The Structure of Business Taxation in China*

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PRELIMINARY AND INCOMPLETE
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March 2020

Abstract

This paper documents facts about the structure of business taxation in China using administrative tax data from the State Administration of Tax from 2007-2011. We present four main findings. First, we show that in industries beyond manufacturing, corporate income taxes comprise a relatively small share of business taxes. Gross receipt taxes play a major role in many other industries, leading to potential distortions across sectors of the economy. Second, within manufacturing, the collection of excise taxes eclipse that of value-added taxes. Third, we document the importance of different deductions and exemptions in the corporate tax system that drive important differences between statutory and effective tax rates. These different deductions lead to significant differences across industries and ownership categories and also drive trends in effective tax rates over time. Finally, we document significant dispersion in effective tax rates and relate these statistics to those in the misallocation literature that infers "tax wedges" from production data.

JEL Codes: D25, H25, E22
Keywords: China, VAT, corporate taxes, business taxes

*This project is funded by NSF grant #17300024. All errors remain our own.

1 Introduction

The structure of business taxation is at the heart of important economic and policy questions. Governments often use tax policy as a form of economic stimulus. Understanding the structure of business taxation is critical for designing effective stimulus policies. The structure of business taxes can also play an important role in structural transformation. This role is especially important for emerging economies wishing to transition from agriculture to manufacturing and eventually by growing their service and innovation sectors. Finally, tax structures may lead to misallocation of resources within a given country if firms face different tax burdens. Quantifying the degree to which taxes may contribute to resource misallocation can inform ongoing debates on the sources of productivity differences across countries.

This paper documents important facts about the structure of business taxation in China. Improving our understanding of business taxes can illuminate broader trends of fiscal policy in China including the evolving mix of private and state sectors as well as the government's focus on technology-intensive industries as a source of future economic growth. Because of China's growing dominance in manufacturing and its crucial role in the global value chain, tax policy in China affects production and consumption in the rest of the world. Finally, China has also undertaken important steps to reform its approach to business taxes. For instance, the central government standardized its income tax system across firms, refined the implementation of the value-added-tax system to avoid disrupting production, and adopted aggressive tax incentives for innovative activities. A better understanding of these changes to business taxation in China can help other emerging countries determine whether these policies can help their economies.

To improve our understanding of business taxation in China, we take advantage of administrative tax data for years 2007–2011. These data have a number of advantages. First, because these data are used by Chinese authorities to audit companies, they help us eschew concerns over misreporting and data quality. By merging administrative tax data with the Annual Survey of Manufactures, we can provide a valuable cross-check for this well-studied database. Second, our data allow us to characterize business taxes beyond the manufacturing sector. Finally, relative to the misallocation literature that infers the influence of taxes through "wedges" in production choices, these data allow us to measure a variety of different taxes and how they interact with each other. Access to these data therefore provide a valuable opportunity to dissect the contribution of fiscal policy to "misallocation" in China at the micro-level.

Our analysis starts by describing our data coverage and by describing the different taxes paid by businesses in China. We document the following facts. First, we document the prevalence of competing tax systems across industries. The Value-Added Tax (VAT) is the major tax for firms in primary industries (e.g., mining, agriculture, forestry). In contrast, the business tax—

a tax on gross receipts—affects many firms in construction and several service sectors (e.g., finance, insurance, transportation, and communications). Surprisingly, an excise tax on specific commodities affects a large fraction of manufacturing firms. The joint existence of VAT, gross-receipts, and excise taxes contradicts simple models of optimal taxation. Moreover, because these tax systems generate different effective tax rates and distortions, they can encourage some sectors while constraining growth in others. In addition to documenting heterogeneity across sectors, we document substantial heterogeneity in the geographic distribution of the structure of tax payments. The reliance of different types of taxes across regions can also be related to the uneven distribution of economic activity in the country.

Second, we document the importance of payroll taxes for Chinese businesses. In spite of the fact that payments to the social security fund are not officially taxes, we find that these contributions constitute a non-negligible fraction of payments to the Chinese government. While changes in other taxes have been studied in the literature, these payroll taxes have not been explored in detail.

Third, we also document changes in the kind of taxes businesses pay over time. Effective tax rates for VAT, business taxes, and corporate income taxes have all been decreasing after 2009. While firms of all ownership structures share this trend in VAT, business, and excise taxes, this is not the case for the corporate income tax. State owned enterprises, collective owned enterprises, and other domestic corporations have experienced a decline in effective tax rates. In contrast, foreign enterprises (including those from Hong Kong, Taiwan or Macao) saw a rise in their effective tax rate.

In ongoing work, we are characterizing how different exclusions and deductions contribute to differences in tax burdens across firms and how dispersion in effective tax rates across firms can lead to misallocation. For instance, we find that a large share of corporations enjoy a lower-than-statutory VAT rate, even in the manufacturing industry. We also find interesting correlations between effective tax rates and measures of firm size, such as assets. We document a negative correlation between effective VAT rates and assets, a positive one between effective business tax rates and assets, and an inverted-U relation between corporate income taxes and assets. We also show that a large share of firms in finance and insurance and of listed corporations are concentrated at a 0% effective corporate income tax rate. These firms are able to achieve this preferential treatment by taking advantage of back deductions and other exemptions. This micro-data approach to characterizing dispersion in effective tax rates, as well as the specific tax policies that lead to these patterns, will allow us to quantify losses from misallocation in finer detail than previous approaches.

This paper is related to several strands of research. First, the paper is related to the literature on taxes in developing countries. Gordon and Li (2009) note that lack of administrative capacity

to enforce compliance leads developing countries to rely on tax systems that interact with the financial system, which generates a paper trail of economic activity. These kind of frictions lead to departures from first-best policy recommendations (e.g., Diamond and Mirrlees, 1971), whereby governments may rely on gross-receipts taxes in order to limit compliance problems (e.g., Best, Brockmeyer, Kleven, Spinnewijn and Waseem, 2015). By studying the structure of business taxation in one of the largest emerging economies, we provide new facts that shed light on how countries balance tax revenue needs with economic distortions.

Second, this paper is related to recent work studying how Chinese firms respond to tax incentives (e.g., Cai and Harrison, 2016; Liu and Mao, 2018; Chen, He and Zhang, 2016; Chen, Liu, Suárez Serrato and Xu, 2019b; Chen, Jiang, Liu, Suárez Serrato and Xu, 2019a; Fan, Liu, Qian and Wen, 2018). These papers show that, as in other countries (e.g., Yagan, 2015; Maffini, Xing and Devereux, 2016; Rao, 2016; Zwick and Mahon, 2017; Ohrn, 2018a,b; Moon, 2019), firms are highly responsive to tax policy incentives. For example, recent reforms to improve the collection and administration of the VAT had important implications for both economic activity and tax collections. In addition, the government has relied on tax incentives as a way to implement national directives to focus on technology upgrading and to foster its innovation sector (e.g., Wei, Xie and Zhang, 2017).

Finally, this paper is related to the large literature that motivates the observed resource misallocation by pointing to dispersion in the marginal products of inputs across firms (e.g., Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009). These so-called "wedges" are often interpreted as distortions arising from fiscal policy. For the case of China, Brandt, Tombe and Zhu (2013) document rich variation in these "wedges" across different regions and time periods. However, few papers have quantified the costs of misallocation by measuring actual variation in tax policy (e.g., Fajgelbaum, Morales, Suárez Serrato and Zidar, 2018). Our unique data allows us to document new patterns of dispersion in actual taxes and subsidies. By comparing these observed wedges to those inferred from optimization, we can cross-check the extent to which fiscal policy is an important driver of misallocation.

The rest of the paper will be structured as follows. Section 2 will present basic facts about business taxation in China. Section 3 will present our data and discuss summary statistics. Section 4 will document patterns in tax payments across different business tax categories. Section 5 will describe patterns that drive differences between statutory and effective tax rates. Finally, Section 6 will document patterns of dispersion in tax wedges across firms. Section 7 will conclude. Currently, the analysis in these sections is preliminary work in progress and is meant to be illustrative of the figures we aim to produce.

