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The Impact of 2009 VAT Reform on Enterprise Investment and Employment – Empirical Analysis Based on Chinese Tax Survey Data

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ABSTRACT

The article analyzes the impact of the 2009 VAT reform in China on investment and employment. This reform was a key step in improving the VAT tax system in the long term, and one of the key measures to structurally reduce taxes in response to the global financial crisis in the short term. The data for this analysis were provided by the "National Tax Survey" jointly conducted by the Chinese Ministry of Finance and State Administration of Taxation. We measured the impact of the VAT reform using the difference-in-differences method: we compared the difference between the experimental group and the control group before and after the reform. There were two kinds of organizations in our control group. The first kind consisted of enterprises that did not pay the VAT and small-scale VAT-paying enterprises that did not subtract the input taxes for fixed assets investment. The second kind comprised organizations that had not been included in pilot experiments before 2009 and foreign-invested corporations that were allowed to deduct the input tax for fixed asset investment before and after 2009. The experimental group consisted of ordinary VAT-paying enterprises that had not been included in the pilot study before 2009 and were affected by the 2009 reform. Our estimations lead us to the conclusion that the VAT tax reform of 2009 significantly enhanced the companies' physical investment in machinery and equipment, but had no impact on employment. When comparing physical investment and employment in 2007 with 2008 and 2009, we detected a downward trend, which may reflect the impact of the global financial crisis on Chinese business. The total corporate profits and profit margins have little impact on business investment and employment, while the asset size and the tax burden show a significant positive impact. Thus, the reform significantly increased business investment in fixed assets, but had no obvious effect on employment.

KEYWORDS

value-added tax reform, investment in fixed assets, employment, difference-in-differences method

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Влияние Китайской реформы налога на добавленную стоимость 2009 года на инвестиции и занятость – эмпирический анализ данных Национального налогового исследования

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АННОТАЦИЯ

В статье анализируется влияние реформы налога на добавленную стоимость, проведенной в Китае в 2009 г., на инвестиции и занятость. В долгосрочной пер-

спективе реформа должна была кардинально улучшить налогообложение добавленной стоимости, а в краткосрочной – ответить структурным снижением налогов на глобальный финансовый кризис. Использованы данные «Национального налогового исследования» проводимого совместно Министерством финансов Китая и Государственной налоговой администрацией. Влияние реформы НДС оценивалось методом «разность-в разностях», путем сравнения экспериментальной и контрольной групп до и после реформы. В контрольную группу были включены два вида организаций. Во-первых, неплательщики НДС и мелкие налогоплательщики, не применяющие вычет входного НДС по инвестициям в основной капитал. Во-вторых, организации, включенные в пилотный эксперимент по НДС до 2009 г. и корпорации с иностранными инвестициями, которым было разрешено вычитать входящий налог для инвестиций в основной капитал до и после 2009 г. В экспериментальную группу включены обычные организации – плательщики НДС, которые не были включены в пилотный эксперимент по НДС до 2009 г., на которых реформа НДС оказала свое воздействие. На основе проведенной оценки был сделан вывод, что реформа НДС значительно увеличила объемы инвестиций в машины и оборудование, но не оказала воздействия на занятость. При этом, сравнение физических объемов инвестиций и занятости в 2007 и 2008–2009 гг. показывает тенденцию показателей к снижению, что отражает влияние на китайский бизнес глобального финансового кризиса. Общая корпоративная прибыль и маржинальная прибыль мало повлияли на инвестиции и занятость, в то время как величина активов и налоговая нагрузка оказали на них значительное положительное влияние. Основным выводом исследования является то, что реформа повлияла на существенное увеличение инвестиций бизнеса в основной капитал, но не оказала заметного влияния на занятость

КЛЮЧЕВЫЕ СЛОВА
реформа налога на добавленную стоимость, инвестиции в основные средства, занятость, метод разность-в разностях

1. Introduction

Before 2009, China's value-added tax was different from that in other countries. In brief, China's value added tax (VAT) system was a production-type VAT that did not allow the deduction of input value added taxes for investment in fixed assets. After many years of pilot experiments starting in 2004, China introduced on January 1, 2009 a nationwide VAT reform, which allowed business investment input value added taxes in machinery and equipment to be deducted from output value added taxes, but not in plants, buildings and other real estate.

