

Does “Replacing Business Tax with VAT” Promote the Integrated Development of Manufacturing and Service industries? An Empirical Study of Listed Companies in China

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Abstract. The reform of replacing business tax with value-added tax (referred to as “Replacing Business Tax with VAT”) in some service industries in 2012 was placed high hopes on by the society. What is the effect of the reform? According to the mean comparison analysis and Difference in Difference regression model analysis of the financial data of 582 listed Chinese companies, “Replacing Business Tax with VAT” not only had a positive impact on the related service industry, but also had the same positive impact on the manufacturing industry. “Replacing Business Tax with VAT” has changed the expectations of these industries for the future, made their expectations more positive, and promoted fixed asset investment and intangible asset investment in manufacturing and related service industries. However, “Replacing Business Tax with VAT” does not immediately improve the operating performance of manufacturing and related service industries as most people thought, and even in the early years, these industries showed some degrees of declining in profit-earning indicators.

Keywords: Difference in difference regression model, Manufacturing industries, Service industries, Integrated development.

1. Introduction

In 1994, China promulgated “the Provisional Regulations of the People's Republic of China on Value-added Tax”, imposing value-added tax based on the added value on the manufacturing industry and business tax based on the sales volume on the service industry. Two kinds of circulation taxes, value-added tax and business tax, exist at the same time. This parallel system design of two kinds of taxes led to double taxation on the service industry and incurred heavier tax on the service industry, which is not conducive to the social industrial division, nor to the integrated development of upstream and downstream enterprises. In order to solve these problems, on January 1, 2012, China implemented the experiment of “Replacing Business Tax with VAT” in the transportation industry (except railway transportation) and some modern service industries in Shanghai, and from September 1st of that year, the experiment areas were gradually extended to Beijing, Tianjin, and Jiangsu, Anhui, Fujian, Guangdong, Hubei, Zhejiang province. Since 2013, the type of tax and the districts where the experiment of “Replacing Business Tax with VAT” carried out had been further expanded, and by May 1st, 2016, “Replacing Business Tax with VAT” had completely covered all service industries in China, realizing the industry-wide coverage of value-added tax in China, and ending completely the parallel state of value-added tax and business tax in China. The reform schedule of “Replacing Business Tax with VAT” in China is shown in Table 1 below.

Table 1. The Reform Schedule of “Replacing Business Tax with VAT” in China

Time	Business Tax	Value-added Tax	Region
1994	Service Industry	Manufacturing industries	All Regions
2012.1.1	Construction, Real estate, Finance, Living Services, Radio, Film and Television Services, Railway transport, Postal Services, Telecommunications	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services	Shanghai
2012.9.1	Construction, Real estate, Finance, Living Services, Radio, Film and Television Services, Railway transport, Postal Services, Telecommunications	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services	Beijing
2012.10.1	Construction, Real estate, Finance, Living Services, Radio, Film and Television Services, Railway transport, Postal Services, Telecommunications	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services	Jiangsu, Anhui
2012.11.1	Construction, Real estate, Finance, Living Services, Radio, Film and Television Services, Railway transport, Postal Services, Telecommunications	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services	Fujian, Guangdong
2012.12.1	Construction, Real estate, Finance, Living Services, Radio, Film and Television Services, Railway transport, Postal Services, Telecommunications	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services	Tianjin, Hubei, Zhejiang
2013.8.1	Construction, Real estate, Finance, Living Services, Railway transport, Postal Services, Telecommunications	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services, Radio, Film and Television Services	All Regions
2014.1.1	Construction, Real estate, Finance, Living Services, Telecommunications	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services, Radio, Film and Television Services, Railway transport, Postal Services	All Regions
2014.6.1	Construction, Real estate, Finance, Living Services	Manufacturing, Transportation (except Rail Transport), R&D and Technology, Information technology, Cultural creativity, Logistics Assistance, Lease of Tangible Property, Forensic and Consulting Services, Radio, Film and Television Services, Railway transport, Postal Services, Telecommunications	All Regions
2016.5.1		Manufacturing & Service	All Regions

From the perspective of industrial chain interconnection, the manufacturing industry get input of research and development, logistics, information technology and other services from the service industry, and at the same time provides the machinery, equipment and facilities for the production and operation of the service industry. The manufacturing industry and the service industry are interconnected. Before “Replacing Business Tax with VAT”, the business tax levied on the service industry could not be deducted as the input tax of the manufacturing industry, which inhibited the willingness of the manufacturing industry to outsource services. After the implementation of “Replacing Business Tax with VAT”, the services purchased by the manufacturing industry can be

used as input tax to deduct its output tax, which would stimulate the manufacturing industry to expand service outsourcing, promote the expansion of production of the service industry, and lead the increase of the investment in fixed assets and intangible assets and sales in service industry. The expansion of production in the service industry requires the purchase of machinery, equipment and facilities from the manufacturing industry, which would also stimulate the expansion of production in the manufacturing industry and promote investment in fixed assets and intangible assets and sales in the manufacturing industry. The external event of “Replacing Business Tax with VAT” broke the existing balance of connection between the service industry and manufacturing industry, led to the expansion of production and investment in the service industry and manufacturing industry, and promoted the common development of the service industry and manufacturing industry (see Figure 1).

