and loans.

	Wage		State		Collective		Other		Wage		State		Collective		Other	
	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS
Previous term	1.063***	0.863***	0.725***	0.873***	0.303	0.660***	0.886***	0.873***	0.978***	0.890***	0.766***	0.892***	0.276	0.694***	0.751***	0.913***
	(0.224)	(0.056)	(0.107)	(0.069)	(0.340)	(0.183)	(0.152)	(0.106)	(0.191)	(0.081)	(0.098)	(0.104)	(0.310)	(0.169)	(0.208)	(0.074)
Deposits	–0.025	0.067	–0.047	0.059*	–0.193	–0.004	0.014	–0.020								
	(0.064)	(0.043)	(0.054)	(0.032)	(0.150)	(0.034)	(0.027)	(0.022)								
Loans									0.056	0.131*	0.033	0.100***	–0.421**	0.013	–0.237***	–0.041**
									(0.140)	(0.071)	(0.112)	(0.032)	(0.182)	(0.070)	(0.059)	(0.019)
Constant		0.000		0.000		1.900*		0.422		0.190		0.732		1.751*		0.304
		(0.000)		(0.000)		(0.950)		(0.307)		(0.693)		(0.564)		(0.891)		(0.281)
Observations	217	248	217	248	120	181	217	248	217	248	217	248	120	181	217	248
Number of provinces	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Instruments	22	28	22	28	19	26	22	28	22	28	22	28	19	26	22	28
ar1p	0.105	0.023	0.028	0.006	0.036	0.006	0.004	0.043	0.085	0.052	0.022	0.020	0.088	0.007	0.246	0.033
ar2p	0.622	0.328	0.200	0.164	0.585	0.910	0.031	0.703	0.503	0.395	0.155	0.099	0.715	0.905	0.048	0.304
hansenp	0.490	0.172	0.327	0.402	0.384	0.277	0.073	0.311	0.477	0.395	0.270	0.484	0.342	0.318	0.067	0.414
A (p–value)		0.426		0.513		0.319		0.465		0.538		0.665		0.309		0.594
B (p–value)		0.121		0.698		0.095		0.942		0.344		0.680		0.154		0.942

DIF and SYS denote the first-differenced GMM and the system GMM, respectively. There is a limit of three lags for every explanatory variable and we use a collapse technique to avoid the “too many instruments” problem. Only the main estimated results of the parameters of interest are reported. Ar1p and ar2p are the p-values of a test for first and second-order serial correlation. Hansenp is the p-value for Hansen’s overidentification restrictions test. In the last two rows, A (p-value) and B (p-value) represent the p-values of the difference-in-Hansen test for system GMM instruments and a difference-in-Hansen test for instruments based on lagged growth, respectively. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 3-1 The impact of financial circumstances on fixed capital investment (Fixed-effect estimation): Interest payment.

	Investment	Δ	Urban	Δ	State	Δ	Collective	Δ	Other	Δ	Private	Δ
Interest	5.331		9.102		9.431**		−12.468		−18.287**		−20.470*	
	(7.045)		(6.432)		(3.920)		(20.123)		(8.510)		(10.451)	
Δinterest		−0.682		1.144		0.009		2.809		−14.447*		−2.677
		(2.351)		(2.777)		(1.220)		(8.916)		(7.140)		(3.008)
Constant	2.175***	0.204***	2.037***	0.208***	1.914***	0.164***	1.366	−0.887***	2.584***	0.265***	2.899***	0.440***
	(0.548)	(0.013)	(0.557)	(0.014)	(0.445)	(0.022)	(0.807)	(0.093)	(0.691)	(0.039)	(0.827)	(0.050)
Observations	341	310	341	310	341	310	264	203	340	308	340	308
R−squared	0.938	0.443	0.947	0.293	0.891	0.474	0.505	0.648	0.916	0.569	0.927	0.351
Number of provinces	31	31	31	31	31	31	31	31	31	31	31	31

The fixed effect estimation includes year dummies. Only the main estimated results of the parameters of interest are reported. Investment is the total investment by all ownership types in the urban and rural areas of the province. Urban represents the total investment by all ownership types in the urban areas of the province. State, collective, other, and private indicate the real fixed capital investment of state-owned units, collective-owned units, other ownership units, and private-owned units, respectively. The symbol Δ denotes the first log difference. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 3-2 The impact of financial circumstances on fixed capital investment (Fixed-effect estimation): Self-raised.