On the background of 2009 VAT reform, this paper will figure out how the tax policy change will affect enterprises behavior. From a global perspective, value-added tax has expanded rapidly in just 65 years since its birth in France in 1954 and more than 140 economies have introduced VAT [1, p. 1]. As the currently largest tax category in China, VAT has undergone the process from pilot, establishment to transformation during the 40 years.

After the reform and opening up, in order to establish a main tax system which is compatible with the market economy, China introduced the VAT pilot in 1979 [2, p. 64]. And in the second phrase of "replacement of profit by tax" in 1984, the value-added tax has been separated from industrial and commercial tax. But the tax base was only the sale of some industrial products in the industrial sector.

In 1994, China implemented a tax-sharing reform. At the same time, the VAT tax system was formally established, which expanded the scope of VAT and adopted the system of invoice deduction. This system allowed the raw materials and other intermediate inputs to be included in the VAT deduction chain but excluded the enterprise's fixed asset investment input. However, this production-type VAT was relatively rare in the world. Under the national conditions in 1994, there were two main reasons for the adoption of the production-type VAT tax system [3, p. 37]: one is to dampen the overheating economy by restricting investment expansion;

the other is to guarantee the stability of fiscal revenue.

However, problems such as repeated taxation, uneven tax burden, and suppression of investment in fixed assets of enterprises became increasingly prominent in production-type VAT. It had always been an important task to change the production-type VAT to the internationally accepted consumption-type VAT in China's tax reform. The government followed the way of gradually-advanced reform [3, p. 38]. In 2004, China began the pilot reform of VAT in eight industries of the three northeastern provinces. The specific method was to allow the enterprise machinery and equipment investment in the input tax to be included in the VAT deduction chain. In 2007 and 2008, the "VAT Transformation Reform" program was promoted in 26 old industrial base cities in six provinces of central China, five cities in Inner Mongolia, and severely affected areas by earthquake in Sichuan. It can be seen that during this period, the "VAT reform" pilot was a regional preferential policy. Since January 1, 2009, China has fully implemented the "VAT Reform" in all regions and industries across the country. However, it should be noted that China's VAT reform has not completely changed the VAT tax system to the internationally accepted "consumption-type VAT", which is mainly reflected in the fact that the input tax on fixed assets investment in plants, buildings or other real estates is still not allowed to be deducted. So China's VAT system after the reform can only be called "half consumption-type VAT" [4, p. 43].

After two years, the Chinese government introduced a policy of replacing the business tax with VAT. After the tax reform in 1994, the value-added tax base was mainly limited to the industrial sector, while most service sectors implemented business tax. For the VAT not covering all industries, the breaking of VAT deduction chain and repeated taxation cannot be ignored [5, p. 36]. In 2012, the replacing BT with VAT reform was first piloted in Shanghai's transportation industry. In August 2013, "one (the transportation industry) plus six (six modern service industries)" pilot became a nationwide reform. By the end of 2015, the tax base of VAT covered all the service industries.

For the VAT reform of China, the reform of 2009 was China's most important tax reform in recent years. First, the proportion of VAT tax revenue in China's total tax revenue had been more than 40% [6, p. 18]. Secondly[1], the reform cut so much tax revenue that in 2009 tax revenue was estimated to drop by more than 140 billion, i.e. 2.35% of the total national revenue. Moreover, the reform was a key step in improving VAT tax system in the long term, and one of the foremost measures to structurally reduce taxes in response to the global financial crisis in the short term.

What is the impact of the reform on enterprises' behavior, especially during the global financial crisis? Did the reform promote the enterprises' fixed assets investment? Would it affect employment? All these questions drew the attention of the public and the Chinese decision-makers.

The paper is organized as follows. The next section presents the literature review. And the third section introduces the data and the method of analysis. The forth section of the paper presents the main results and discusses the possible problems. The last part concludes.

