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Capital market opening and labour investment efficiency

Suyuan Tian, Wenqing Bai and Wenlei Shi

School of Accountancy, Shandong University of Finance and Economics, Jinan, China

ABSTRACT

The purpose of this research is to explore the impact of capital market opening on inefficient labour investment of enterprises and its impact path. This paper takes 2010–2019 A-share non-financial listed companies in Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) as research objects and samples, and uses DID method to examine the impact of capital market opening on labour investment efficiency of listed companies.We collected 22567 pieces of data.The results show that the capital market opening system significantly reduces inefficient labour investment of enterprises, mainly through reducing the information asymmetry and the agency costs as the main paths. This research shows that the capital market opening is of positive significance to the sustainable development of enterprises, and it proposes targeted suggestions for the government, listed companies and market investors to effectively reduce the inefficient labour investment of enterprises. The research provides more feasible references for capital market opening and corporate governance, and also offers theoretical evidence for the implementation of 'Shanghai-Hong Kong Stock Connect' program.

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1. Introduction

The combination of labour economics and corporate governance has gradually become a theoretical hotspot. Most existing research on labour investment efficiency mainly focussed on issues related with information asymmetry and agency costs, including stock price informativeness (Ben-Nasr & Alshwer, 2016), the relation between CEO and chairman (Khedmati et al., 2020), and incentive effect of institutional investors (Ghaly et al., 2020), but few from the perspective of capital market opening. In view of this fact, this paper, from the perspective of capital market opening, discusses the impact of capital market opening on inefficient labour investment through two paths of information asymmetry and agency costs, which will provide more research references in related fields.

A large number of studies have proved that the capital market opening has an impact on the capital market efficiency. For example, the capital market opening is

CONTACT Wenqing Bai wenqingbai@163.com

conducive to optimising the investor structure and improving the investment efficiency of enterprises, improving the efficiency of stock pricing, and promoting economic development (Orlowski, 2020). In addition, the implementation of the Shanghai-Shenzhen-Hong Kong Stock Connect trading system will improve the stock price informativeness and the stock pricing efficiency (Edmans, 2014). As foreign investors with information advantages enter the market and increase the stock price informativeness, it will help improve the possibility of successful decision-making (Bond et al., 2012). However, there are few studies that extend to the field of labour force. In the context of labour reversibility and the social environment of China, it is meaningful to study whether the capital market opening has impact on the efficiency of corporate labour investment and how it works.

On November 17, 2014, the mainland and Hong Kong stock market trading interconnection mechanism (known as 'Shanghai-Hong Kong Stock Connect') was officially launched. In December 2016, the Mainland launched the Shenzhen-Hong Kong Stock Connect trading system. This trading system has learned and introduced advanced concepts and experience from foreign investors, which is conducive to improving the investor structure of the A-share capital market and enhancing corporate governance level and efficiency.

Human capital plays an important role that determines firm productivity, and labour investment efficiency is the most important factor that determines firm competitive advantage (Erosa et al., 2010). However, with the decline of the birth rate, economic growth needs higher quality labour investment efficiency. In order to solve the population problem, many countries have formulated Fertility Policies, which have not reversed the decline of the total fertility rate (Bapna et al., 2013; Li et al., 2017). The labour pressure is still a challenge hindering the economic growth of various countries. Therefore, it is essentially important for economic growth to improve the labour investment efficiency.

In view of the above analysis, this paper uses 2010–2019 A-share non-financial listed companies as the research objects to analyse the impact of capital market opening on inefficient labour investment. First of all, we build a model to measure the inefficient labour investment, and use the DID method to prove that capital market opening under the Shanghai-Hong Kong Stock Connect trading system can reduce the level of inefficient labour force investment of enterprises, which is consistent with our hypothesis. We find that improving information transparency and reducing agency costs are the two main paths for capital market opening to reduce inefficient labour force investment.

Our research contributes to the literature in several ways: (1) We enrich the relevant research on labour investment efficiency. With human capital receiving more attention, some scholars have discussed the influencing factors of labour investment efficiency from political promotion incentive systems (Kong et al., 2018) and institutional investors (Ghaly et al., 2020), but there is no literature on the impact of capital market opening on labour investment efficiency. (2) We extend the research results of capital market opening. Previous studies explored the impact of capital market opening on non-financial information pricing, stock price informativeness (Bond et al., 2012), and promotion of economic growth (Orlowski, 2020) and some other

aspects. This paper innovatively combines capital market opening with corporate governance mechanisms and labour force structure, enriching the research results of capital market opening.