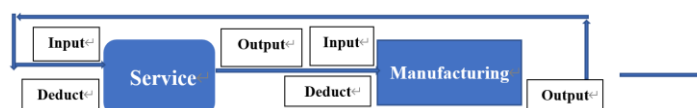


Figure 1. Connection and Tax Deduction Chain of Manufacturing and Service Industries

This study collected the financial data of 582 listed companies from 2009 to 2016, taking manufacturing enterprises and service enterprises in the experimental program of “Replacing Business Tax with VAT” as the experimental group, and other non-experimental service enterprises in the same districts as the control group. It first tested whether “Replacing Business Tax with VAT” promoted the common development of manufacturing industries and related service industries by analyzing whether the investment of fixed assets and intangible assets, sales revenue, profit rate, return on assets and return on equity of the experimental group before the implementation of “Replacing Business Tax with VAT” are significantly different from that after the implementation. It then established a Difference in Difference regression model, taking fixed assets, intangible assets, total sales revenue, profit rate, return on assets and return on equity as the dependent variables, and “Replacing Business Tax with VAT” as the external event, to further study the promotion effect of “Replacing Business Tax with VAT” on the integrated development of service industry and manufacturing industry.

2. Literature Review

The experiment and promotion of “Replacing Business Tax with VAT” started in 2012 has improved the VAT deduction chain between the secondary industries and tertiary industries, promoted economic development, and facilitated the adjustment and transformation of economic structure [1]. The effect of the implementation of “Replacing Business Tax with VAT” has attracted many scholars to study. The existing studies mainly include the following aspects: First, the changes of macroeconomic and local fiscal revenue before and after “Replacing Business Tax with VAT” [2, 3]; Second, the impact of “Replacing Business Tax with VAT” on the tax burden of enterprises [4, 5]; Third, the impact of “Replacing Business Tax with VAT” on enterprise investment, R&D and growth [6, 7]; Fourth, the promotion effect of “Replacing Business Tax with VAT” on the industrial division for enterprises [8, 9].

Up till now, the academic and business worlds have done a lot of effective research on the effect of “Replacing Business Tax with VAT”, however there still exist some shortcomings. In terms of sample selection, existing studies mainly focus on the industries experimented by “Replacing Business Tax with VAT”, namely the transportation and modern service industries, ignoring the fact that “Replacing Business Tax with VAT” also have the similar impact on the manufacturing industry. On the one hand, the manufacturing industry accepts the output (service) of the service industry and is a downstream enterprise of the service industry. After “Replacing Business Tax with VAT”, the VAT invoices issued by the service industry can be used to offset the output tax of the manufacturing industry, which will inevitably drive the manufacturing industry to outsource more services. Most studies have also confirmed the point that the reform of business tax with value-added tax has

promoted the fixed asset investment in service industry [10]. On the other hand, the manufacturing industry also provides the machinery, equipment and facilities needed by the service industry to expand production. From this perspective, the manufacturing industry has become the upstream of the service industry. Therefore, “Replacing Business Tax with VAT” on the service industry will also affect the manufacturing industry. The fixed asset investment and technological improvement in the service industry will in turn drive the manufacturing industry to expand production and promote the investment and development of the manufacturing industry. In other words, “Replacing Business Tax with VAT” will not only promote the development of experimental service industry, but also promote the development of the manufacturing industry. “Replacing Business Tax with VAT” in the transportation industry and modern service industry will affect both the directly related service industry and indirectly related manufacturing industry. In this way, the experimental group of the sample for the research should include not only the experimental service enterprises, but also the manufacturing enterprises. From the perspective of research objectives, the existing studies lack the perspective that “Replacing Business Tax with VAT” improves the VAT deduction chain between the service industry and the manufacturing industry and promotes the integrated development of service industry and manufacturing industry. From the perspective of the time span of the research, the time span of the existing studies after the implementation of “Replacing Business Tax with VAT” is relatively short, most of them extend to 2014, only 2 to 3 years from the start of the experiment of “Replacing Business Tax with VAT”, which is not enough long to observe the actual effect of the enterprise investment, the expanded production. We know that whether it is the service industry or the manufacturing industry, the expansion of production of enterprises must carry out fixed asset investment and technological improvement, and the effects of these investments will take a long time to appear. Generally speaking, it takes at least 4 to 5 years or even longer time for enterprises to reach large-scale production after the investment in fixed asset and technological improvement. The enterprises need to experience the process of planning, designing, construction, and production. Therefore, to observe the effect of “Replacing Business Tax with VAT” on enterprise investment, growth and development, a longer observation time from the start point of the experiment is needed.