2. Literature Review

The impact of tax incentives for business investment is a hot topic in the academic literature. According to the new classical theory [7, p. 392; 8, p. 5; 9, p. 1306], since tax policy changes the marginal cost of fixed-asset investment, it significantly affects business investment. Many people tested this conclusion when some countries changed their tax policies. Cummins et al's [10, p. 237] study on 14 OECD member countries found that the conclusion was valid for almost all countries. Cummins, Hassett and Hubbard [11, p. 5] used aggregate and macro-level data to study the tax reform in the United States

[1] Data source: http://www.gov.cn/2010lh/content_1550075.htm

between 1962 and 1988, and found that tax incentives had a strong impact on the level of business fixed investment. House and Shapiro [12, p. 35] studied the tax incentive policy by price data on 2002 bonus depreciation in the United States, and concluded that the policy noticeably increased investment in types of capital that benefited substantially from bonus depreciation and increase the employment. Cohen, Hansen and Hassett [13, p. 465] also found that the depreciation allowances increases the incentive to invest in equipment significantly. However, in Hassett and Hubbard [9, p. 1338] and Auerbach and Hassett's [14, p. 248] overview the conclusion differed depending on the specific situation. And Yagan [15, p. 3531] used corporate income tax data to test the 2003 dividend tax cut in US but found no promotion effect on corporate investment.

Compared with a focus on the income tax policy such as investment tax credits, depreciation policy changes and additional depreciation, VAT reform in China is to increase business investment deduction in the field of consumption tax. Before 2009, China conducted a pilot VAT reform in three provinces in the Northeast in 2004, and in 28 cities in six central provinces in 2007. Theoretically, this reform should reduce the investment cost of machinery and equipment, and thus promote corporate investment; plant and building investment may be accompanied by machinery and equipment investment but may be replaced under tax incentive, so the impact of the reform on plant and building type investment is depend on the relative size of expansion effect and substitution effect; nevertheless because of the combined income and substitution effects, the reform's impact on employment is controversial. According to the CGE simulation analysis of Chen et al [16, p. 29], the VAT reform in China played a limited role in increasing investment and had a great negative impact on employment. While Li and Li [17, p. 26] researched the 2004 pilot found the tax reform pilot lowered the corporate tax burden and increased the fixed-asset investments. Nie, Fang and Li [18, p. 445] studied the three northeastern provinces and found that there were both a significant increase in the fixed-asset investment and a decrease in the employment after the reform. Nie and Liu's finding [19, p. 1] on the six central provinces revealed a significant promotion on both investment and employment. Cai and Harrison [20, p. 23] came to the conclusion that, while the reform seldom increased investment, it had a great negative effect on employment. Overall, there was a lack of consensus about the impact of the VAT reform.

For the policy of "replacing BT with VAT" in 2012, there are many empirical studies evaluating the effect of the reform recently. Business tax was the most important source of tax for local governments, and the reform of "replacing BT with VAT" would change the tax allocation pattern between central and local governments [21, p. 46; 22, p. 6]). According to the simulation of Input-output table, Li and Fang [23, p. 33] found that the reform will lead to significant reduction in tax revenue of provincial governments if there is no change on VAT sharing proportion. Shi and Lou [24, p. 105] used the model of CGE and concluded that the VAT policy had played a positive role in China's GDP and would reduce energy consumption coefficient. For the tax reform effects on industry, Li and Yan's [25, p. 18] study on the tax reform of the service industry found that the tax cut effect promoted the upgrading of China's manufacturing industry. Chen and Wang [26, p. 36] used the Chinese listed company data to prove that "the replacing BT with VAT" reform indeed promote the specialized division of labor. Tian and Hu [27, p. 29] found that the tax burden of some industries that transformed from business tax to VAT would still rise in the long run. Tong, Su and Wei's [28, p. 14] study showed that company's bargaining power would lead to tax shifting and influence the effect of tax reform on enterprise's actual tax burden.

Contrary to the above studies, this paper evaluates for the first time the effect of the nationwide reform of 2009. Another distinguishing feature of our research is our data source. The previous research was supported by the Chinese National

Bureau of Business survey data, and our data are the joint "national tax survey" data from the Chinese Ministry of Finance and State Administration of Taxation. The data collects more information on corporate investment in fixed assets and can clearly identify the corporations affected by the policy.