	Investment	Δ	Urban	Δ	State	Δ	Collective	Δ	Other	Δ	Private	Δ
Self–raised	1.227**		1.360**		0.573		3.657***		1.473***		2.096**	
	(0.587)		(0.596)		(0.724)		(1.284)		(0.524)		(0.876)	
ΔSelf–raised		0.230		0.343		–0.178		0.494		0.658*		0.878***
		(0.217)		(0.291)		(0.260)		(1.128)		(0.385)		(0.260)
Constant	1.810***	0.202***	1.685***	0.204***	1.849***	0.167***	–0.679	–0.887***	1.735***	0.299***	2.128***	0.435***
	(0.464)	(0.012)	(0.461)	(0.014)	(0.522)	(0.022)	(0.854)	(0.094)	(0.263)	(0.043)	(0.747)	(0.049)
Observations	341	310	341	310	341	310	273	212	310	310	341	310
R–squared	0.943	0.449	0.952	0.309	0.885	0.475	0.554	0.608	0.907	0.559	0.932	0.374
Number of provinces	31	31	31	31	31	31	31	31	31	31	31	31

The fixed effect estimation includes year dummies. Only the main estimated results of the parameters of interest are reported. Wage indicates the total log average real wage. State, collective, and other in the column headings indicate the real average wages of state-owned units, collective-owned units, and other ownership units, respectively. The symbol Δ indicates the first log difference. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 3-3 The impact of financial circumstances on fixed capital investment (GMM estimation): Interest payment.

	Investment		Urban		State		Collective		Other		Private	
	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS
Previous term	1.054***	1.049***	1.100***	1.119***	1.089***	1.023***	0.116	1.040***	0.285	0.995***	0.542**	1.010***
	(0.109)	(0.109)	(0.138)	(0.121)	(0.104)	(0.046)	(0.165)	(0.151)	(0.482)	(0.111)	(0.229)	(0.031)
Interest	–3.702	–10.239	–4.732	–6.834	–0.534	3.010	0.440	1.113	–9.114	–17.100	–26.288**	–24.362
	(7.299)	(6.408)	(8.384)	(6.644)	(4.354)	(2.238)	(16.278)	(30.472)	(14.660)	(14.450)	(12.092)	(18.024)
Constant		0.000		0.542		0.323		0.000		–0.807		0.639
		(0.000)		(0.443)		(0.303)		(0.000)		(0.583)		(0.729)
Observations	279	310	279	310	279	310	173	234	277	309	277	309
Number of provinces	31	31	31	31	31	31	31	31	31	31	31	31
Instruments	24	30	24	30	24	30	21	28	24	30	24	30
ar1p	0.016	0.015	0.007	0.005	0.004	0.001	0.282	0.027	0.012	0.137	0.071	0.001
ar2p	0.946	0.890	0.599	0.732	0.404	0.514	0.939	0.828	0.060	0.171	0.432	0.822
hansenp	0.114	0.093	0.184	0.106	0.553	0.389	0.316	0.105	0.081	0.243	0.227	0.086
A (p–value)		0.387		0.349		0.652		0.291		0.404		0.786
B (p–value)		0.234		0.163		0.231		0.096		0.467		0.270

DIF and SYS denote the first-differenced GMM and the system GMM, respectively. There is a limit of three lags for every explanatory variable and we use a collapse technique to avoid the “too many instruments” problem. Only the main estimated results of the parameters of interest are reported. Ar1p and ar2p are the p-values of a test for first and second-order serial correlation. Hansenp is the p-value for Hansen’s overidentification restrictions test. In the last two rows, A (p-value) and B (p-value) represent the p-values of the difference-in-Hansen test for system GMM instruments and a difference-in-Hansen test for instruments based on lagged growth, respectively. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 3-4 The impact of financial circumstances on fixed capital investment (GMM estimation): Self-raised.