2 Business Taxes in China

Since the end of the 20 century, China has gone through a series of tax reforms to establish China's current tax system, which serves the goals of collecting fiscal revenue, serving as an instrument of economic policies and improving fairness of income distribution. By 2013, there are 18 taxes in China's tax system, of which 17 taxes except personal income tax can be classified as business taxes [1]. The 17 business taxes are Value-Added tax (VAT), Enterprise Income Tax (EIT), Business Tax, Excise Tax, City Maintenance and Construction Tax, Deed Tax, Tariff, Land Appreciation Tax, Vehicle and Vessel Tax, Urban Land Use Tax, Real Estate Tax, Farmland Occupation Tax, Stamp Tax, Resources Tax, Vehicle Purchase Tax, Tonnage Tax and Tobacco Tax.

Table 1 shows the breakdown of China's tax revenue in 2011. The Value-Added Tax (VAT), Enterprise Income Tax (EIT), Business Tax and Excise Tax (ET) have contributed to more than 80% of total tax fiscal revenue of China in 2011, as shown in Table 1.

[1] Individuals also pay some of these 17 taxes, including Real Estate tax, Vehicle and Vessel Tax, Vehicle Purchase Tax, Stamp Tax and Deed Tax

Table 1: **2011 Tax Revenue Breakdown**

Type of Tax	% of Total Tax Revenue
Total Tax Revenue	100 %
Domestic Value Added Tax (VAT)	27.0%
Enterprise Income Tax	18.7%
Business Tax	15.2%
VAT and Excise Tax on Import	15.1%
Domestic Excise Tax	7.7%
Personal Income Tax	6.7%
City Maintenance and Construction Tax	3.1%
Deed Tax	3.1%
Tariff	2.9%
Land Appreciation Tax	2.3%
Vehicle and Vessel Tax	2.3%
Urban Land Use Tax	1.4%
Real Estate Tax	1.2%
Farmland Occupation Tax	1.2%
Stamp Tax	1.2%
Resources Tax	0.7%
Other miscellaneous taxes	0.5%
VAT and Excise Tax Refund on Export	-10.3%

Source: `www.gov.cn`

These 17 business tax can be reclassified in to four big categories - agriculture tax, goods and service tax, income tax, and property tax. The Agriculture Tax was terminated in 2006, so the tobacco tax is the only tax that is levied on agriculture currently.

There have been a series of tax reforms on goods and service since 2008. VAT is a type of consumption tax, which is levied on the value added part at each stage of production and sales. The baseline VAT rate is 17 %, but 13 % VAT is applied to mining and utilities industries, and agriculture produces are exempt from VAT. One of the biggest tax reform in China is the change from production-based VAT to consumption-based VAT in 2009. Before 2009, the VAT on fixed investment was not allowed to deduct from VAT calculations, while since 2009, VAT from investment on fixed assets can be deducted from VAT base. Excise Tax is also a type

of consumption tax, but is levied on a small group of consumption goods, such as tobacco, alcohol, makeups, and fireworks. Producers need to pay both VAT and excise tax if the goods are applicable to excise tax. Excise Tax can taxed based on price, quantity, or both, depending on categories of goods. In 2008, China raised the per unit excise tax on refined oil and Excise Tax rate on large displacement vehicle, while lowering excise tax on small displacement vehicle. And in 2009, China added a 5% excise tax at the wholesale stage of tobacco. Business Tax is the counterpart of VAT on service, intangible assets and real estate. Corporations pay Business Tax on the whole revenue from provision of service, transfer of intangible assets, and sell or leasing of real estate. A 3% Business Tax is levied on business revenue in the construction, transportation, postal, telecommunication, and culture and sports industries, and a 5% Business Tax is applied to business revenue from all the other service industry in general.

Before 2008, there is a dual-track system of EIT in China, in which domestic-owned enterprise pay a 33% EIT, while foreign-owned enterprises pay a preferential EIT rate varying from 15% and 24%. Since 2008, both domestic and foreign owned enterprises pay a common 25% rate of EIT.

As for property taxes, China has unified Vehicle and Vessel Tax, Urban Land Use Tax, Farmland Occupation Tax, Real Estate Tax, Resources Tax, and City Maintenance and Construction Tax for domestic and foreign owned enterprises since 2006. In 2008, China has lowered the Stamp Tax on securities transactions from 0.3% bi-laterally to 0.1% unilaterally In 2010, China changed Resources Tax from quantity base to price base, and raised the Resource Tax rate in Western China, and later expanded this reform to the whole nation.

In addition to the 17 business taxes above, corporations established in China have to pay a general 20% of total wages per month as contributions to social security funds, which is similar to payroll tax, and various administrative charges and fees.

3 Administrative Tax Data

Our main data is the administrative tax records from 2007-2011, collected by State Taxation Administration (STA) of China. STA is the counterpart of IRS in China, and is responsible for tax collection, tax audition and collection of contributions to social security funds. In this data, we have access to firm-level records of detailed tax payment breakdowns of the above 17 business taxes, which include specific annual tax bases, tax payable, tax deductions and exemptions, tax credits and actual tax payment information for VAT, EIT, Business Tax, and Excise Tax. In addition to tax payment, the data also include payment information on contributions to social security funds, charges and fees, and financial statement information used in tax-related

calculations.

According to different treatment of tax code, we reclassify the 20 industry groups into 9 groups, as shown in Table 2. Table 3 and Table 4 report summary statistics of firms in each industry and each ownership structure, respectively.

Table 2: **Industry Classification**

Group	Industry	China Industry Classification
1	Agriculture, Fishing and Forestry	Agriculture, Fishing and Forestry
2	Mining, Quarrying, and Oil and Gas Extraction	Mining, Quarrying, and Oil and Gas Extraction
3	Manufacturing	Manufacturing
4	Utilities	Utilities and Energy
5	Construction	Construction
6	Finance and Insurance	Finance and Insurance
7	Real Estate	Real Estate
8	Transportation, Postal and Telecommunication	Transportation, Warehousing and Postal Industry - Transportation, Postal Industry Information - Telecommunications Transportation, Warehousing and Postal Industry - Warehousing Information - Information Service, Software
9	Other Services	Wholesale and Retail Trade Accommodation and Food Services Leasing and Business Services Professional, Scientific, and Technical Services Water, Environment and Public Facilities Management Resident Services and Other Services Educational Services Health Care and Social Assistance Arts, Entertainment, and Recreation Public Administration and Social Organization International Organization

Notes: Twenty China Industry Classification codes from China's Bureau of Statistics are reclassified based on tax code treatment of each industry. Industries that share the similar statutory tax rate of a certain taxes and similar applicable tax categories are classified into one group.

3.1 Industry

Table 3: **Summary Statistics by Industry**

Industry	2007	2008	2009	2010	2011
(A) Number of Firms					
Agriculture, Fishing and Forestry	4,287	7,206	8,101	6,867	6,206
Mining, Quarrying, and Oil and Gas Extraction	16,894	18,130	17,232	18,132	18,192
Manufacturing	273,455	313,797	308,803	315,358	283,051
Utilities	11,417	12,737	13,771	13,874	13,463
Construction	23,597	26,149	27,408	30,226	30,537
Finance and Insurance	16,862	18,765	19,889	20,854	22,443
Real Estate	21,375	25,554	30,473	36,186	37,367
Transportation, Postal and Telecommunications	14,549	16,508	17,542	19,335	24,229
Other Services	250,781	311,237	300,946	285,957	256,379
(B) Assets					
Agriculture, Fishing and Forestry	32,173	32,101	39,943	58,832	93,156
	[3,988]	[3,631]	[3,638]	[5,685]	[9,794]
Mining, Quarrying, and Oil and Gas Extraction	85,845	101,824	162,489	170,094	255,849
	[10,443]	[13,046]	[15,945]	[17,330]	[23,510]
Manufacturing	62,208	62,738	82,499	95,019	135,819
	[6,790]	[6,762]	[8,773]	[10,762]	[17,030]
Utilities	290,316	304,395	400,943	405,571	532,279
	[55,809]	[53,748]	[52,398]	[53,914]	[64,515]
Construction	91,126	104,632	137,856	150,454	208,417
	[17,992]	[20,708]	[24,888]	[28,166]	[32,814]
Finance and Insurance	925,201	996,013	1,507,892	1,389,035	1,978,090
	[503,674]	[533,294]	[500,792]	[433,018]	[164,035]
Real Estate	248,176	268,027	358,848	397,928	518,732
	[82,054]	[90,446]	[107,645]	[127,436]	[162,689]
Transportation, Postal and Telecommunications	172,271	174,305	228,100	209,874	271,999
	[14,038]	[13,429]	[9,510]	[10,521]	[11,022]
Other Services	37,779	38,825	58,132	71,506	108,286