Based on the analysis above, this study chose a new perspective on whether “Replacing Business Tax with VAT” promotes the integrated development of manufacturing and service industries as the research objective on the basis of summarizing existing relevant studies. In addition to the transportation industry and modern service industry that implemented the experiment of “Replacing Business Tax with VAT”, the manufacturing industry was added to the experimental group of the sample to improve the research. The end point of the time span for the research has been extended from 2014 to 2016, an increase of two years, in order to better observe the impact and effect of “Replacing Business Tax with VAT” on the enterprise investment, the growth and development of the enterprises. The reason to take 2016 as the end point of the time, is that at the end of 2006, China has completed the industry-wide coverage of VAT, and no control group can be found to compare with the experimental group after 2016. Therefore, Difference in Difference regression model analysis could not be applied in the research. However, in terms of the effect of the investment, the time span of the study is still likely short.

3. Research design

3.1. Data source

The experiment of “Replacing Business Tax with VAT” started in Shanghai on Jan. 1st 2012, and began to be launched in other provinces and cities from September in the same year. Considering the time lag of the policy, we uniformly took December 31, 2012 as the start point of the reform in the study. It is assumed that there is no “Replacing Business Tax with VAT” before this point of time and there exists “Replacing Business Tax with VAT” after this point of time.

The data of the study is derived from China Stock Market & Accounting Research Database (CSMAR), which includes financial data of enterprises listed on the Shanghai Stock Exchange and

Shenzhen Stock Exchange from 2009 to 2016. There are four years before and after “Replacing Business Tax with VAT” respectively, a total of eight years, four years before “Replacing Business Tax with VAT” and four years after “Replacing Business Tax with VAT”. A total of 462 manufacturing enterprises and experimental service enterprises (those implemented the experiment of “Replacing Business Tax with VAT” in mid-2012 in Beijing, Tianjin, and Jiangsu, Anhui, Fujian, Guangdong, Hubei and Zhejiang provinces) were taken as the experimental group. 120 enterprises from non-experimental services in the same districts were taken as the control group. The sample consists of 57 sub-industries including computer, real estate, pharmaceutical manufacturing, retail, etc. Shanghai was not included in the research sample because of the particularity of the original tax setup and the particularity of Shanghai's economic development. The transportation industry is not included in the study sample as it could deduct the 7% deduction rate of transportation fees as input tax before the experiment of “Replacing Business Tax with VAT”. The financial data included the net fixed assets, net intangible assets, sales revenue, profit rate (net profit/sales revenue), return on assets, return on equity, the time when the enterprise established, total assets, total liabilities, total shareholders' equity and total assets turnover (sales revenue/average total assets) of the enterprises in the experimental group and the control group.

3.2. Research objectives and research hypotheses

This study focuses on the impact of “Replacing Business Tax with VAT” on manufacturing and related service industries, and analyzes whether “Replacing Business Tax with VAT” has promoted the integrated development of manufacturing and related service industries. It mainly includes:

Research objective 1:

Compared with the control group, whether there are significant differences in the net fixed assets, net intangible assets, sales revenue, profit rate, return on assets and return on shareholders' equity of the enterprises in the experimental group before and after “Replacing Business Tax with VAT”, and whether the net fixed assets, net intangible assets, sales revenue, profit rate, return on assets and return on shareholders' equity of the experimental group enterprises have significantly increased after “Replacing Business Tax with VAT”. For this objective, we make the following hypotheses:

Hypothesis 1: There are significant differences in the net fixed assets, net intangible assets, sales revenue, profit rate, return on assets and return on shareholders' equity of the enterprises in the experimental group before and after “Replacing Business Tax with VAT”, and these financial indicators have significantly increased after “Replacing Business Tax with VAT”.

Hypothesis 2: There is no significant difference between the net fixed assets, net intangible assets, sales revenue, profit rate, return on assets and return on shareholders' equity of the enterprises in the control group enterprises before and after “Replacing Business Tax with VAT”.