The basic structure of this paper is as follows. In the next section we will discuss theoretical analysis and put forward research hypotheses. Section 3 presents the data and conducts model analysis. In section 4, we present the empirical results, and show other additional analysis and various robustness tests. Section 5 summarises and puts forwards some suggestions to the government, listed companies, and investors.

2. Theoretical analysis and research hypothesis

Existing research results show that information asymmetry can reduce the labour investment efficiency of enterprises. First, the adverse selection problem caused by information asymmetry will increase financing costs of firms, thus distorting the labour allocation and reducing labour investment efficiency (Jung et al., 2014); second, information asymmetry may increase ethical issues of the management. In the pursuit of more personal interests, managers may manipulate the quality of the company's information disclosure, which may adversely affect the operational development of firms, and result in lower investment efficiency in labour (Ben-Nasr & Alshwer, 2016; Jensen & Meckling, 1976). It may cause distortions in labour allocation and lower investment efficiency. In addition, agency problems can also reduce the efficiency of labour investment. In the case of separation of management rights and ownership, managers are prone to opportunistic behaviour and may choose to invest in unprofitable projects out of their own interests, which can eventually lead to over-investment and reduction in investment efficiency. With relatively high economic costs of labour investment (Khedmati et al., 2020), managers' irrational behaviours can easily increase agency costs and thus reduce labour investment efficiency, which may hinder the further development of firms.

How can the capital market opening affect labour investment efficiency through the above ways? Based on the discussion above, capital market opening can reduce inefficient labour investment of enterprises, and information asymmetry and agency problems will reduce inefficient labour investment. Then capital market opening will significantly reduce inefficient labour investment by mitigating information asymmetry and agency problems.

First of all, this paper proposes the hypothesis that the capital market opening can reduce information asymmetry and enhance information transparency under the following basis. On the one hand, overseas investors play the leading role in Shanghai-Hong Kong Stock Connect, and compared with domestic investors, possesses comparative advantages in terms of information acquisition and valuation capabilities. Accordingly, supervision will play a better role (Bae et al., 2012; Li et al., 2004). Under the supervision of the Shanghai-Hong Kong Stock Connect trading system, the management, for better financing, will actively improve the quality of information disclosure and enhance the transparency of corporate information to attract more foreign investors to hold their shares. The Shanghai-Shenzhen-Hong Kong Stock Connect trading system will improve the sensitivity of

non-financial information and help optimise the investor structure, which will enhance the guiding role and improve the efficiency of the capital market. In this context, labour investment efficiency of firms will be improved accordingly. On the other hand, the capital market opening will stimulate foreign investors to optimise corporate governance mechanisms (Aggarwal et al., 2011) and consequently enhance the quality of corporate information disclosure. Optimised corporate governance mechanism will improve the disclosure quality of corporate insider information, and reduce the cost of obtaining the insider information (Karamanou & Vafeas, 2005).

Secondly, based on previous research, we speculate that the capital market opening will work in the following two ways to reduce agency costs and improve labour investment efficiency. On the one hand, foreign investors take advantage of their experience, technology and human resources from developed countries or regions to enhance investors' supervision over listed companies on the mainland. It will help recognise problems of agency costs, which will reduce the inefficient investment of the management and limit agency problems. On the other hand, following capital market opening, foreign institutional investors' focus on social responsibility has guided the management to improve socially responsible investment and performance (Dyck et al., 2019). The introduction of foreign investors in the Shanghai-Shenzhen-Hong Kong Stock Connect trading system will boost the socially responsible investment of firms. In case of any management's perks and the 'pseudo' social responsibility behaviour that will hurt the interests of external shareholders, overseas shareholders will work together to resist these unreasonable behaviours and restrain their opportunistic behaviours, which will reduce the agency cost and accordingly influence the corporate social responsibility strategic decision making. Higher corporate social responsibility will help the management to reduce the opportunity cost and the supervision cost of investors, and enhance the labour investment efficiency.