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Table 3 – continued from previous page

Industry	2007	2008	2009	2010	2011
	[2,617]	[2,927]	[3,562]	[5,021]	[6,787]
(C) Employment					
Agriculture, Fishing and Forestry	67	56	70	74	98
	[19]	[15]	[15]	[18]	[22]
Mining, Quarrying, and Oil and Gas Extraction	210	201	258	222	255
	[66]	[65]	[75]	[65]	[65]
Manufacturing	148	132	149	149	175
	[42]	[38]	[44]	[50]	[60]
Utilities	238	217	229	210	220
	[99]	[84]	[78]	[71]	[70]
Construction	190	177	219	196	219
	[40]	[40]	[50]	[49]	[47]
Finance and Insurance	147	149	171	167	183
	[50]	[49]	[52]	[55]	[50]
Real Estate	50	45	49	48	48
	[25]	[23]	[24]	[24]	[24]
Transportation, Postal and Telecommunications	208	195	232	200	204
	[60]	[55]	[57]	[59]	[48]
Other Services	46	42	53	57	66
	[10]	[11]	[12]	[13]	[13]
(D) Production					
Agriculture, Fishing and Forestry	18,918	18,513	22,206	29,451	48,737
	[1,602]	[1,682]	[532]	[1,094]	[3,000]
Mining, Quarrying, and Oil and Gas Extraction	59,543	76,116	66,888	73,367	119,608
	[11,870]	[14,395]	[8,101]	[10,760]	[16,399]
Manufacturing	56,869	56,611	54,312	63,088	99,415
	[7,000]	[7,190]	[5,650]	[8,076]	[14,784]
Utilities	147,256	148,271	140,180	135,852	208,550
	[18,286]	[20,122]	[8,335]	[9,237]	[14,072]
Construction	80,315	88,363	78,898	73,767	122,288
	[12,608]	[15,218]	[5,960]	[3,065]	[10,534]

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Table 3 – continued from previous page

Industry	2007	2008	2009	2010	2011
Finance and Insurance	45,646	60,772	27,777	16,167	43,468
	[0]	[0]	[0]	[0]	[0]
Real Estate	46,943	46,497	37,910	27,487	48,305
	[389]	[2,020]	[0]	[0]	[0]
Transportation, Postal and Telecommunications	59,215	66,459	35,583	27,849	54,525
	[5,120]	[7,337]	[0]	[0]	[0]
Other Services	20,498	24,735	20,814	22,756	57,556
	[0]	[177]	[0]	[0]	[1]
Observations	633,217	750,083	744,165	746,789	691,867

Notes: This table presents summary statistics of number of firms, assets, employment and production by industry from 2007 to 2011. Asset is the end of year asset, which includes both current and non-current assets, and reported in thousand RMB. Employment is the average number of workers within a calendar year. Production is the total output within a calendar year, and reported in thousand RMB. Variables are winsorized at the 1% level. Medians are reported in brackets.

As shown in Table 3 Panel (A), the manufacturing industry has the largest number of firms per year, following by service industry excluding finance and insurance, real estate, and transportation, postal and telecommunication. In terms of assets (both current and non-current assets), the finance and insurance industry has the highest value of average asset, followed by utilities industry and real estate industries, as shown in Table 3 Panel (b). In Table 3 Panel (C), the utilities, mining, quarrying, and oil and gas extraction, and transportation, postal and telecommunication industry have the highest average employment across years. As shown in Table 3 Panel (D), utilities industry has the highest average output of all time. Finance and insurance industry have the 3rd highest average productions in 2007, but the average output shrank sharply during 2008, 2009 and 2010, and recovered in 2011.

3.2 Ownership Structure

Table 4: Summary Statistics by Ownership

Ownership	2007	2008	2009	2010	2011
(A) Number of Firms					
State Owned Enterprise	52,928	49,422	45,727	40,135	38,950

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Table 4 – continued from previous page

Ownership	2007	2008	2009	2010	2011
Collective Owned Enterprise	40,134	36,494	28,256	24,059	17,282
Foreign Invested Enterprise	36,950	43,296	47,144	54,989	51,479
HK, TW or MO Invested Enterprise	26,305	28,703	30,724	34,879	34,006
Listed Stock Corporation	9,147	9,727	11,803	12,558	14,504
Others	467,705	582,433	580,523	580,173	535,646
(B) Assets					
State Owned Enterprise	233,905	255,011	368,732	368,741	553,815
	[23,248]	[23,639]	[26,522]	[32,565]	[36,372]
Collective Owned Enterprise	59,569	65,006	91,319	105,217	175,504
	[3,830]	[3,623]	[4,082]	[4,406]	[6,738]
Foreign Invested Enterprise	182,998	178,671	218,434	213,468	287,325
	[36,590]	[32,666]	[33,310]	[32,170]	[39,548]
HK, TW or MO Invested Enterprise	150,329	162,346	210,459	212,486	276,726
	[33,198]	[32,500]	[35,283]	[35,080]	[42,374]
Listed Corporation	997,552	1,138,040	1,554,199	1,554,100	2,128,667
	[571,796]	[768,139]	[486,920]	[728,806]	[314,690]
Other	47,024	51,588	78,199	95,662	141,249
	[3,980]	[4,265]	[5,528]	[7,611]	[11,864]
(C) Employment					
State Owned Enterprise	215	203	253	233	265
	[60]	[57]	[63]	[68]	[65]
Collective Owned Enterprise	84	79	93	94	109
	[25]	[23]	[26]	[30]	[33]
Foreign Invested Enterprise	255	230	247	220	250
	[100]	[88]	[85]	[84]	[90]
HK, TW or MO Invested Enterprise	264	248	270	244	262
	[114]	[105]	[106]	[101]	[102]
Listed Stock Corporation	297	293	358	333	394
	[82]	[80]	[82]	[102]	[93]
Other	77	69	81	85	99

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Table 4 – continued from previous page

Ownership	2007	2008	2009	2010	2011
	[18]	[16]	[20]	[22]	[26]
(D) Production					
State Owned Enterprise	96,359	108,388	82,425	80,615	145,679
	[5,858]	[7,744]	[0]	[0]	[2,169]
Collective Owned Enterprise	18,172	17,509	15,717	17,504	30,443
	[2,484]	[2,552]	[1,074]	[1,139]	[2,389]
Foreign Invested Enterprise	132,724	129,773	104,494	105,286	169,514
	[28,128]	[26,118]	[10,811]	[13,767]	[24,588]
HK, TW or MO Invested Enterprise	106,383	107,541	94,331	97,776	146,165
	[26,152]	[25,745]	[14,010]	[16,000]	[24,221]
Listed Stock Corporation	254,988	297,467	133,366	116,808	228,505
	[19,548]	[39,063]	[0]	[0]	[0]
Other	32,883	34,869	30,474	34,710	62,920
	[2,895]	[3,361]	[1,100]	[1,256]	[3,936]
Observations	633,169	750,075	744,177	746,793	691,867

Notes: This table presents summary statistics of number of firms, assets, employment and production by ownership structure from 2007 to 2011. The "Other" ownership category includes private corporations, non-stock corporations, sole proprietorship corporations and unlisted stock corporations. Asset is the end of year asset, which includes both current and non-current assets, and reported in thousand RMB. Employment is the average number of workers within a calendar year. Production is the total output within a calendar year, and reported in thousand RMB. Variables are winsorized at the 1% level. Medians are reported in brackets.

The number of corporation with specific ownership structure is shown in Table 4 Panel (A). Table 4 Panel (B) shows that listed corporations have the largest amount of average asset value, followed by SOEs and FIEs. Moreover, listed corporations have the largest average employment, followed by FIEs and SOEs, as is shown in Table 4 Panel (C). In terms of average production, listed corporations has the highest average amount, but the size was reduced by more than half in 2009 and 2010, compared to those in 2007 and 2008.