Research objective 2:

Excluding the influence of external variables such as time, natural economic growth, historical effects, and the maturity effect of enterprises, whether “Replacing Business Tax with VAT” has a positive impact on the investment and the production expansion of manufacturing and experimental service industries. For this objective, we make the following hypotheses:

Hypothesis 3: “Replacing Business Tax with VAT” promotes the production expansion of manufacturing and experimental service enterprises, and the investment in fixed assets and intangible assets increases significantly.

Hypothesis 4: “Replacing Business Tax with VAT” promotes the production expansion of manufacturing and experimental service enterprises, and the sales revenue increases significantly.

Hypothesis 5: “Replacing Business Tax with VAT” promotes the production expansion of manufacturing and experimental service enterprises, and the profit rate increases significantly.

Hypothesis 6: “Replacing Business Tax with VAT” promotes the production expansion of manufacturing and experimental service enterprises, and the return on assets increases significantly.

Hypothesis 7: “Replacing Business Tax with VAT” promotes the production expansion of manufacturing and experimental service enterprises, and the return on equity increases significantly.

Research objective 3:

In order to verify that “Replacing Business Tax with VAT” in the service industry also played a similar role in promoting the development of the manufacturing industry, the experimental service enterprises were excluded from the experimental group, and only the manufacturing enterprises were retained to form a new experimental group, which is called experimental group 1. The new research sample is composed of experimental group 1 and the original control group. The Difference in Difference regression model was then used to analyze and verify whether “Replacing Business Tax with VAT” had a positive impact on the investment and the production expansion of the manufacturing industry after excluding the influence of extraneous variables such as time, natural economic growth, historical effect and maturity effect. For this purpose, we make the following hypothesis:

Hypothesis 8: “Replacing Business Tax with VAT” also promotes the production expansion of manufacturing enterprises, and the investment in fixed assets and intangible assets increases significantly.

3.3. Research methodology and the research model design

Descriptive statistical method was first used to analyze the mean and standard deviation of total assets, sales revenue, profit rate, return on assets and return on shareholders' equity of enterprises in the experimental group and the control group from 2009 to 2016, and to observe the changing trend of these financial indicators.

In order to test Hypothesis 1, the mean comparison analysis was applied to compare whether there were significant differences in the net fixed assets, net intangible assets, sales revenue, profit rate, return on assets and return on shareholders' equity of the experimental group before and after “Replacing Business Tax with VAT”, and whether these financial indicators showed significant growth.

In order to test Hypothesis 2, the mean comparison analysis was applied to compare whether there were significant differences in the net fixed assets, net intangible assets, sales revenue, profit rate, return on assets and return on shareholders' equity of the control group before and after “Replacing Business Tax with VAT”.

The Difference in Difference regression models then were created. The experimental group was composed of 462 manufacturing and experimental service enterprises in Beijing, Tianjin, and Jiangsu, Anhui, Fujian, Guangdong, Hubei, Zhejiang provinces that implemented the experiment of “Replacing Business Tax with VAT” in mid-2012. The experimental group was represented by **T**. The control group was composed of 120 non-experimental service enterprises in the same districts, represented by **C**. The difference between the experimental group **T** and the control group **C** was analyzed by applying the Difference in Difference regression models to evaluate the effect of “Replacing Business Tax with VAT”.

The Difference in Difference regression model is as follows:

$$Y_{it} = \beta_0 + \beta_1 * treat_{it} * after_{it} + \beta_2 * treat_{it} + \beta_3 * year_{it} + \varepsilon_{it} \quad (1)$$

The dummy variable “treat”=1, represents the experimental group T, and “treat”=0, represents the control group C. The dummy variable “after” is set according to the time before and after “Replacing Business Tax with VAT”. “after” = 1 indicates the time after “Replacing Business Tax with VAT”, and “after” = 0 indicates the time before “Replacing Business Tax with VAT”.

For the experimental group **T**, the difference estimates before and after the experiment of “Replacing Business Tax with VAT” are as follows:

$$E(Y|X, treat = 1, after = 1) - E(Y|X, treat = 1, after = 0) = \beta_1 + \beta_3 \quad (2)$$

Among them, Y is the dependent variable, X is the control variable, and β_3 is the factor of extraneous variables (including time effect, history effect and maturity effects etc.), which has the same impact on both the experimental group and the control group at the same time. Therefore, in

order to obtain the net effect of “Replacing Business Tax with VAT”, the influence of the factor should be removed.