3. Data and method of analysis

The data for this analysis come from the "National tax survey" jointly collected by the Chinese Ministry of Finance and State Administration of Taxation. The survey collected information on production and operations, fixed assets investment, taxes, the financial situation and employment. After cleaning, we obtained a balanced panel data from 2007 to 2009 of about 230 thousand corporations a year.

As Nie, Fang and Li [18, p. 450], Nie and Liu [19, p. 5], Cai and Harrison's [20, p. 11], we also use the difference-in-differences method, i.e. we measure the impact of VAT reform by comparing the difference between the treatment group and the control group before and after the reform. There were two kinds of corporations in our control group, one was the non-VAT taxpayers and small-scale VAT taxpayers that were irrelevant to the subtraction of input taxes for fixed assets investment, another was the corporations that had been included in pilot experiments before 2009 and the foreign-invested corporations, which were allowed to deduct input tax for fixed asset investments before and after 2009. The treatment group was the ordinary VAT-paying enterprises that were not included in the pilot before 2009 and were affected by the 2009 reform. The model specification is as follows:

$$y_{it} = \alpha + \beta policy_{it} + \rho Treat_{it} + \\ + X'_{it}\delta + \eta_i + \eta_t + \varepsilon_{it},$$

where y_{it} is the company's investment in fixed assets (FAI) or the annual average number of employees (EMP), $policy_{it}$ is the variable capturing the effect of policies, that is, the product of the year dummy for 2009 and the treatment group dummy. The control variables X'_{it} include the size of enterprise assets (Assets), the total profit (Profit), the profit margin (Profit rate) and the tax burden rate (Tax rate). Among them, the tax burden of enterprises is the sum of all the taxes paid by the enterprise.

Except for fixed asset investment (FAI), which is very special and can only be obtained through complex calculations, the above variables are directly available in the "National Tax Survey" dataset or can be obtained through a simple calculation. The previous papers using the data from National Bureau of Statistics could only get the fixed assets investment data by taking the first differences in the fixed assets balance. Thus we design four fixed asset investment (FAI) indicators. This is the unique character of our paper.

FAI1 covers all the enterprise's fixed assets investment, FAI2 focuses on fixed assets investment on operation, FAI3 and FAI4 are somewhat the same as FAI2, but they are only a part of FAI2, the former pays more attention on machinery and equipment, while the later cares more about housing and building. Because the 2009 VAT reform is to allow enterprises to deduct input tax of machinery and equipment in operation, we can expect that the FAI3 is the most important variable affected by the reform.

Another important point is that the reform itself affects the book value of the fixed assets. According to China's accounting system, relevant taxes and fees are also included in the book value of the fixed assets investment. For the corporation affected by the reform, the book value of the fixed assets investment after 2009 loses the input VAT deduction. Therefore we made an adjustment: the book value in 2008 remains unchanged, the adjusted fixed assets investment of the treatment group in 2009 is calculated as follows: adjusted value = original value + "the input VAT tax on import machinery and equipment" + "the input VAT tax on domestic machinery and equipment purchase".

4. Main results

The main results of the estimation are given in Table 1 and 2. Table 1 uses all the data available, that is, it includes all the en-

Table 1

Full sample estimation (units: thousand yuan for investment and persons for employment)

Variables	FAI1	FAI2	FAI3	FAI4	EMP
Policy effect	–2638.0 (–0.52)	3301.3 (1.50)	3185.4* (1.88)	115.9 (0.10)	–11.40 (–1.48)
Treatment group dummy	–331.6 (–0.16)	–1733.6 (–1.00)	–1523.1 (–0.96)	–210.5 (–0.40)	6.37 (0.98)
Year dummy for 2009	1807.9 (0.39)	–3194.8* (–1.73)	–2644.6 (–1.64)	–550.2 (–0.91)	–11.63 (–1.56)
Year dummy for 2008	–1320.0* (–1.89)	–867.8 (–1.32)	–496.7 (–0.90)	–371.0 (–1.18)	–10.99*** (–5.16)
Profit	0.177 (0.99)	0.0934 (0.71)	0.106 (0.91)	–0.0131 (–0.54)	0.00 (1.45)
Profit rate	–0.0936 (–0.46)	–0.00847 (–0.05)	–0.0321 (–0.23)	0.0236 (0.81)	0.00 (0.03)
Assets	11169.6*** (3.97)	8891.3*** (2.98)	4271.2*** (3.20)	4620.1* (1.93)	59.50*** (5.42)
Tax rate	65.05* (1.87)	51.81* (1.68)	24.02* (1.72)	27.78 (1.38)	0.35** (2.04)
constant	–97302.0*** (–3.49)	–74995.8*** (–.64)	–32904.4*** (–2.72)	–42091.3* (–1.82)	–345.4*** (–3.26)
Number of observations	691469	691469	691469	691469	691469