4 Tax Payment

Tax payment is the total of all VAT, excise tax, business tax, and EIT payable amounts and local taxes, VAT and excise tax on imported goods, duties, administrative and other charges,

social security funds contributions, and fines, but does not include withholding personal income tax and withholding excise tax, among all firms within the same classification group.

Given the fact that only paid amounts of local taxes, VAT and excise tax on imported goods, duties, administrative and other charges, social security funds contributions, and fines are available in our data, in terms of calculating total tax payment, the paid amounts are used for these taxes and charges.

Besides, because the EIT payable is only available from 2008 to 2011, the analysis is conducted on a balanced panel sample from 2008 to 2011.

4.1 Tax Payment by Industry

The composition of the total tax payment across industries is shown in Figure 1. As can be seen from the figure, in addition to other taxes and charges, VAT is the major tax type among agriculture, mining, manufacturing and utilities industries, while business tax is the major tax among construction and real estate industries.

Noticeably, in addition to VAT, the excise tax plays an important role in the total tax payment among firms in the manufacturing industry. Besides, more than half of tax burden in the utilities industry comes from VAT.

Among construction, finance and insurance, real estate, and transportation, postal and telecommunications industries, the business tax dominates total tax payment. Generally speaking, the enterprise income tax is the second largest tax payment in all industries, except for manufacturing and real estate industry. However, in the real estate industry, the other taxes and charges have a similar role as enterprise income tax among total tax payment.

4.2 Tax Payment by Ownership

The composition of total tax payment also varies with ownership structure, as seen in Figure 2.

Among SOEs, the excise tax takes the largest fraction, followed by VAT and business tax, but the fraction of business tax is decreasing over time. In contrast to SOEs, the excise tax takes an negligible share of total tax payment, while business tax is the 2nd largest tax after VAT, among COEs. Moreover, among FIEs and HK, TW and MO invested enterprises, VAT, enterprise income and excise tax are the top three tax categories other than other taxes and charges, but the fractions of VAT and excise tax are shrinking over the years. However, the shares of enterprise income tax are both small in SOEs and listed corporations, compared to other ownership structured.

Generally speaking, the composition of total tax payment across ownership types is quite stable over time, except that of the listed firm. In detail, the share of excise tax almost doubled



Figure 1: **Total Tax Payment Decomposition by Industry, 2008 - 2011**

Notes: This figure displays the tax type composition of total tax payment among each industry in a given year from 2008 to 2011. The total tax payment is calculated as the sum of tax payable of all taxes, administrative and non administrative charges, payment to social security funds, and fines and fees, excluding withholding personal income tax and withholding excise tax. The figure shows that the tax payment structure varies across industries, but remains quite stable over the years.

in 2008 compared to that in 2007, among listed firms.

4.3 Tax Payment by Region

Next, we decompose the total tax payment of six regions (North, Northeast, Northwest, East, Southeast, Southwest). There is also heterogeneity across geographical locations, as shown in Figure 3. For example, business tax plays an important role as VAT in the North, while excise tax have become the dominating tax in the Northeast and Northwest regions.

5 Effective Tax Rate Analysis

The effective tax rates are calculated as the ratio of tax payable over tax base, as shown in the following:

$$
\begin{aligned}
ETR^{VAT} &= \frac{\text{VAT Payable}}{\text{Value-added}} \\
ETR^{ET} &= \frac{\text{Excise Tax Payable}}{\text{Sales of Goods subject to Excise Tax}} \\
ETR^{BT} &= \frac{\text{Business Tax Payable}}{\text{Revenue subject to Excise Tax}} \\
ETR^{EIT} &= \frac{\text{EIT Payable}}{\text{Taxable Income after Tax Adjustment}}
\end{aligned}
$$

5.1 Effective Tax Rate Across Industry, Ownership and Region

5.1.1 Industry

As shown in Figure 4, there is large heterogeneity in the effective tax rate across tax categories, industries and years.

First of all, the effective VAT tax rate is the highest in mining, quarrying, and oil and gas extraction industry, manufacturing industry and the utilities industry, while construction, finance and insurance, real estate, transportation, postal and telecommunication industries pay little effective VAT tax rate. In the perspective of changes over time, the effective VAT tax rate increases around 2009 among mining, quarrying, oil and gas extraction, manufacturing and utilities industries, and stays quite stable in other time periods. As can be seen from Figure 4 Panel A, the effective tax rates in these industries are generally higher than the statutory rates, which reflects the fact that not all input materials and raw goods can be deducted from VAT collections.

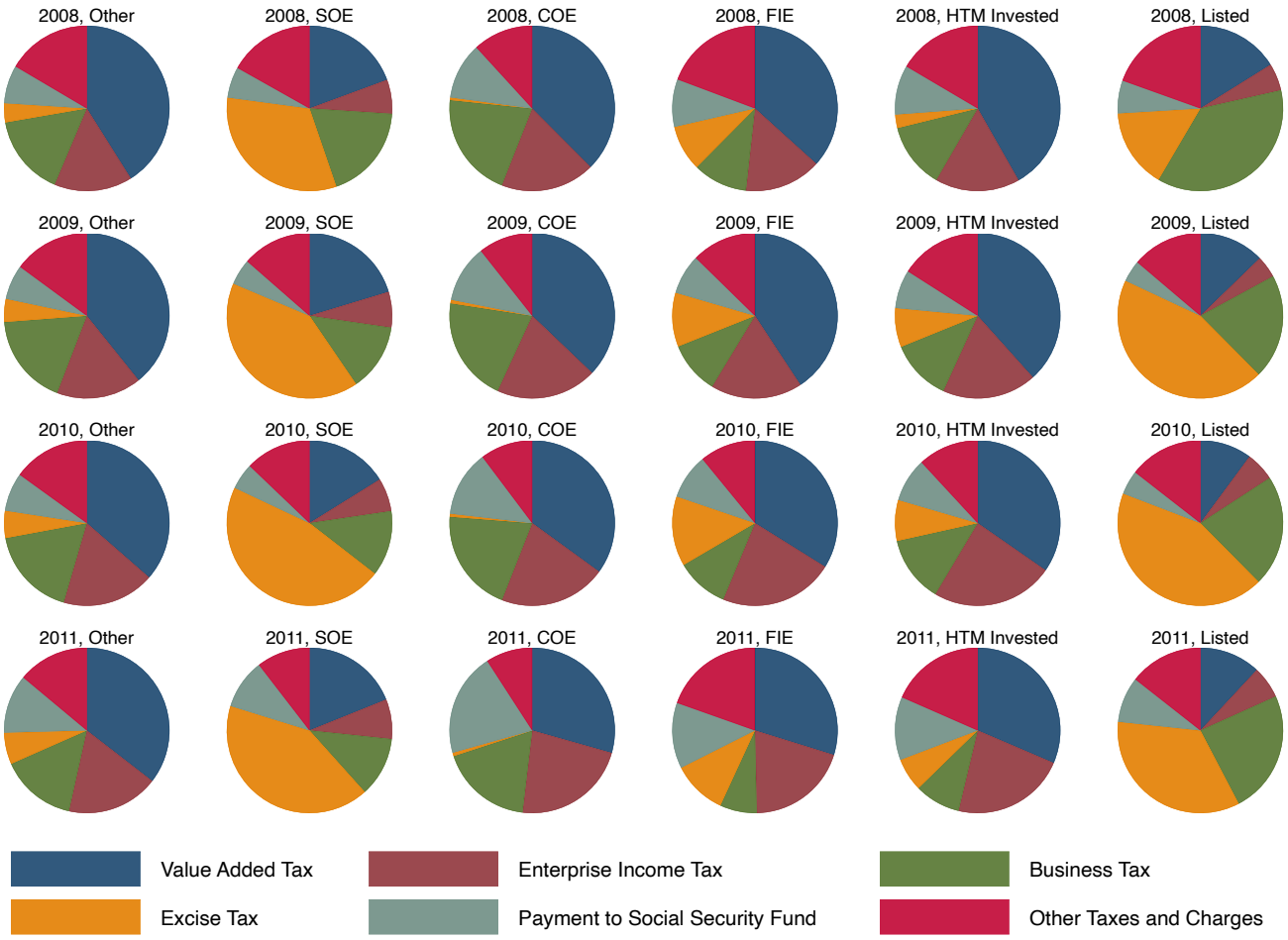


Figure 2: **Total Tax Payment Decomposition by Ownership, 2008 - 2011**

Notes: This figure displays the tax type composition of total tax payment among each ownership structure in a given year from 2008 to 2011. The total tax payment is calculated as the sum of tax payable of all taxes, administrative and non administrative charges, payment to social security funds, and fines and fees, excluding withholding personal income tax and withholding excise tax. The figure shows that SOEs and listed corporations have similar tax payment structure, in which excise tax plays an important role. In other ownership structures, VAT and EIT are the major taxes.