For the control group, the difference estimates before and after the experiment are:

$$E(Y|X, treat = 0, after = 1) - E(Y|X, treat = 0, after = 0) = \beta_3 \quad (3)$$

Similarly, Y is the dependent variable, X is the control variable, and β_3 is the factor of extraneous variables.

According to the above analysis, (2) - (3) can get the net effect of “Replacing Business Tax with VAT” β_1 .

In order to test Hypothesis 3, Difference in Difference Regression Model III was established, among them:

Dependent variable: net fixed asset, and net intangible asset in the year, represented as Fixed_asset and Int_asset

Independent variable: the dummy variable of “Replacing Business Tax with VAT”

Control variable:

(1) Sales revenue (SR), the increase in sales revenue may provide more earned capital for the enterprise to expand the production.

(2) Amount of debt compared with equity, D/E Ratio was selected in the study, considering that some enterprises with low debt ratio may tend to make investment through debt financing, and the degree of debt may affect the investment behavior of the enterprise.

(3) Rate of Profit, Enterprises with good profitability have strong motivation and ability to expand investment.

In order to test Hypothesis 4, Difference in Difference Regression Model IV was established, among them:

Dependent variable: Sales revenue in the year, represented by SR.

Independent variable: the dummy variable of “Replacing Business Tax with VAT”

Control variable:

(1) Size of the enterprise, the study selected total assets to represent the size of the enterprise as economies of scale will have a positive impact on sales revenue of the enterprise.

(2) Enterprise operating capability, this study selects total assets turnover ratio (TOT), which is equal to the ratio of operating income to total assets, reflecting an enterprise's asset application capability and having a direct impact on its sales revenue.

(3) Rate of Profit, profitability closely related with sales revenue.

In order to test Hypothesis 5, Difference in Difference Regression Model V was established, among them:

Dependent variable: rate of profit in the year, represented by RP.

Independent variable: the dummy variable of “Replacing Business Tax with VAT”.

Control variable:

(1) Size of the enterprise, the study selected total assets to represent the size of the enterprise as economies of scale will have a positive impact on the profitability of enterprises.

(2) Enterprise operating capability, this study selects total assets turnover ratio (TOT), which is equal to the ratio of operating income to total assets, reflecting an enterprise's asset application capability and having a direct impact on its profitability.

(3) Sales revenue, sales revenue directly affects the profitability.

In order to test Hypothesis 6, Difference in Difference Regression Model VI was established, among them:

Dependent variable: return on assets in the year, represented by ROA

Independent variable: the dummy variable of “Replacing Business Tax with VAT”.

Control variable:

(1) Size of the enterprise, the study selected total assets to represent the size of the enterprise as economies of scale will have a positive impact on the profitability of enterprises.

(2) Enterprise operating capability, this study selects total assets turnover ratio (TOT), which is equal to the ratio of operating income to total assets, reflecting an enterprise's asset application capability and having a direct impact on its profitability.

(3) Sales revenue, sales revenue directly affects the profitability.

In order to test Hypothesis 7, Difference in Difference Regression Model VII was established, among them:

Dependent variable: return on equity in the year, represented by ROE

Independent variable: the dummy variable of “Replacing Business Tax with VAT”.

Control variable:

(1) Size of the enterprise, the study selected total assets to represent the size of the enterprise as economies of scale will have a positive impact on the profitability of enterprises.

(2) Enterprise operating capability, this study selects total assets turnover ratio (TOT), which is equal to the ratio of operating income to total assets, reflecting an enterprise's asset application capability and having a direct impact on its profitability.

(3) Sales revenue, sales revenue directly affects the profitability.

In order to test Hypothesis 8, the study used the newly constructed research sample (experimental group included only manufacturing enterprises and the control group was non-experimental service enterprises). Difference in Difference Regression Model VIII was established, among them:

Dependent variable: net fixed asset, and net intangible asset in the year, represented as Fixed_asset and Int_asset

Independent variable: the dummy variable of “Replacing Business Tax with VAT”

Control variable:

(1) Sales revenue (SR), the increase in sales revenue may provide more earned capital for the enterprise to expand the production.

(2) Amount of debt compared with equity, D/E Ratio was selected in the study. Considering that some enterprises with low debt ratio may tend to make investment through debt financing, the degree of debt may affect the investment behavior of the enterprise.

(3) Rate of Profit, Enterprises with good profitability have strong motivation and ability to expand investment.