Notes: Coefficients and *t* statistics are reported. Significance levels of 1%, 5% and 10% are represented by ***, ** and * respectively.

terprises in the control group listed above. As we can see from Table 1, it is only when we use FAI3 to measure corporate investment in fixed assets that the impact of the reform is significantly positive on investment, and the reform has little impact on employment (EMP). Table 2 only includes the enterprises in the industrial department that are subject to VAT tax[2].

As is shown in Table 2, whether we use FAI1, FAI2 or FAI3 to measure corporate investment in fixed assets, the impact of the reform is significantly positive, whereas there impacts on corporate plant and building investment (FAI4) and on employment (EMP) are not significantly different from zero. With the estimation, we get the conclusion that the VAT tax reform in 2009 significantly enhanced the company's physical investment in machinery and equipment but had no impact on employment. The conclusion regarding the impact on investment is almost the same as the findings by Nie, Fang, and Lie [18, p. 460] and Nie and Liu's [19, p. 14] findings, but different from Cai and Harrison's [20, p. 21] study. When comparing physical investment and employment in 2007 with 2008 and 2009, we find a reduction in trend, which may reflect the impact of the global financial on Chinese business. The total corporate profits and profit margins have little impact on business investment and employment, while asset size and the tax burden show a significant positive impact. That the tax burden has a positive effect on investment and employment is counterintuitive. In our opinion, in China, more tax may mean more glorious prospects for the company[3].

Three questions could be raised to put in doubt the positive effect of the VAT reform on physical investment in fixed assets. First, is it because we adjust the book value of the treatment group's fixed assets in 2009 that we get the above conclusions? Second, is it because in the firms of the treatment group investment in fixed

[2] The industrial department includes manufacturing, electricity, gas, steam and air conditioning supply, mining and quarrying, water supply, sewerage, and waste management and remediation.

[3] In our survey, business managers and frontline tax collectors and management staff provided us with this view.

assets just tended to increase in recent years? Are the conclusions affected by the fact that in our sample around 30% of the corporations did not add any new investment in fixed assets?

In response to the first question, Table 3 presents estimates obtained with the data that have not been adjusted for the book value in 2009. We find that the conclusions still hold. In addition, whereas

Table 2

Estimation based on industrial department data (units: thousand yuan for investment and persons for employment)

Variables	FAI1	FAI2	FAI3	FAI4	EMP
Policy effect	4602.6**	4630.1**	3422.0**	1208.0	–1.02
	(2.41)	(2.44)	(2.33)	(1.51)	(–0.22)
Treatment group dummy	–2560.3	–2267.0	–2207.7	–59.36	–1.61
	(–1.26)	(–1.16)	(–1.21)	(–0.17)	(–0.27)
Year dummy for 2009	–5849.0***	–4880.5***	–3503.7***	–1376.8***	–29.36***
	(–4.14)	(–3.42)	(–2.82)	(–3.44)	(–6.51)
Year dummy for 2008	–2671.1***	–1944.4**	–1155.1	–789.3**	–13.47***
	(–2.82)	(–2.09)	(–1.45)	(–2.04)	(–6.15)
Profit	–0.218	–0.224	–0.179	–0.0445	0.00
	(–1.16)	(–1.18)	(–1.19)	(–0.78)	(0.94)
Profit rate	3.581	2.294	1.646	0.648	0.02
	(0.54)	(0.35)	(0.31)	(0.34)	(1.03)
Assets	15793.9***	14235.5***	9872.0***	4363.5**	67.41***
	(5.36)	(4.93)	(6.41)	(2.46)	(9.84)
Tax rate	1914.8***	1799.6***	1254.5***	545.2**	7.47***
	(3.51)	(3.40)	(3.74)	(2.09)	(4.25)
constant	–132899***	–120219.0***	–80944.9***	–39274.1**	–369.5***
	(–4.77)	(–4.41)	(–5.73)	(–2.29)	(–5.47)
Number of observations	405188	405188	405188	405188	405188