	Investment		Urban		State		Collective		Other		Private	
	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS
Previous term	0.949***	0.967***	0.948***	1.007***	1.063***	0.904***	0.350	1.044***	0.306	0.846***	0.800***	0.919***
	(0.078)	(0.050)	(0.087)	(0.058)	(0.103)	(0.076)	(0.254)	(0.088)	(0.210)	(0.105)	(0.177)	(0.131)
Self–raised	0.772*	0.395***	0.546	0.332**	−1.437*	0.048	1.126	0.204	1.167	0.583*	2.921**	0.751
	(0.454)	(0.119)	(0.469)	(0.131)	(0.831)	(0.231)	(2.333)	(0.502)	(0.913)	(0.296)	(1.417)	(0.645)
Constant		0.117		0.240		0.469*		0.000		–0.414		0.000
		(0.167)		(0.259)		(0.241)		(0.000)		(0.818)		(0.000)
Observations	310	341	310	341	310	341	212	273	310	341	310	341
Number of provinces	31	31	31	31	31	31	31	31	31	31	31	31
Instruments	25	31	25	31	25	31	22	29	25	31	25	31
ar1p	0.016	0.009	0.006	0.003	0.000	0.001	0.312	0.007	0.052	0.106	0.019	0.000
ar2p	0.746	0.978	0.347	0.535	0.671	0.521	0.998	0.597	0.098	0.141	0.437	0.160
hansenp	0.064	0.077	0.084	0.041	0.143	0.044	0.105	0.256	0.025	0.049	0.095	0.128
A (p–value)		0.289		0.115		0.490		0.385		0.083		0.235
B (p–value)		0.445		0.197		0.160		0.854		0.818		0.281

DIF and SYS denote the first-differenced GMM and the system GMM, respectively. There is a limit of three lags for every explanatory variable and we use a collapse technique to avoid the “too many instruments” problem. Only the main estimated results of the parameters of interest are reported. Ar1p and ar2p are the p-values of a test for first and second-order serial correlation. Hansenp is the p-value for Hansen’s overidentification restrictions test. In the last two rows, A (p-value) and B (p-value) represent the p-values of the difference-in-Hansen test for system GMM instruments and a difference-in-Hansen test for instruments based on lagged growth, respectively. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 4-1 The interrelationship between wage determination and fixed asset investment (Fixed-effect estimation): Interest payment.

	Investment	Δ	Urban	Δ	State	Δ	Collective	Δ	Other	Δ	Private	Δ
Previous Δwage	0.353	0.227	0.459*	0.284**	0.974***	0.521***	−0.076	0.096	0.084	0.089	−0.143	0.085
	(0.261)	(0.162)	(0.247)	(0.123)	(0.349)	(0.173)	(0.497)	(0.539)	(0.138)	(0.099)	(0.326)	(0.169)
Interest	5.302		9.064		9.529**		−12.707		−19.015*		2.117	
	(7.005)		(6.373)		(3.912)		(19.519)		(9.780)		(14.161)	
Δinterest		−0.376		1.528		0.122		2.754		−14.974**		0.315
		(2.306)		(2.806)		(1.130)		(8.781)		(6.957)		(5.189)
Constant	2.078***	0.178***	1.911***	0.175***	1.670***	0.108***	1.365	−0.899***	2.586***	0.257***	3.867***	0.088***
	(0.568)	(0.022)	(0.585)	(0.016)	(0.442)	(0.025)	(0.805)	(0.123)	(0.693)	(0.038)	(0.801)	(0.026)
Observations	341	310	341	310	341	310	264	203	340	308	150	150
R−squared	0.939	0.450	0.948	0.305	0.895	0.491	0.505	0.648	0.916	0.570	0.903	0.327
Number of provinces	31	31	31	31	31	31	31	31	31	31	30	30

The fixed effect estimation includes year dummies. Only the main estimated results of the parameters of interest are reported. Wage indicates the total log average real wage. State, collective, and other in the column headings indicate the real average wages of state-owned units, collective-owned units, and other ownership units, respectively. The symbol Δ indicates the first log difference. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 4-2 The interrelationship between wage determination and fixed asset investment (Fixed-effect estimation): Self-raised.

	Investment	Δ	Urban	Δ	State	Δ	Collective	Δ	Other	Δ	Private	Δ
Previous Δwage	0.460	0.244	0.580**	0.300**	1.002**	0.512***	0.266	0.010	0.029	0.035	−0.076	0.142
	(0.275)	(0.163)	(0.254)	(0.124)	(0.369)	(0.177)	(0.433)	(0.442)	(0.096)	(0.106)	(0.258)	(0.171)
Self−raised	1.258**		1.400**		0.639		3.638***		1.803***		1.718**	
	(0.591)		(0.595)		(0.712)		(1.271)		(0.579)		(0.706)	
ΔSelf−raised		0.245		0.362		−0.137		0.494		0.734*		0.848**
		(0.215)		(0.286)		(0.249)		(1.129)		(0.364)		(0.393)
Constant	1.672***	0.174***	1.511***	0.169***	1.564***	0.111***	−0.684	−0.888***	1.978***	0.272***	2.805***	0.052
	(0.503)	(0.021)	(0.519)	(0.017)	(0.558)	(0.026)	(0.852)	(0.116)	(0.551)	(0.036)	(0.773)	(0.034)
Observations	341	310	341	310	341	310	273	212	341	310	150	150
R−squared	0.944	0.457	0.953	0.321	0.890	0.492	0.555	0.608	0.918	0.558	0.917	0.353
Number of provinces	31	31	31	31	31	31	31	31	31	31	30	30