Based on the above analysis, capital market opening will reduce inefficient labour investment through two paths: information transparency and agency costs. However, some scholars also believe that the deepening capital market interconnection can improve the internationalisation of enterprises and intensify the risk interlock between domestic and international capital markets, and the increasing foreign exchange demand will exacerbate the capital market volatility (Aggarwal et al., 2011) and weaken the benefit of capital market opening to the capital investment efficiency; and the corporate governance mechanism and information asymmetry may deteriorate, and it will generate negative impact on the governance mechanism of domestic listed companies (Chang et al., 2017). To sum up, it is still an empirical question for capital market opening to reduce inefficient labour investment. For this point, the following two hypotheses are proposed.

Hypothesis 1: Under the same context, the higher opening extent of capital market will lead to lower inefficient investments in labour.

Hypothesis 2: Under the same context, the higher opening extent of capital market will lead to higher inefficient investments in labour.

3. Research design

3.1. Sample and data sources

Based on previous research results, we select the implementation interval of the Shanghai-Shenzhen Stock Connect system from 2010 to 2019 as the study interval and carry out research with the difference in difference method. This research takes 2010 as the starting point to guarantee the timeliness of experimental data by setting it four years ahead of the commencement year of Shanghai-Hong Kong Stock Connect in 2014. This paper processes the data as follows: (1) screen out ST firms or PT firms; (2) screen out financial firms; (3) screen out firms with missing data. We finally obtain the data of 22567 samples. To mitigate the effect of outliers, all continuous variables are winsorized at the 1st and the 99th percentiles. Moreover, the research data in this paper is obtained from the Wind database and the CSMAR database.

3.2. Model to test the hypothesis

In order to verify the research hypothesis of this paper, we build the fixed effects model (1):

$$\begin{aligned} \text{Labeff}_{i,t} =& \alpha + \alpha_1 \text{Size}_{i,t} + \alpha_2 \text{Post}_{i,t} + \alpha_3 \text{Quick}_{i,t} + \alpha_4 \text{Stdcfo}_{i,t} \\ &+ \alpha_5 \text{Stdsale}_{i,t} + \alpha_6 \text{Tangbile}_{i,t} + \alpha_7 \text{Std}-\text{nethire}_{i,t} \\ &+ \alpha_8 \text{Labour}-\text{intensity}_{i,t} + \alpha_8 \text{Lev}_{i,t} + \alpha_9 \text{Los}_{i,t} + \varphi_{i,t} + \theta_{i,t} + \mu_{i,t} \end{aligned} \tag{1}$$

The dependent variable, $Labeff_{i,t}$, is the inefficient labour investment of firm i at year t. The smaller the inefficient labour investment of the firm is, the lower the level of inefficient labour investment of the firm will be; The explanatory variable, $Post_{i,t,}$ is the degree of capital market opening of firm i at year t; $\theta_{i,t}$ is firm fixed effect, and $\varphi_{i,t}$ is time fixed effect. $u_{i,t}$ is the error term. If H1a is true, then the coefficient on $Post_{i,t}$ should be significantly negative, indicating that capital market opening leads to lower inefficient investments in labour. If H1b is true, then the coefficient on $Post_{i,t}$ should be significantly positive, indicating that capital market opening leads to higher inefficient investments in labour. All variables are defined in Appendix A.

Based on previous literature (Jung et al., 2014), the following factors are used as control variables for capital investment: $Size_{i,t}$ is the scale of firm i in year t; $Quick_{i,t-1}$ is quick ratio firm i in the year t-1, that is, quick ratio; $Lev_{i,t}$ is the asset-liability ratio of firm i in the year t; $Std\text{-}cfo_{i,t}$ is the net volatility of firm i's operating cash flow in year t (i.e., cash flow volatility); $Std\text{-}sale_{i,t}$ is the net volatility of firm i's operating income in year t (i.e., operating income volatility); *Los* indicates the loss of firm i in the year t; $Tangbile_{i,t}$ represents fixed assets ratio of firm i in year t; $Std\text{-}nethire_{i,t}$ represents the net hiring volatility of firm i in the year t; $Labour\text{-}intensity_{i,t}$ represents the labour intensity of firm i in the year t; $Los_{i,t-1}$ is the loss situation of firm i in the year t-1.