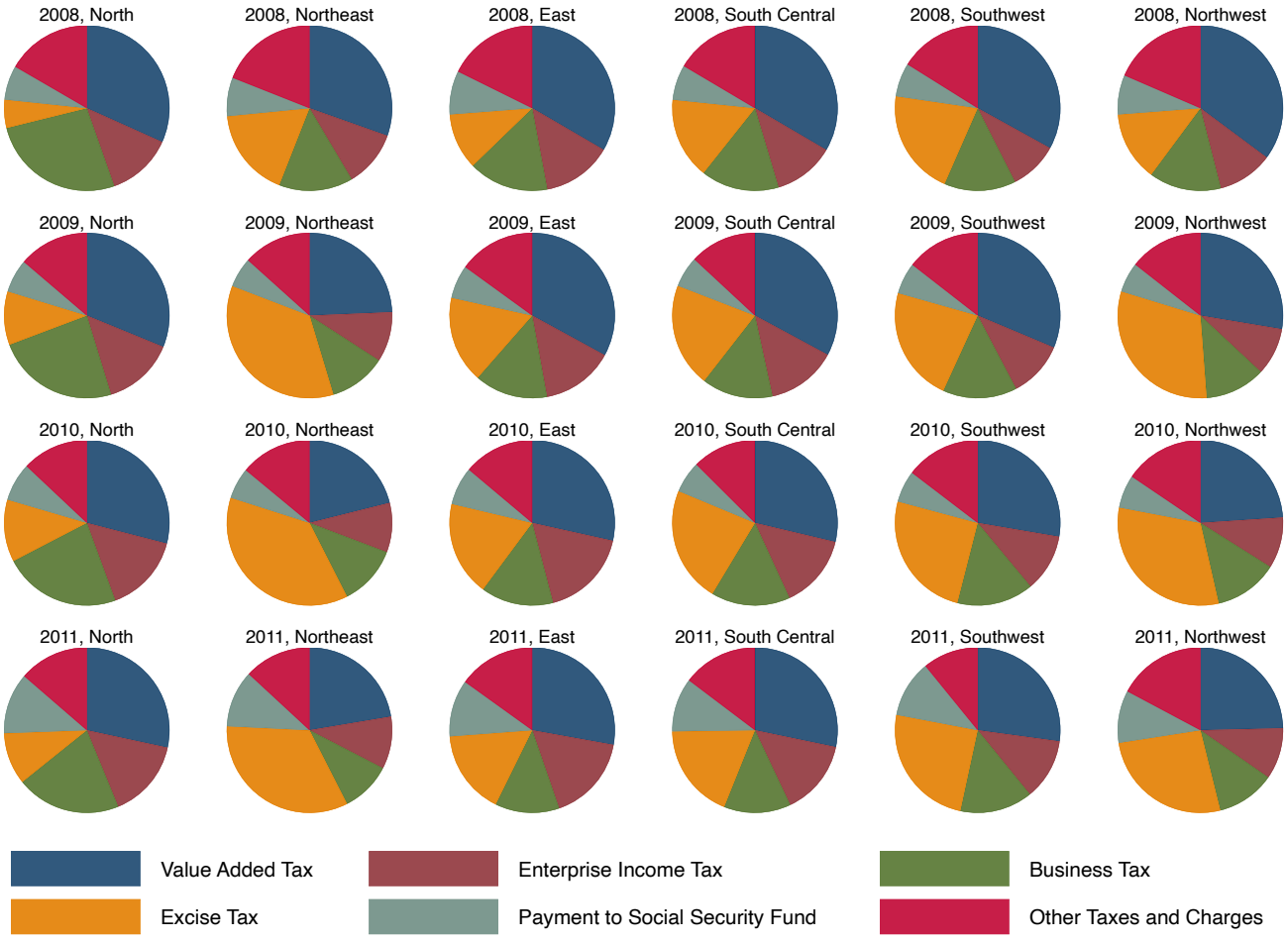


Figure 3: **Total Tax Payment Decomposition by Region, 2008 - 2011**

Notes: This figure displays the tax type composition of total tax payment in six regions (North, Northeast, Northwest, East, South Central, South West) of China from 2008 to 2011. The total tax payment is calculated as the sum of tax payable of all taxes, administrative and non administrative charges, payment to social security funds, and fines and fees, excluding withholding personal income tax and withholding excise tax. The figure shows corporations in Northeastern and Northwestern China have both experienced expansion of excise tax from 2008 to 2009, while the tax payment structure remains relatively stable in other regions of China.