The fixed effect estimation includes year dummies. Only the main estimated results of the parameters of interest are reported. Wage indicates the total log average real wage. State, collective, and other in the column headings indicate the real average wages of state-owned units, collective-owned units, and other ownership units, respectively. The symbol Δ indicates the first log difference. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 4-3 The interrelationship between wage determination and fixed asset investment (GMM estimation): Interest payment.

	Investment		Urban		State		Collective		Other		Private	
	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS
Previous term	0.963***	0.871***	1.016***	0.916***	1.014***	0.965***	0.236	1.144***	–0.058	0.854***	0.860***	1.065***
	(0.122)	(0.073)	(0.143)	(0.067)	(0.120)	(0.058)	(0.292)	(0.078)	(0.179)	(0.171)	(0.169)	(0.038)
Previous Δwage	0.057	0.278*	0.076	0.307*	0.390	0.522*	–0.622	–0.844	–0.890*	–0.166	–0.266	–0.310
	(0.190)	(0.161)	(0.208)	(0.163)	(0.306)	(0.267)	(0.531)	(0.611)	(0.510)	(0.301)	(0.228)	(0.375)
Interest	–1.984	–3.851	–2.764	–0.734	–0.601	2.897	–5.001	–29.939	–17.422*	–48.738*	–1.386	–0.333
	(7.405)	(5.607)	(8.601)	(4.524)	(5.707)	(2.144)	(17.421)	(21.943)	(9.926)	(25.045)	(5.745)	(5.915)
Constant		0.000		0.000		0.151		0.000		0.585		0.000
		(0.000)		(0.000)		(0.452)		(0.000)		(1.370)		(0.000)
Observations	248	279	248	279	248	279	142	203	246	278	246	278
Number of provinces	31	31	31	31	31	31	30	31	31	31	31	31
Instruments	26	33	26	33	26	33	23	31	26	33	26	33
ar1p	0.023	0.010	0.009	0.006	0.005	0.002	0.367	0.017	0.085	0.137	0.013	0.002
ar2p	0.908	0.994	0.482	0.712	0.731	0.774	0.466	0.515	0.722	0.093	0.469	0.545
hansenp	0.095	0.126	0.122	0.136	0.112	0.488	0.209	0.169	0.012	0.390	0.103	0.183
A (p–value)		0.513		0.652		0.980		0.054		0.890		0.516
B (p–value)		0.477		0.471		0.993		0.181		0.919		0.821

DIF and SYS denote the first-differenced GMM and the system GMM, respectively. There is a limit of three lags for every explanatory variable and we use a collapse technique to avoid the “too many instruments” problem. Only the main estimated results of the parameters of interest are reported. Ar1p and ar2p are the p-values of a test for first and second-order serial correlation. Hansenp is the p-value for Hansen’s overidentification restrictions test. In the last two rows, A (p-value) and B (p-value) represent the p-values of the difference-in-Hansen test for system GMM instruments and a difference-in-Hansen test for instruments based on lagged growth, respectively. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 4-4 The interrelationship between wage determination and fixed asset investment (GMM estimation): Self-raised.