3.3. Main variables

3.3.1. Dependent variable (inefficient labour investment)

In this section, we set up a major test to examine the impact of capital market opening on labour investment efficiency.

We follow the practice of Jung et al. (2014), and measure the net hiring of an enterprise by the number variation percentage of firm employees, as proposed by Pinnuck and Lillis (2007). The following is the estimation of labour investment efficiency using model (2):

$$\begin{aligned} NetHire_{i,t} =& \alpha + \alpha_1 SaleGrowth_{i,t-1} + \alpha_2 SaleGrowth_{i,t} + \alpha_3 ROA_{i,t-1} \\ &+ \alpha_4 ROA_{i,t} + \alpha_5 \Delta ROA_{i,t} + \alpha_6 Size_{i,t-1} + \alpha_7 Quick_{i,t} \\ &+ \alpha_8 \Delta Quick_{i,t} + \alpha_9 Lev_{i,t-1} + \alpha_{10} Lossbin1_{i,t-1} + \alpha_{11} Lossbin2_{i,t-1} \\ &+ \alpha_{12} Lossbin3_{i,t-1} + \alpha_{13} Lossbin4_{i,t-1} + Lossbin5_{i,t-1} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

where $NetHire_{i,t}$ is the variation percentage in the number of employees in financial year t of firm i (i.e., the employee growth rate); $SaleGrowth_{i,\ t}$ is the revenue growth rate of firm i in the year t; $SaleGrowth_{i,\ t\text{-}1}$ is the revenue growth rate of firm i in the year t-1; and $ROA_{i,t}$ is the return on net assets of firm i in the year t; $\Delta ROA_{i,\ t}$ is the increase in the return on net assets of the firm i in the year t; $\text{Lossbin}_{i,\ t}$ is the loss of firm i in the year t; and the firm's ROA is divided into five ranges from (−0.025,0). If the ROA is in the range of (−0.005,0), then Lossbin1 is 1, otherwise it is 0, followed by Lossbin2, Lossbin3, Lossbin4, and Lossbin5. Then the actual labour investment of firm i in the year t deducts the expected labour investment to obtain the unexpected labour investment of the enterprise (i.e., $\varepsilon_{i,t}$). When $\varepsilon_{i,\ t} < 0$, it indicates underinvestment in the labour force, and when $\varepsilon_{i,\ t} > 0$, it indicates overinvestment in the labour force. In this paper, the absolute value of $\varepsilon_{i,\ t}$ is used to measure the level of investment in inefficient labour force.

3.3.2. Independent variable (degree of the capital market opening)

Following the practice of Lian et al. (2019), this paper takes whether to enter the Shanghai-Shenzhen-Hong Kong Stock Connect trading system as an indicator of the opening of corporate capital market (i.e., Post).

4. Results and analysis

4.1. Descriptive statistics

Descriptive statistics for the variables are included in Table 1: the mean value of inefficient labour investment (*Labeff*) is 0.253, which is higher than the median value of 0.159, and the variable distribution is similar to the study results of Kong et al. (2018). The mean value of capital market openness (*Post*) is 0.32, and the variable distribution is similar to the research of Lian et al. (2019). The distributions of descriptive statistics for other control variables are generally similar to those found in previous research.

Table 1. Descriptive statistics of variables.

Variable	Obs	Mean	Max	Min	Median	Sd
Labeff	22567	0.253	2.365	0.004	0.159	0.331
Post	22567	0.329	1	0	0	0.470
Size	22567	22.23	27.42	18.83	22.06	1.305
Lev	22567	0.049	0.465	022	0.008	0.080
Quick	22567	1.655	11.50	0.182	1.085	1.825
Tangible	22567	0.224	0.716	0.002	0.190	0.168
Labour-intensity	22567	−0.703	1.607	−3.815	−0.573	0.997
Std-cfo	22567	0.713	16.84	0.009	0.239	1.748
Std-sales	22567	0.177	3.058	0.002	0.043	0.436
Std-neithire	22567	0.666	1.959	0.076	0.535	0.436
los	22567	0.108	1	0	0	0.311

Source: Authors own estimations.