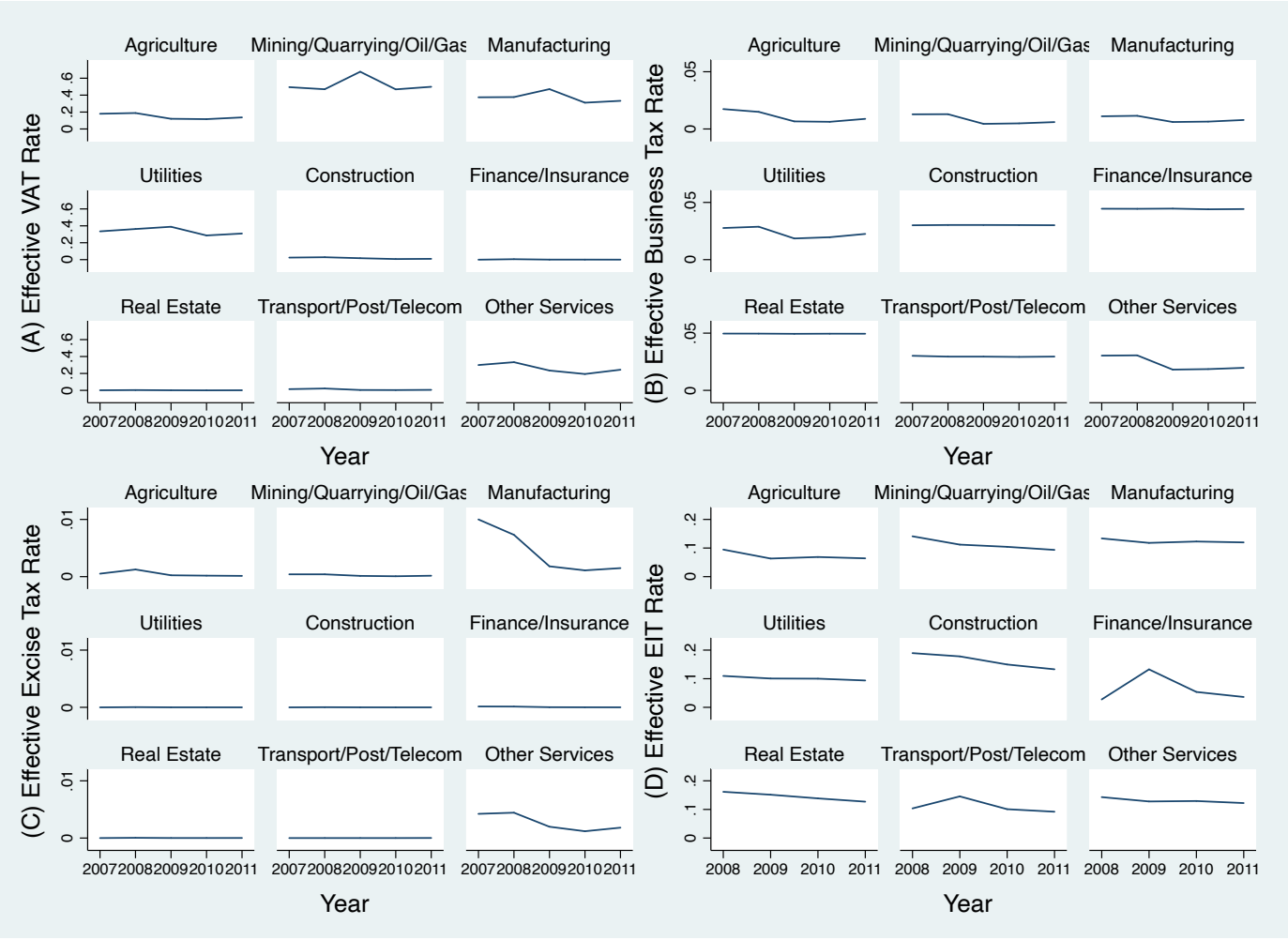


Figure 4: **Effective Tax Rate by Industry, 2008 - 2011**

Notes: This figure displays the effective tax rates of VAT, business tax, excise tax and EIT in each industry from 2008 to 2011. The effective tax rate is defined as the ratio between tax payable over tax base, where the tax base is referred to the accounting income, revenue or sales statistics after tax adjustment, but before tax credits, deductions and exemptions. Panel (A) shows that VAT is mostly levied on the agriculture, mining, manufacturing and utilities industries, and the average effective tax rate in these industries are higher than statutory rates of VAT. Panel (B) shows that finance and insurance, real estate and construction industries have the highest effective business tax rates, which remain relatively stable over time. Panel (C) show that manufacturing industry pays the highest effective excise tax rate, which drops sharply from 2007 to 2009. Panel (D) shows that there is a slightly decreasing trend in effective EIT rates across years, except the finance and insurance, and transportation, postal and telecommunication industries, which witnessed a spike around 2009.

The finance and insurance, real estate, construction, and transportation, postal and telecommunication industries have the highest effective business tax rate, the magnitude of which remains quite stable over the years, as shown in Figure 4 Panel B. In contrast, agriculture, mining, manufacturing, utilities and other service industry have witnessed a decline in the effective business tax rate.

In terms of the effective excise tax rate, manufacturing industry has the highest effective excise tax rate and has experienced the largest cut in effective excise tax rate over the years, followed by agriculture and other service industries. The effective excise tax rate is less than 1 percent, which is relatively small compared to other tax categories.

The effective enterprise income tax rate is higher than the effective tax rate of VAT, excise tax and business tax across industries, on average. And the construction and real estate industries have the highest effective EIT tax rate. All industries have experienced decline in the effective EIT tax rate over years, except that the finance and insurance, and transportation, postal and telecommunication industries, which first experienced a rise in the effective EIT tax rate in 2009,.

5.1.2 Ownership

The decomposition of effective tax rate by ownership structure and years is shown in Figure 5.

Generally speaking, the effective tax rates of VAT, business tax and excise tax decline across all ownership structure over time, but the time pattern of effective EIT tax rate exhibits heterogeneity across ownership structures.

In detail, FIEs, HK, TW or MO invested enterprises have relatively lower effective VAT tax rates, compared to the effective tax rates among SOEs and COEs and other ownership structures are slightly higher than that among FIEs and HK, TW or MO invested enterprises, and the effective tax rate of listed corporations is the lowest among all ownership structures. Besides, the drop in the effective VAT tax rate is larger among SOEs, COEs and listed corporations, compared to that among FIEs and HK, TW or MO invested enterprises.

In terms of business tax rate, the listed corporations has the highest effective business tax rate, followed by SOEs. Besides, the drop in effective business tax rate is the lowest among listed corporations, compared to corporations with other ownership structures.

Similarly, the effective excise tax rate is highest among listed corporations, which has also witnessed the largest decline in effective excise tax rate over the years. Besides, the effective excise tax rate among all groups become pretty low after the decline in 2009.

Initially, the effective EIT tax rates are the highest among SOEs and COEs, and have experienced a steady decline over the years. To the contrary, the effective EIT tax rates among FIEs and HK, TW or MO invested enterprises have grown steadily over time. Noticeably, the

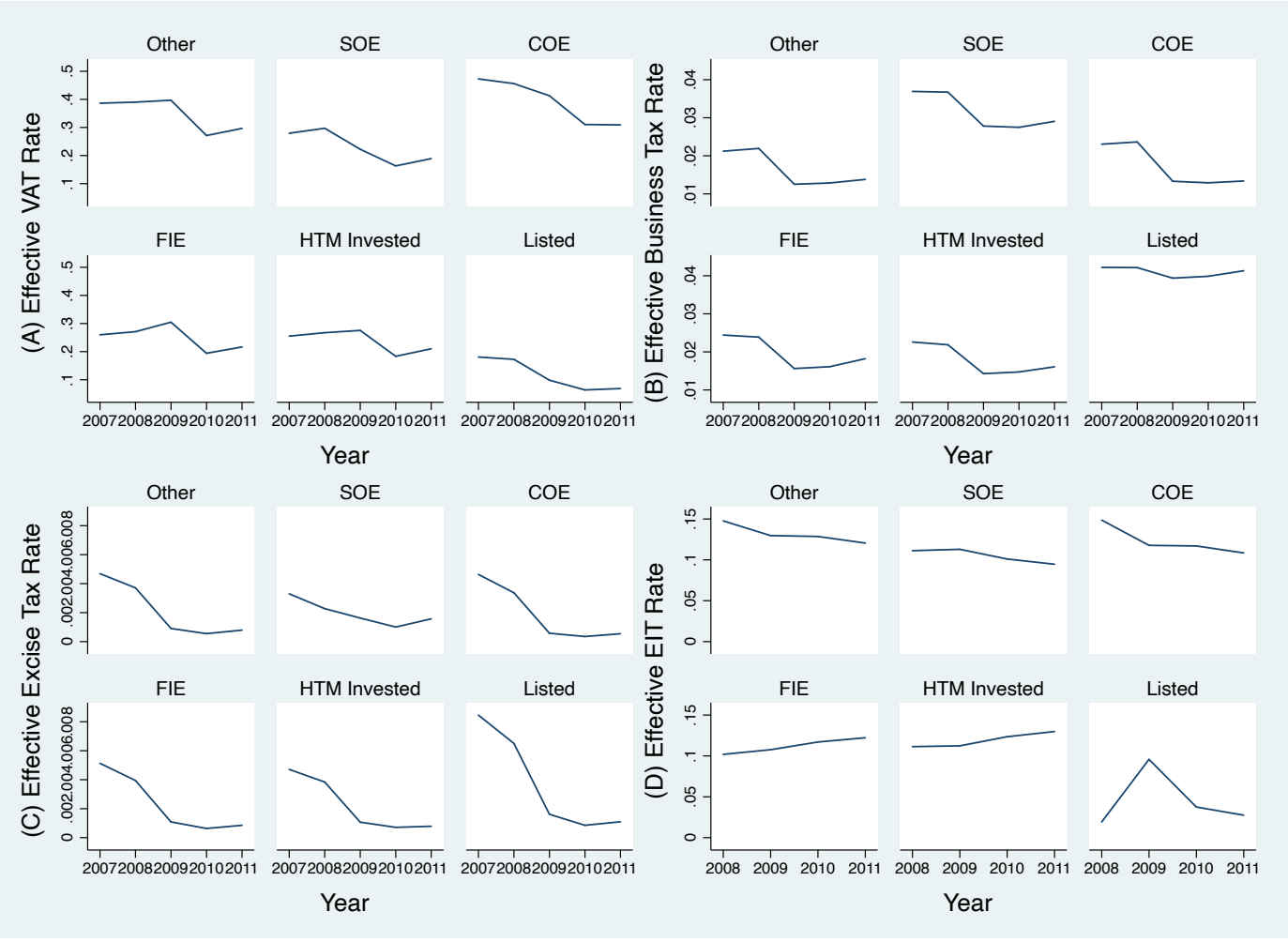


Figure 5: **Effective Tax Rate by Ownership Structure, 2008 - 2011**

Notes: This figure displays the effective tax rates of VAT, business tax, excise tax and EIT in each ownership structure from 2008 to 2011. The effective tax rate is defined as the ratio between tax payable over tax base, where the tax base is referred to the accounting income, revenue or sales statistics after tax adjustment, but before tax credits, deductions and exemptions. This figure illustrates a general trend of reducing effective tax rates of VAT, business tax and excise tax across ownership structures. Panel (A) shows that FIEs and HK, TW or MO invested enterprises have relatively lower effective VAT rates, compared to SOEs and COEs, while listed corporations have the lowest effective tax rates. Panel (B) shows that listed corporations have the highest effective business tax, which remains quite stable over time. Panel (C) show that listed corporations have the highest effective excise tax rate to start with, which dropped sharply from 2007 to 2009. Panel (D) shows that there is a slightly decreasing trend in effective EIT rates among SOEs and COEs, while effective EIT rates among FIEs and HK, TW and MO invested enterprises have slightly increasing effective EIT rates, and the effective EIT rate of listed corporations spiked around 2009.

effective EIT tax rate of listed corporation is the lowest in 2008, then is raised a large amount in 2009, and then has declined to the lowest level of effective EIT tax rate among all ownership structures.