	Investment		Urban		State		Collective		Other		Private	
	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS
Previous term	0.944***	0.959***	0.944***	0.983***	1.050***	0.887***	0.387*	1.033***	0.321	0.838***	0.930***	0.805***
	(0.074)	(0.047)	(0.085)	(0.055)	(0.094)	(0.064)	(0.212)	(0.084)	(0.215)	(0.104)	(0.234)	(0.080)
Previous Δwage	0.049	0.275	0.050	0.333*	0.222	0.592**	–0.617	–0.599	–0.160	0.039	–0.146	–0.214
	(0.168)	(0.193)	(0.190)	(0.173)	(0.258)	(0.263)	(0.570)	(0.366)	(0.094)	(0.085)	(0.307)	(0.217)
Self–raised	0.534	0.364***	0.375	0.330***	–1.131	0.104	0.750	0.051	0.538	0.649**	–0.116	1.669**
	(0.479)	(0.106)	(0.528)	(0.119)	(0.753)	(0.207)	(2.481)	(0.525)	(0.992)	(0.256)	(1.462)	(0.780)
Constant		0.000		0.080		0.000		1.712		–0.426		–1.150
		(0.000)		(0.268)		(0.000)		(1.881)		(0.929)		(0.943)
Observations	310	341	310	341	310	341	212	273	310	341	120	150
Number of provinces	31	31	31	31	31	31	31	31	31	31	30	30
Instruments	28	35	28	35	28	35	25	33	28	35	22	29
ar1p	0.010	0.006	0.004	0.002	0.000	0.001	0.263	0.014	0.065	0.106	0.022	0.066
ar2p	0.545	0.740	0.258	0.450	0.559	0.542	0.563	0.438	0.119	0.136	0.524	0.529
hansenp	0.065	0.154	0.114	0.147	0.284	0.128	0.141	0.507	0.087	0.162	0.109	0.114
A (p–value)		0.871		0.439		0.468		0.535		0.264		0.160
B (p–value)		0.865		0.552		0.161		0.996		0.938		0.229

DIF and SYS denote the first-differenced GMM and the system GMM, respectively. There is a limit of three lags for every explanatory variable and we use a collapse technique to avoid the “too many instruments” problem. Only the main estimated results of the parameters of interest are reported. Ar1p and ar2p are the p-values of a test for first and second-order serial correlation. Hansenp is the p-value for Hansen’s overidentification restrictions test. In the last two rows, A (p-value) and B (p-value) represent the p-values of the difference-in-Hansen test for system GMM instruments and a difference-in-Hansen test for instruments based on lagged growth, respectively. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 4-5 The interrelationship between wage determination and fixed asset investment (GMM estimation): Deposits.

	Investment		State		Collective		Other		Private	
	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS	DIF	SYS
Previous term	0.858***	0.924***	1.012***	0.868***	0.214	0.985***	–0.293	0.929***	0.640***	1.009***
	(0.168)	(0.042)	(0.140)	(0.065)	(0.294)	(0.063)	(0.203)	(0.139)	(0.180)	(0.041)
Previous Δwage	–0.095	0.160	0.435	0.516**	–1.715**	–0.614	–0.133	0.001	–0.559***	–0.575***
	(0.187)	(0.152)	(0.301)	(0.217)	(0.800)	(0.470)	(0.164)	(0.084)	(0.109)	(0.062)
Deposits	–0.155	–0.071**	0.084	–0.076**	1.302	–0.054	–1.309***	–0.077	–0.291	–0.144**
	(0.281)	(0.028)	(0.122)	(0.034)	(0.957)	(0.078)	(0.427)	(0.125)	(0.359)	(0.058)
Constant		0.187		0.744*		0.000		1.065		–1.058
		(0.242)		(0.373)		(0.000)		(1.045)		(0.638)
Observations	310	372	310	372	212	304	310	372	310	372
Number of provinces	31	31	31	31	31	31	31	31	31	31
Instruments	28	36	28	36	25	34	28	36	28	36
ar1p	0.053	0.007	0.002	0.000	0.558	0.008	0.335	0.101	0.002	0.000
ar2p	0.672	0.795	0.228	0.343	0.556	0.511	0.418	0.127	0.472	0.363
hansenp	0.022	0.137	0.071	0.358	0.100	0.344	0.447	0.245	0.005	0.275
A (p–value)		0.972		0.991		0.725		0.976		0.772
B (p–value)		1.000		0.925		0.719		0.759		1.000

DIF and SYS denote the first-differenced GMM and the system GMM, respectively. There is a limit of three lags for every explanatory variable and we use a collapse technique to avoid the “too many instruments” problem. Only the main estimated results of the parameters of interest are reported. Ar1p and ar2p are the p-values of a test for first and second-order serial correlation. Hansenp is the p-value for Hansen’s overidentification restrictions test. In the last two rows, A (p-value) and B (p-value) represent the p-values of the difference-in-Hansen test for system GMM instruments and a difference-in-Hansen test for instruments based on lagged growth, respectively. Robust standard errors are shown in parentheses. The symbols ***, **, and * denote that $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.