4.2. Empirical test of research hypothesis

4.2.1. Basic regression results

Table 2 reports the regression results on the impact of the capital market opening system on inefficient labour investment. We adopt model (1) to use a fixed effects model for regression, and the results are shown in column 1 of Table 2. The coefficient of capital market opening (*Post*) to inefficient labour investment (*Labeff*) is −0.046, which is significant at the level of 1%. Our results show that the opening of the capital market reduces the inefficient labour investment of enterprises. The result supports research hypothesis 1. The regression results of other variables are also similar to the results obtained by Kong et al. (2018) and so on.

4.3. Robustness tests

4.3.1. Parallel trend test

For the difference in difference method, there should be no significant systematic difference between the control group and the experimental group, as one premise. Therefore, following the common practice, this paper examines the parallel trends of listed companies before and after the capital market opening, with specific results shown in Table 3. The results in Table 3 show that before the capital market opening was approved, there was no significant difference in labour investment efficiency between listed companies in the experimental group and in the control group, indicating that the data conformed to the hypothesis of parallel trends.

4.3.2. Impact of the auto correlation

In order to consider the impact of the auto correlation, clustering robust standard error is used to correct auto correlation problem. The results are shown in column 3 of Table 2. The coefficient of capital market opening to inefficient labour investment is −0.046, which is significant at the level of 1%. The result shows that the opening of the capital market reduces the inefficient labour investment of enterprises. The result matches well with that of column 1 of Table 2. After considering the impact of the auto correlation, the conclusion remains unchanged.

Table 2. Capital market opening and inefficient labour investment.

Variables	(1) Labeff	(2) Labeff	(3) Labeff	(4) Labeff
Post	−0.046*** (−5.63)	−0.033*** (−7.24)	−0.046*** (−5.40)	−0.020*** (−2.62)
Size	0.062*** (8.80)	0.027*** (7.08)	0.062*** (6.84)	0.102*** (15.19)
Lev	0.124** (2.36)	0.069** (2.41)	0.124* (1.93)	0.016 (1.63)
Quick	−0.000 (−0.12)	0.002* (1.91)	−0.000 (−0.12)	−0.001 (−0.58)
Tangible	−0.187*** (−5.69)	−0.174*** (−9.60)	−0.187*** (−4.88)	−0.170*** (−5.00)
Labour-intensity	0.030*** (4.76)	−0.004 (−1.10)	0.030*** (3.48)	0.106*** (16.12)
Std-cfo	−0.007** (−2.51)	0.002 (1.52)	−0.007*** (−2.62)	0.004 (0.68)
Std-sales	0.018 (1.47)	0.003 (0.43)	0.018 (1.27)	0.124*** (9.59)
Std-neithire	0.220*** (28.73)	0.030*** (7.07)	0.220*** (22.47)	0.341*** (34.31)
los	0.031*** (3.89)	0.009** (2.10)	0.031*** (3.69)	0.030*** (3.64)
Constant	−1.263*** (−8.37)	−0.418*** (−5.04)	−1.263*** (−6.47)	−2.017*** (−13.74)
Year	YES	YES	YES	YES
Firm	YES	YES	YES	YES
N	22,567	22,567	22,567	25,669
R-squared	0.129	0.026	0.129	0.137
F	150.2	26.92	106.6	175.4

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors own estimations.

4.3.3. Alternative variable test

In the above statements, the research is based on net hiring (i.e., the employee growth rate) to construct inefficient labour investment. Referring to the practice of Bu and Sun (2020), we use the ratio between the cash paid to and for employees and the total assets (*NetHire*) to measure the labour investment status of enterprises. Therefore, replace the explained variable (*NetHire*) in model 2 and re-estimate the inefficient labour investment. Retest it by using the regression model 1, with the results shown in column 2 of Table 2. The coefficient of capital market opening to inefficient labour investment is −0.033, which is significant at the level of 1%. The result shows that the opening of the capital market reduces the inefficient labour investment of enterprises. The result matches well with that of column 1 of Table 2. After replacing the core variable indicators, the conclusion remains unchanged.