5.1.3 Region

Next, we check the effective tax rates across regions, and the result is shown in Figure 6.

The general trends for the effective tax rates of VAT, business tax, excise tax and EIT are decreasing over time. However, there are different responses across regions.

Specifically, the effective VAT rate first spiked in 2009 in the North region before declining in 2010. The effective VAT rate first experienced a slight decline in 2009 and 2010, and returned to a higher level in 2011.

In terms of effective business tax rate,all regions experienced cut in the effective business tax rates from 2008 to 2009. The East and South Central regions have the lowest effective business tax initially, and the cut in both regions are milder than other parts of China.

The effective excise tax rate is lower than 1 percent across all regions in China. Besides, the Northeastern, Southeastern and Southern Central parts of China have the highest effective excise tax rates, while corporations in Eastern and Northwestern China have the lowest level if effective excise tax rate.

The effective enterprise income tax rate in the North and East regions are relatively higher effective enterprise income tax rate, compared to other regions. In addition, corporations in Northeastern and Northwestern China have experienced the largest drop in effective enterprise income tax rate from 2008 to 2009.

5.2 Regression Analysis

5.2.1 Research Design

$$\begin{aligned} ETR_{i,t}^{\tau} =& \alpha + \beta Industry_{i,t} + \gamma Ownership_{i,t} + \psi Industry_{i,t} \times Ownership_{i,t} \\ &+ \sum_{k} \phi^{k} Industry_{i,t} \#\# Controls_{i,t}^{k,\tau} + \varepsilon_{i,t} \end{aligned}$$

where $ETR_{i,t}^{\tau}$ is the effective tax rate of tax τ in year t for firm i, calculated as the ratio of the tax τ payable over the corresponding tax base, which is the accounting data after tax adjustment, but before tax credits, deductions and exemptions. $Industryi, t$ is the industry classification, and $Ownership_{i,t}$ ownership types of firm i. $Controls_{i,t}^{\tau}$ include year fixed effects, the log of total assets, log of total employment, region, tax deduction and exemption terms or preferential

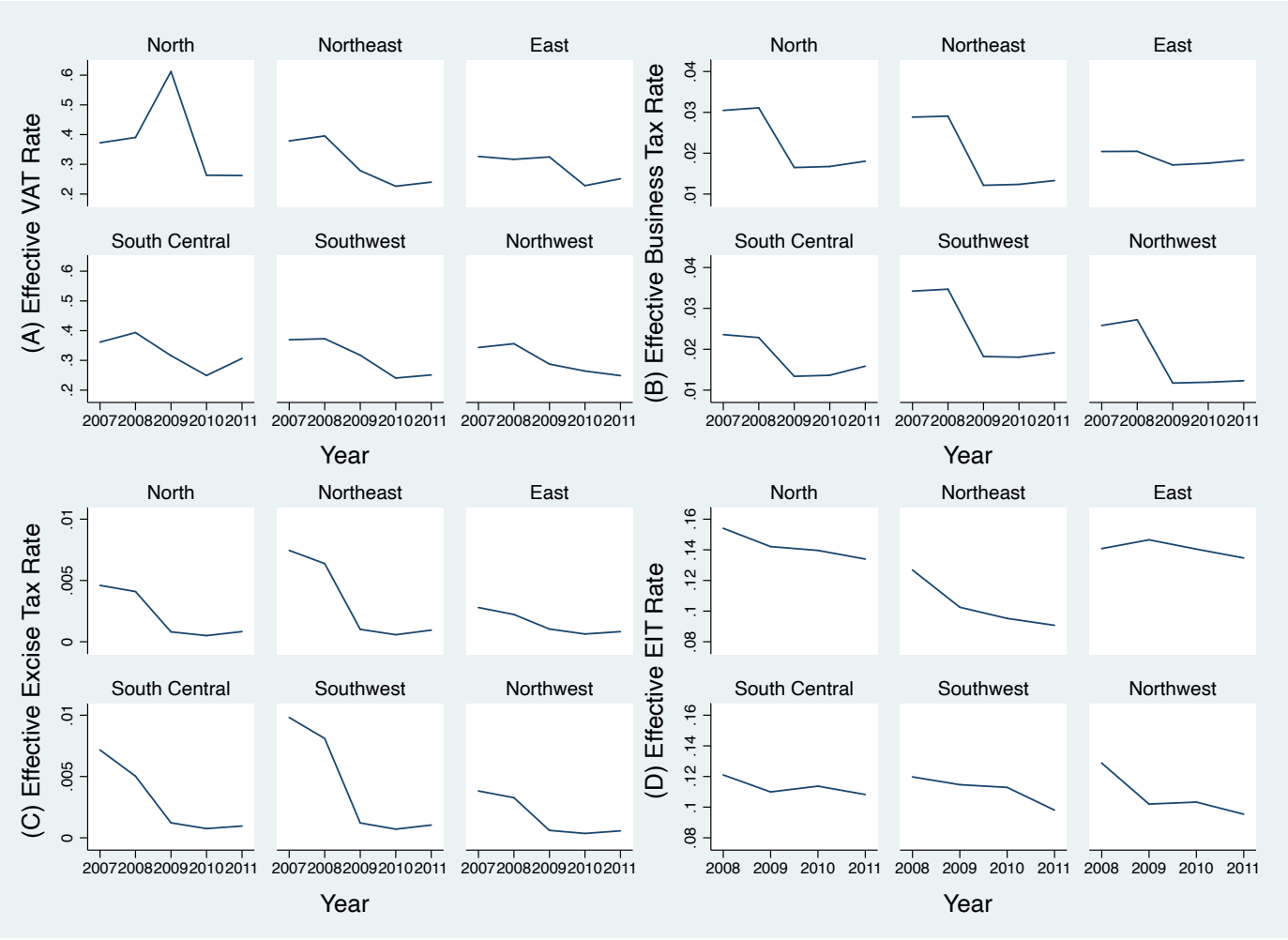


Figure 6: **Effective Tax Rate by Region, 2008 - 2011**

Notes: This figure displays the effective tax rates of VAT, business tax, excise tax and EIT in each region from 2008 to 2011. The effective tax rate is defined as the ratio between tax payable over tax base, where the tax base is referred to the accounting income, revenue or sales statistics after tax adjustment, but before tax credits, deductions and exemptions. This figure illustrates a general trend of reducing effective tax rates of VAT, business tax and excise tax across ownership structures. Panel (A) shows that Northern China experienced an increase in effective VAT rates from 2008 to 2009, while other regions experienced decline in effective tax rates in the same period. Panel (B) shows that Eastern China has the lowest effective business taxes, of which the cut from 2008 to 2009 is the mildest among all regions. Panel (C) show that Northeastern and Southwestern regions have the highest effective excise tax rate to start with, which dropped sharply from 2008 to 2009. Panel (D) shows that there is a slightly decreasing trend in effective EIT rates among all regions, while effective EIT rates among Northern and Eastern China remain the highest.

treatment policy dummies.

This part is conducted on a balanced panel sample in 2007 to 2011 of the original data.