4. Empirical study

4.1. Descriptive statistics analysis

In order to verify hypothesis 1 and hypothesis 2, the study adopts the method of mean comparison analysis to compare the differences of the mean of net fixed assets, net intangible assets, total sales revenue, profit margin, ROA and ROE before and after the implementation of “Replacing Business Tax with VAT” in the experimental group and the control group. The results are shown in Table 2 and Table 3:

Table 2. Comparison of the Mean of Financial Indicators in Experimental Group before and after “Replacing Business Tax with VAT”

VARIABLES	Comparison of average		Mean Diff (Unit: ¥)
	After=0 (Unit: ¥)	After=1 (Unit: ¥)	
Fixed asset, net	3.500e+09	4.900e+09	1.4e+09***
Intangible asset, net	4.900e+08	7.600e+08	2.7e+08***
Sales revenue	7.100e+09	9.600e+09	2.6e+09***
Profit rate	0.0740	0.0550	-0.019***
ROA	0.0480	0.0330	-0.014***
ROE	0.0860	0.0560	-0.030***

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Comparison of the Mean of Financial Indicators in Control Group before and after “Replacing Business Tax with VAT”

VARIABLES	Comparison of average		Mean Diff (Unit: ¥)
	After=0 (Unit: ¥)	After=1 (Unit: ¥)	
Fixed asset, net	1.600e+09	1.900e+09	2.700e+08
Intangible asset, net	3.300e+08	4.400e+08	1.100e+08
Sales revenue	7.500e+09	1.200e+10	5.0e+09***
Profit rate	0.112	0.109	-0.00300
ROA	0.0420	0.0350	-0.007***
ROE	0.102	0.0860	-0.016***

As can be seen from Table 1 and Table 2, after the implementation of “Replacing Business Tax with VAT”, the net fixed assets, net intangible assets and total sales revenue of the experimental group significantly increased compared with that before the implementation ($p < 0.01$). However, the financial performance indicators such as profit rate, ROA and ROE declined.

In contrast, the net fixed assets and net intangible assets of the control group only increased slightly and not significantly after the implementation of “Replacing Business Tax with VAT”, while the total sales revenue increased significantly. Profit margin, ROA and ROE fell significantly.

It can be seen that the net fixed assets and net intangible assets of the experimental group after “Replacing Business Tax with VAT” are significantly different from that before the experiment. These indicators of the experimental group had significantly increased after the experiment. “Replacing Business Tax with VAT” has promoted the investment in fixed assets and intangible assets of the manufacturing industry and the experimental service industry. No significant difference before and after “Replacing Business Tax with VAT” was found in the net fixed assets and intangible assets of the control group. Therefore, it can be preliminarily inferred that hypothesis 1 and hypothesis 2 are valid, and “Replacing Business Tax with VAT” did promote the investment in fixed assets and intangible assets of the manufacturing industry and the experimental service industry, and did have a positive effect on these industries.

4.2. Parallel trends assumption test

Before applying the Difference in Difference regression models, the parallel trend assumption is first required to confirm that there is no significant difference in the changing trend of the dependent variables between the experimental group and the control group before the implementation of the experiment, that is, there is no significant difference in the changes of mean of the explained variables between the experimental group and the control group in different years. In this study, since the experimental reform of “Replacing Business Tax with VAT” was set on January 1, 2013, it is speculated that there is no significant difference in the change of mean of the explained variables between the two groups from 2009 to 2012, so the following model can be established:

$$Y_{it} = \beta_0 + \beta_1^{2009} * treat_i + \beta_1^{2010} * treat_i * year_{2010} + \beta_1^{2011} * treat_i * year_{2011} + \beta_1^{2012} * treat_i * year_{2012} + \beta_2 * after_t + \beta_3 * treat_i * after_t + e_{it}$$

β_1^{2009} approximated the change of mean of the explained variables between the two groups in 2009, and $\beta_1^{2010}, \beta_1^{2011}, \beta_1^{2012}$ approximated the change of mean of the explained variables between the two groups in 2010, 2011, and 2012. There exists $\beta_1^{2009} = \beta_1^{2010} = \beta_1^{2011} = \beta_1^{2012} = 0$, if the parallel assumption holds. Table 4 is the result of the analysis by applying the model above.