4.3.4. Impact of the Covid-19 pandemic

In order to consider the impact of the impact of the COVID-19 pandemic, we add the 2020 data and retest it by using the regression model 1. The results are shown in column 4 of Table 2. The coefficient of capital market opening to inefficient labour investment is −0.020, which is significant at the level of 1%. The result shows that the opening of the capital market reduces the inefficient labour investment of enterprises. The result matches well with that of column 1 of Table 2. After considering the impact of the COVID-19 pandemic, the conclusion remains unchanged.

4.4. Test on channels

The regression results listed in Table 2 verify the hypothesis that the capital market opening will reduce inefficient labour investment. Moreover, what path does capital market opening affect the efficiency of labour investment through? According to the

Table 3. Parallel trend test.

Variables	*Labeff*
D_3	−0.004 (−0.35)
D_2	0.008 (0.74)
D_1	0.012 (1.00)
Current	−0.018 (−1.46)
D1	−0.056*** (−4.53)
D2	−0.047*** (−3.69)
D3	−0.049*** (−3.91)
D4	−0.040** (−2.28)
Size	0.061*** (8.50)
Lev	0.128** (2.45)
Quick	−0.000 (−0.14)
Tangible	−0.184*** (−5.60)
Labour-intensity	0.030*** (4.73)
Std-cfo	−0.007** (−2.55)
Std-sales	0.017 (1.44)
Std-neithire	0.221*** (28.75)
los	0.033*** (4.11)
Constant	−1.237*** (−8.09)
Year	YES
IND	YES
N	22,567
R-squared	0.130
F	110.6

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors own estimations.

previous discussion, this paper discusses the subject from the perspectives of information asymmetry and agency.

First of all, this paper uses the model (3) to test the channel of capital market opening on information transparency.

$$\begin{aligned} Abacc =& \alpha_0 Post + \beta_1 Bm + \beta_2 Roa + \beta_3 Lev + \beta_4 Empnum \\ &+ \beta_5 Firsthold + \beta_6 Totassrat + \beta_7 Stateshrpct + \beta_8 Soe + \beta_9 Size \\ &+ IND + YEAR + \varepsilon_t \end{aligned} \tag{3}$$

where *Abacc* is the information asymmetry. *Bm* is the book-to-market ratio; *Empnum* is the number of employees; *Firsthold* is the largest shareholder's equity ratio; *Totassrat* is the total asset turnover ratio; *Stateshrpct* is the state-owned shareholding ratio; *Soe* is nature of property right, as a virtual variable; the state-owned enterprise takes 1, and the other is 0; And *IND* and *Year* are the industry and annual virtual variables.

Column (1) of Table 4 reports the regression results between capital market opening and information asymmetry. Among them, the coefficient of capital market opening to information transparency is −0.005, which is significant at 1%. The results show that the capital market opening can alleviate the asymmetry of company information. It supports the hypothesis that capital market opening reduces information asymmetry.

Secondly, we draw on the model of Jurkus et al. (2011), and use the model (4) to test the impact of capital market opening on agency costs, and then build the following model (4):

Table 4. Impact path testing.

Variable	(1) Abacc		(2) Agent cost
Post	−0.005*** (−3.28)	*Post*	−0.009*** (−4.39)
Bm	−0.043*** (−12.92)	*Bm*	−0.100*** (−15.01)
Roa	−0.252*** (−20.68)	*Lev*	−0.017 (−1.11)
Lev	−0.024** (−2.55)	*Roa*	−0.232*** (−14.25)
Empnum	−0.004*** (−5.35)	*Firsthold*	−0.118*** (−4.11)
Firsthold	0.000 (0.41)	*Firsthold2*	0.099*** (2.84)
Totassrat	0.006*** (3.12)	*Firsthold10*	−0.008 (−0.92)
Stateshrpct	−0.010 (−0.82)	*Soe*	−0.008*** (−3.45)
Soe	−0.007*** (−5.34)	*Delist*	0.014*** (4.29)
Size	0.004*** (4.56)	*Delight*	−0.004*** (−3.31)
Constant	0.002 (0.09)	*Constant*	0.167*** (13.34)
Year	YES	*Year*	YES
IND	YES	*IND*	YES
N	21,768	*N*	22,014
R-squared	0.118	*R-squared*	0.255
F	34.65	*F*	38.29

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors own estimations.