Notes: Coefficients and t statistics are reported. Significance levels of 1%, 5% and 10% are represented by ***,**, *

Table 3

Estimation without adjusting the fixed-asset input tax of the treatment group in 2009 (units: thousand yuan)

Variables	Full sample	VAT general taxpayer in industry sector			
	FAI3	FAI1	FAI2	FAI3	FAI4
Policy effect	2614.0	3951.8**	3979.2**	2771.2*	1208.0
	(1.55)	(2.07)	(2.10)	(1.89)	(1.51)
Treatment group dummy	–1543.0	–2541.2	–2247.9	–2188.6	–9.36
	(–0.97)	(–1.26)	(–1.15)	(–1.20)	(–0.17)
Year dummy for 2009	–2633.9	–5807.1***	–4838.6***	–3461.8***	–1376.8***
	(–1.63)	(–4.11)	(–3.39)	(–2.79)	(–3.44)
Year dummy for 2008	–496.0	–2638.6***	–1911.9**	–1122.6	–789.3**
	(–0.90)	(–2.79)	(–2.05)	(–1.40)	(–2.04)
Profit	0.106	–0.215	–0.221	–0.177	–0.0445
	(0.90)	(–1.15)	(–1.17)	(–1.18)	(–0.78)
Profit rate	–0.0319	3.450	2.163	1.514	0.648
	(–0.23)	(0.52)	(0.33)	(0.28)	(0.34)
Assets	4191.8***	15503.6***	13945.2***	9581.7***	4363.5**
	(3.15)	(5.27)	(4.84)	(6.24)	(2.46)
Tax rate	24.19*	1869.2***	1754.0***	1208.8***	545.2**
	(1.71)	(3.46)	(3.35)	(3.67)	(2.09)
Constant	–32118.3***	–130113***	–117433***	–78159.1***	–39274.1**
	(–2.66)	(–4.67)	(–4.31)	(–5.54)	(–2.29)
Number of observations	691469	405188	405188	405188	405188

Notes: Coefficients and t statistics are reported. Significance levels of 1%, 5% and 10% are represented by ***, ** and * respectively.

the coefficient of the tax policy is insignificant for the full sample, it is significant for the sample of the ordinary VAT-paying enterprises and in the industrial department. This shows that the adjustment of the book value of the treatment group in 2009 is not what is generating the result that value-added tax reform promotes business investment.

In response to the second question, we have used the 2007–2008 data to redo what has been done in Tables 1 and 2. Table 4 uses the data that removed the observations in 2009. The policy variable is

Table 4

Estimation with 2007–2008 data (units: thousand yuan)

Variables	Full sample			VAT general taxpayer in industry sector		
	FAI1	FAI2	FAI3	FAI1	FAI2	FAI3
Policy effect	491.2 (0.22)	650.1 (0.28)	1177.1 (0.58)	866.5 (0.33)	200.7 (0.07)	734.6 (0.30)
Treatment group dummy	220.5 (0.11)	224.3 (0.12)	72.67 (0.04)	–333.4 (–0.15)	368.0 (0.17)	–250.6 (–0.13)
Year dummy for 2008	–897.7 (–0.51)	–693.4 (–0.40)	–998.5 (–0.67)	–3669.4 (–1.52)	–2369.8 (–0.96)	–2349.8 (–1.07)
Profit	5135.2 (1.57)	4786.5 (1.46)	2490.6 (0.84)	16665.4*** (6.42)	15253.9*** (5.83)	12787.9*** (5.33)
Profit rate	0.280 (0.87)	0.224 (0.69)	0.191 (0.64)	–0.383* (–1.67)	–0.384 (–1.63)	–0.408* (–1.88)
Assets	–0.213 (–0.86)	–0.170 (–0.70)	–0.145 (–0.64)	14.82 (0.76)	14.40 (0.73)	19.62 (1.00)
Tax rate	277.4 (1.14)	264.8 (1.10)	138.6 (0.73)	1963.5*** (2.93)	1820.5*** (2.85)	1559.2*** (2.78)
constant	–41236.9 (–1.44)	–38905.7 (–1.36)	–18260.8 (–0.71)	–141537*** (–6.04)	–130642*** (–5.57)	–108435*** (–5.05)
Number of observations	452143	452143	452143	265245	265245	265245

Notes: Coefficients and t statistics are reported. Significance levels of 1%, 5% and 10% are represented by ***, ** and * respectively.