Table 4. Parallel Trend Assumption Test

VARIABLES	(1) Fixed Asset, net	(2) Intangible asset, net	(3) Sales revenue	(4) Profit rate	(5) ROA	(6) ROE
treat	0.104 (1.61)	0.048 (0.74)	-0.098 (-1.51)	-0.332*** (-5.16)	0.037 (0.57)	-0.226*** (-3.52)
<i>treat * year</i> ₂₀₁₀	0.023 (0.35)	0.025 (0.38)	0.061 (0.94)	0.127* (1.95)	0.203*** (3.11)	0.221*** (3.40)
<i>treat * year</i> ₂₀₁₁	0.039 (0.60)	0.051 (0.78)	0.109* (1.67)	0.009 (0.14)	0.054 (0.82)	0.057 (0.88)
<i>treat * year</i> ₂₀₁₂	0.065 (0.99)	0.088 (1.34)	0.122* (1.86)	-0.123* (-1.89)	-0.187*** (-2.87)	-0.145** (-2.23)
after	0.018 (0.28)	0.056 (0.87)	0.207*** (3.22)	-0.039 (-0.61)	-0.154** (-2.40)	-0.157** (-2.47)
treat*after	0.112 (1.36)	0.118 (1.43)	-0.033 (-0.40)	-0.052 (-0.63)	-0.054 (-0.66)	-0.050 (-0.61)
Constant	-0.149*** (-3.28)	-0.129*** (-2.84)	-0.041 (-0.91)	0.303*** (6.71)	0.062 (1.38)	0.265*** (5.89)
Observations	4,656	4,656	4,656	4,656	4,656	4,656
R-squared	0.007	0.007	0.006	0.026	0.019	0.029

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As can be seen from the above table, the changes of the dependent variables $\hat{\beta}_1^{2009}, \hat{\beta}_1^{2010}, \hat{\beta}_1^{2011}, \hat{\beta}_1^{2012}$ before the implementation of “Replacing Business Tax with VAT” were basically not significant. That is the parallel trend assumption was satisfied, and the further analysis of Difference in Difference regression is applicable in the study.

4.3. Analysis of Difference in Difference regression models

On the basis of satisfying the parallel trend assumption, the analysis of Difference in Difference regression models then was applied.

Since sales revenue, profit margin, ROA and ROE are all business performance indicators, which are related to the profitability of enterprises. There may be strong correlation among these indicators. Therefore, the correlation of the above indicators was analyzed first, and the variables with strong correlation should be excluded. The correlation analysis results are as follows:

Table 5. Correlation Analysis of Financial Performance Indicators

	Sales Revenue	Profit Rate	ROA	ROE
Sales Revenue	1			
Profit Rate	-0.0220	1		
ROA	-0.0150	0.727***	1	
ROE	0.071***	0.661***	0.867***	1

The analysis showed that ROE was significantly correlated with other indicators, so ROE was no longer considered in the subsequent regression analysis, that is, only the net fixed assets, net intangible assets, total sales revenue, profit rate and ROA were used as dependent variables for regression analysis, that is, Hypothesis 7 was excluded and only Hypothesis 3, Hypothesis 4, Hypothesis 5, Hypothesis 6 and Hypothesis 8 were tested.

To verify these hypotheses, we use the previously established Difference in Difference regression model for analysis. In order to ensure the reliability and readability of the regression results, Python was first used to indent the data by 1% up or down, delete the outliers, and to standardize the quantitative data with large values (including net fixed assets, net intangible assets, and total sales revenue), and then Stata was applied for the regression analysis. The results are in the table below.

Table 6. Analysis of Difference in Difference Regression Model

VARIABLES	(1) Fixed asset, net	(2) Intangible asset, net	(3) Sales revenue	(4) Profit rate	(5) ROA
treat*after	0.101*** (5.34)	0.107*** (3.82)	-0.028 (-0.95)	-0.105 (-1.59)	-0.114* (-1.87)
Sales revenue	0.230*** (3.62)	0.307*** (2.79)		0.065 (0.99)	0.099 (1.34)
Profit rate	0.002 (0.27)	-0.007 (-1.35)			
Liability/Equity	0.002 (0.56)	0.005 (0.42)	-0.010** (-2.45)		
Asset			0.708*** (8.76)	0.026 (0.26)	-0.047 (-0.72)
Asset turnover			0.195*** (4.77)	0.051 (1.05)	0.358*** (5.82)
Constant	-0.039*** (-3.98)	-0.058*** (-2.72)	-0.041*** (-3.61)	0.048* (1.67)	0.087*** (2.86)
Observations	4,656	4,656	4,656	4,656	4,656
R-squared	0.154	0.164	0.490	0.018	0.083
Number of code	582	582	582	582	582

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

From the results of analysis, it can be found that the cross-term coefficient “treat*after” of net fixed assets and net intangible assets is significantly positive ($p<0.01$), so it can be inferred that hypothesis 3 is valid, and “Replacing Business Tax with VAT” did promote the investment in fixed assets and intangible assets in the experimental group of enterprises (namely manufacturing enterprises and experimental service enterprises). The cross-term coefficients of total sales revenue, profit margin and ROA are all negative, and the overall significance is not strong. That means Hypothesis 4, 5 and 6 failed to pass the test, indicating “Replacing Business Tax with VAT” did not significantly improve the operating performance of the experimental group of enterprises before 2016, and even the analysis showed that these enterprises experienced a decline in profitability to a certain extent in the early years after “Replacing Business Tax with VAT”.