$$\begin{aligned} Agent\ \ cost =& \alpha_0 + \beta_1 Post + \beta_2 Bm + \beta_3 Lev + \beta_4 Roa + \beta_5 Firsthold \\ &+ \beta_6 Firsthold^2 + \beta_7 Firsthold10 + \beta_8 Soe + \beta_9 Delist + \beta_{10} Deligt \\ &+ IND \ \ + Year + \varepsilon_t \end{aligned} \tag{4}$$

where *Agent cost* is the agency cost of the firm in the year t; Based on the study of Li. (2021), the management expense is used for measurement. $Firsthold^2$ is the square of the shareholding ratio of the largest shareholder; *Firsthold10* is the sum of the shareholding ratio of the second largest shareholder to the tenth largest shareholder; *Delist* is the virtual variable of the firm's earnings; take 1 when the return on net assets is greater than 0 but less than 1%, otherwise take 0; and *Delight* is the virtual variable of the firm's return; take 1 when the return on net assets is greater than 6% but less than 10%, otherwise take 0.

As shown in column 2 of Table 4, we find the return results of capital market opening to agency costs. The coefficient of capital market opening to agency cost is −0.009, which is significant at 1%. The results show that the opening of capital market can alleviate the agency problem of firms. It supports the hypothesis that capital market opening alleviates the agency problem.

5. Discussion and recommendations

As China actively promotes the capital market opening, more researches focus on what impact it generates on enterprises. In this paper, we mainly explore the investment of enterprises on labour efficiency, and examine the impact of capital market opening on inefficient labour investment from the perspective of the Shanghai-Shenzhen-Hong Kong stock connect system. With the increasing globalisation of China's economy and rising labour costs, it is of theoretical and practical significance to deeply analyse the impact of capital market opening on inefficient labour investment of enterprises. Theoretically, this paper will enrich the research achievements in

terms of agency theory and information opacity, and broaden the theoretical research on the factors influencing the efficiency of labour investment. In practical sense, this paper proves that the opening of capital market has a positive impact on the sustainable development of enterprises.

The empirical results show that (1) the capital market opening will reduce the inefficient labour investment, which is consistent with the argument of this paper; (2) the capital market opening increases the information transparency and decreases the agency cost, which significantly improve the labour investment efficiency of enterprises through these two paths.

we recommend that the government should steadily promote the opening up of capital market and improve the efficiency labour investment of enterprises, and strengthen the supervision over financial markets to prevent financial risks from overseas investment. Listed companies, under the capital market opening environment, should enhance information disclosure, reduce agency costs, improve its own governance mechanism, and actively attract foreign investment to promote the sound development of enterprises. Investors should continuously improve their identification capabilities and invest in companies with higher labour efficiency and better quality of information disclosure.

It should be noted that this study only focuses on labour efficiency and does not conduct any extended study on labour. This point can be explored in future research by dividing the structure of the labour force based on academic qualifications, and then we can separately study the impact of the capital market opening on the investment efficiency of the labour with different academic qualifications. Future research should also include factors such as over-investment and under-investment and the influence of external mechanisms.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Suyuan Tian http://orcid.org/0000-0001-5109-392X

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Appendix A

Table A1. Variable definitions.

Variable	Definition	Sources of data
NetHire	Percentage change of employees	WIND
Labeff	The absolute magnitude of the difference between the actual labour investment and the expected labour investment	Calculate in the text
Post	An indicator variable that equals one if the firm is listed on Shenzhen-Hong Kong Stock Connect trading system, and zero otherwise	CSMAR
Size	Natural logarithms of total assets	CSMAR
Quick	Difference between current assets and net inventory divided by current liabilities	CSMAR
Stdcfo	Standard deviation of the cash flows in past 5 years	CSMAR
Stdsale	Standard deviation of the sales in past 5 years	CSMAR
Tangbile	Net value of fixed assets divided by total assets	CSMAR
Stdnethire	Standard deviation of employee growth rate in past 5 years	CSMAR
Laborintensity	The number of employees divided by total assets	CSMAR
Lev	Long-term debts divided by total assets	CSMAR
Los	An indicator that equals one for loss firms, and zero otherwise	CSMAR
ROA	Net profit divided by total assets	CSMAR
SaleGrowth	Percentage change in revenue	CSMAR

Source: Authors own estimations.