Table 5

Estimation with Logit model (units: thousand yuan)

Variables	FAI1		FAI2		FAI3		FAI4	
Policy effect	0.689*** (27.60)	0.690*** (27.61)	0.688*** (29.97)	0.688*** (29.97)	0.723*** (32.52)	0.723*** (32.52)	0.013 (0.51)	0.013 (0.50)
Treatment group dummy	–0.344*** (–9.07)	–0.343*** (–9.07)	–0.298*** (–8.46)	–0.298*** (–8.46)	–0.264*** (–7.72)	–0.264*** (–7.72)	–0.019 (–0.47)	–0.019 (–0.47)
Year dummy for 2009	–0.621*** (–26.62)	–0.622*** (–26.64)	–0.365*** (–17.16)	–0.365*** (–17.17)	–0.0148 (–0.72)	–0.0151 (–0.74)	–0.825*** (–34.41)	–0.827*** (–34.46)
Year dummy for 2008	–0.203*** (–17.85)	–0.203*** (–17.88)	–0.106*** (–9.85)	–0.106*** (–9.87)	–0.017 (–1.63)	–0.017* (–1.65)	–0.224*** (–18.68)	–0.226*** (–18.76)
Assets	0.543*** (30.36)	0.549*** (30.16)	0.501*** (28.90)	0.504*** (28.72)	0.472*** (27.11)	0.474*** (26.97)	0.577*** (25.19)	0.588*** (25.30)
Profit	0.000 (0.71)	0.000 (0.70)	0.000 (1.08)	0.000 (1.08)	0.000 (1.42)	0.000 (1.42)	0.000 (–0.13)	0.000 (–0.17)
Profit rate	0.001* (1.66)	0.001* (1.66)	0.000 (1.56)	0.000 (1.56)	0.000 (1.19)	0.000 (1.19)	0.000 (0.46)	0.000 (0.45)
Tax rate		0.015* (1.79)		0.010 (1.08)		0.009 (1.04)		0.057*** (2.83)
Number of observations	144946	144946	161684	161684	172401	172401	125312	125312

Notes: Coefficients and t statistics are reported. Significance levels of 1%, 5% and 10% are represented by ***,** and * respectively.

now defined as the product of a dummy variable in 2008 and a dummy variable for being in the treatment group. We find that no matter which sample we use and which type of fixed asset investment we consider, the regression results are not significant, some factors are even reversed and become negative. It shows that the second objection does not hold.

For the last question, we use the Logit model to analysis the impact of the 2009 VAT reform on corporate fixed assets investment. If there are newly added corporate fixed assets, FAI is assigned the value 1, otherwise it is 0. The policy regression coefficient in this model represents the impact of VAT reform on the log odds ratio that a corporation will invest in fixed assets. As can be seen from Table 5, the VAT reform in 2009 increased significantly the probability of fixed assets investment but shows no significant effect on the investment on fixed assets such as plant and building (FAI4).

5. Conclusion

In this paper we used "National Tax Survey" enterprise data to evaluate the impact of China's nationwide VAT reform in 2009 on enterprise fixed-asset investment and employment. Our conclusion is that the VAT reform in 2009 significantly increased business investment in fixed assets but had not much effect on employment. Specifically, the reform mainly enhanced the investment in fixed assets for operation such as machinery and equipment, but not the investment in plants and buildings.

According to our study, the VAT reform in 2009 is not only a critical step in improving the Chinese tax system, but it also played an important role in fighting the global financial crisis. Meanwhile, as the renovation of machinery and equipment is an important way for firms in developing countries to achieve technological progress, the VAT reform is also conducive to China's structural transformation.

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