In order to verify hypothesis 8, we only take manufacturing enterprises in the experimental districts as the experimental group, and non-experimental service enterprises in the same districts as the control group to re-conduct the Difference in Difference regression model analysis, and the results are as follows:

Table 7. Analysis of Difference in Difference Regression Model Taking only Manufacturing as Experimental Group

VARIABLES	(1) Fixed asset, net	(2) Intangible asset, net	(3) Sales revenue	(4) Profit rate	(5) ROA
treat*after	0.106*** (5.41)	0.111*** (3.95)	-0.030 (-1.02)	-0.122* (-1.81)	-0.116* (-1.83)
Sales revenue	0.235*** (3.59)	0.312*** (2.74)		0.048 (0.70)	0.071 (0.90)
Profit rate	0.004 (0.40)	-0.006 (-1.05)			
Liability/Equity	0.002 (0.45)	0.005 (0.39)	-0.009** (-2.16)		
Asset			0.704*** (8.63)	0.064 (0.61)	-0.008 (-0.11)
Asset turnover			0.195*** (4.28)	0.103** (2.40)	0.454*** (8.43)
Constant	-0.040*** (-3.84)	-0.057** (-2.58)	-0.043*** (-3.67)	0.066** (2.33)	0.095*** (3.12)
Observations	4,272	4,272	4,272	4,272	4,272
R-squared	0.161	0.166	0.487	0.023	0.102
Number of code	534	534	534	534	534

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As can be seen from the above table, the cross-term coefficient of net fixed assets and net intangible assets is significantly positive for the manufacturing enterprises in the experimental districts. It can be inferred that Hypothesis 8 is valid, that is, "Replacing Business Tax with VAT" in the service industry did have the same effect on the manufacturing industry, and "Replacing Business Tax with VAT" did promote the investment and expansion of production in the manufacturing industry and the experimental service industry. "Replacing Business Tax with VAT" promoted the integrated development of the manufacturing and experimental service industries.

5. Conclusion

"Replacing Business Tax with VAT" implemented in 2012 has changed the expectations of manufacturing and related experimental service industries for the future, making these industries' expectations more positive, and promoting the fixed asset investment and the intangible asset investment in these industries. "Replacing Business Tax with VAT" not only has a positive impact on the experimental service industries, but also has a positive impact on the manufacturing industries. "Replacing Business Tax with VAT" has promoted the integrated development of manufacturing and experimental service industries. At the same time, "Replacing Business Tax with VAT" did not immediately improve the business performance of manufacturing and experimental service industries as people thought, and even in the early years of the reform, these industries experienced some degrees of decline in profitability. There are three possible reasons. First is the delay of the investment effect. The effect of the investment may take longer time, rather than four or five years to emerge; The second reason is that the investment facing the future may squeeze the input in current production and operation, and result in the decline of the current operating profit; The third is the economic environment, because all industries, including manufacturing, experimental services and non-experimental services, experienced a decline in profitability during that time. In order to further confirm the effect of "Replacing Business Tax with VAT", a longer period of observation and analysis is needed.

6. Limitations

Based on the above analysis, this study applied descriptive statistics and Difference in Difference regression model, and better analyzed the promotion effect of "Replacing Business Tax with VAT" on the integrated development of service industry and manufacturing industry, but there are also the following shortcomings:

(1) The enterprises in the experimental group and the control group belong to different sub-industries, and the difference of the industry itself may have different impacts on the development of enterprises, thus would confuse the actual effect of "Replacing Business Tax with VAT".

(2) The observation period of time after the implementation of "Replacing Business Tax with VAT" is from 2013 to 2016. The 4 years of time span may be still not long enough to observe the effect of the expanded production of enterprises. The effect of the investment in the manufacturing and experimental service industries generated by "Replacing Business Tax with VAT" may take longer time to fully emerge.

(3) The integrated development of service industry and manufacturing industry will also be affected by the degree of industrial division and cooperation between the upstream and the downstream enterprises. This study is not detailed enough to consider the degree of industrial division and cooperation between the upstream and the downstream enterprises as a variable, which can be applied in future studies to analyze its impact on the effect of "Replacing Business Tax with VAT".

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