5.2.2 VAT

In Table 5, on average, mining, quarrying, oil and gas extraction industry, manufacturing industry and utilities industry have higher effective VAT tax rate, while construction and service industries have lower effective VAT tax rate, compared to that of agriculture, fishing and forestry industry. Besides, SOEs, COEs, FIEs, HK, TW or MO invested enterprises and listed corporations have lower effective VAT tax rate on average, compare to a corporation with other ownership structure.

Model (1) shows the average effective VAT tax rate across industries, compared to agriculture, fishing and forestry industry. Model (2) includes the ownership structure, and interaction terms of ownership structure and industry. For example, the estimated effective VAT tax rate of a manufacturing FIE is on average $0.109 (= 0.263 - 0.072 - 0.082)$ higher than the average effective VAT tax rate of a corporation of other ownership structure in the agriculture, fishing and forestry industry.

Model (3) includes the year fixed effects, and model (4) adds logarithms of asset and worker numbers as size controls. As can be seen from column (4), the coefficient of the mining, quarrying, oil and gas extraction industry is increased from 0.334 to 0.590 due to the inclusion of corporation size. Besides, it can be seen that the magnitude of coefficients of construction, finance and insurance, real estate, transportation, postal and telecommunication industries are increased after controlling for size.

Model (5) adds region dummies, and model (6) adds preferential VAT treatment dummies, and the coefficients remain relatively stable.

Among the industry-ownership coefficients, it can be seen that in the manufacturing industry, FIEs and HK, TW and MO invested enterprises have a lower effective excise tax rate, compared to other ownership types. In other service industries, SOEs have lower effective tax rate compared to other ownership structure.

Noticeably, the adjusted R^2 of this model is quite low, so there is more dispersion of the effective VAT rate that can't be simply explained by industry and ownership structures, and needs further exploration.

Table 5: Regression of Effective VAT Tax Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Industry						

Continued on next page

Table 5 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
Mining/Quarrying/Oil/Gas	0.382***	0.394***	0.334***	0.590***	0.607***	0.607***
	[45.64]	[39.53]	[10.66]	[10.31]	[8.11]	[8.11]
Manufacturing	0.233***	0.263***	0.229***	0.205***	0.236***	0.236***
	[32.73]	[30.83]	[7.80]	[4.08]	[3.50]	[3.50]
Utilities	0.196***	0.193***	0.156***	0.104	0.055	0.055
	[24.56]	[18.99]	[5.03]	[1.83]	[0.74]	[0.73]
Construction	-0.126***	-0.139***	-0.167***	-0.407***	-0.507***	-0.507***
	[-17.66]	[-16.40]	[-5.64]	[-8.07]	[-7.50]	[-7.50]
Finance/Insurance	-0.138***	-0.150***	-0.189***	-0.401***	-0.503***	-0.503***
	[-19.63]	[-17.82]	[-6.47]	[-8.04]	[-7.51]	[-7.51]
Real Estate	-0.138***	-0.150***	-0.188***	-0.390***	-0.487***	-0.487***
	[-19.61]	[-17.74]	[-6.41]	[-7.81]	[-7.27]	[-7.27]
Transport/Post/Telecom	-0.133***	-0.144***	-0.174***	-0.403***	-0.486***	-0.486***
	[-18.75]	[-16.88]	[-5.87]	[-8.00]	[-7.21]	[-7.21]
Other Services	0.107***	0.124***	0.142***	-0.105*	-0.222**	-0.223**
	[14.68]	[14.16]	[4.75]	[-2.07]	[-3.26]	[-3.28]
Ownership						
SOE		-0.069***	-0.067***	-0.075***	-0.074***	-0.074***
		[-3.82]	[-3.71]	[-4.33]	[-4.08]	[-4.10]
COE		0.041	0.041	0.047	0.036	0.036
		[0.91]	[0.90]	[1.10]	[0.86]	[0.86]
FIE		-0.072**	-0.070**	-0.067**	-0.052	-0.053
		[-2.99]	[-2.92]	[-2.75]	[-1.93]	[-1.93]
HTM Invested		-0.005	-0.001	-0.006	0.003	0.003
		[-0.13]	[-0.02]	[-0.15]	[0.07]	[0.07]
Listed		-0.083*	-0.082*	-0.016	-0.010	-0.010
		[-2.09]	[-2.00]	[-0.35]	[-0.21]	[-0.22]
Industry × Ownership						
Mining/Quarrying/Oil/Gas		-0.113***	-0.115***	-0.027	-0.025	-0.025
× SOE		[-5.26]	[-5.36]	[-1.29]	[-1.15]	[-1.14]
Mining/Quarrying/Oil/Gas		0.004	0.004	-0.044	-0.039	-0.039

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Table 5 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
× COE		[0.09]	[0.08]	[-0.95]	[-0.85]	[-0.86]
Mining/Quarrying/Oil/Gas		-0.029	-0.031	0.023	0.011	0.013
× FIE		[-0.67]	[-0.72]	[0.54]	[0.25]	[0.30]
Mining/Quarrying/Oil/Gas		-0.075	-0.080	-0.023	-0.029	-0.029
× HTM Invested		[-1.34]	[-1.45]	[-0.42]	[-0.52]	[-0.52]
Mining/Quarrying/Oil/Gas		-0.270***	-0.276***	-0.151**	-0.150**	-0.149**
× Listed		[-5.66]	[-5.71]	[-2.85]	[-2.75]	[-2.74]
Manufacturing × SOE		-0.002	-0.005	0.030	0.022	0.021
		[-0.11]	[-0.26]	[1.65]	[1.14]	[1.13]
Manufacturing × COE		0.054	0.054	0.026	0.034	0.033
		[1.21]	[1.18]	[0.60]	[0.79]	[0.77]
Manufacturing × FIE		-0.082***	-0.084***	-0.061*	-0.073**	-0.071**
		[-3.37]	[-3.46]	[-2.49]	[-2.69]	[-2.59]
Manufacturing		-0.159***	-0.162***	-0.132***	-0.131***	-0.129**
× HTM Invested		[-4.05]	[-4.15]	[-3.33]	[-3.30]	[-3.28]
Manufacturing × Listed		-0.087*	-0.082*	-0.071	-0.073	-0.072
		[-2.15]	[-1.98]	[-1.55]	[-1.53]	[-1.53]
Utilities × SOE		0.051*	0.048*	0.060**	0.058**	0.058**
		[2.57]	[2.44]	[3.13]	[2.88]	[2.90]
Utilities × COE		0.058	0.055	0.025	0.035	0.036
		[0.98]	[0.93]	[0.43]	[0.62]	[0.62]
Utilities × FIE		0.033	0.030	0.043	0.030	0.030
		[1.14]	[1.02]	[1.43]	[0.94]	[0.94]
Utilities		0.014	0.009	0.027	0.022	0.022
× HTM Invested		[0.32]	[0.20]	[0.60]	[0.49]	[0.48]
Utilities × Listed		0.071	0.069	0.028	0.023	0.024
		[1.38]	[1.32]	[0.50]	[0.41]	[0.41]
Construction × SOE		0.079***	0.077***	0.082***	0.079***	0.080***
		[4.30]	[4.16]	[4.60]	[4.30]	[4.32]
Construction × COE		-0.039	-0.038	-0.043	-0.033	-0.032
		[-0.87]	[-0.85]	[-0.99]	[-0.77]	[-0.76]
Construction × FIE		0.139***	0.135***	0.131***	0.115**	0.116**

Continued on next page

Table 5 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
		[3.64]	[3.56]	[3.42]	[2.89]	[2.89]
Construction		0.044	0.039	0.044	0.035	0.035
× HTM Invested		[1.02]	[0.90]	[1.00]	[0.79]	[0.79]
Construction × Listed		0.083*	0.080	0.004	-0.003	-0.003
		[2.07]	[1.94]	[0.08]	[-0.07]	[-0.06]
Finance/Insurance × SOE		0.069***	0.067***	0.075***	0.073***	0.074***
		[3.80]	[3.68]	[4.30]	[4.07]	[4.09]
Finance/Insurance × COE		-0.041	-0.041	-0.049	-0.037	-0.037
		[-0.93]	[-0.92]	[-1.13]	[-0.88]	[-0.88]
Finance/Insurance × FIE		0.072**	0.070**	0.066**	0.051	0.051
		[2.97]	[2.89]	[2.71]	[1.88]	[1.89]
Finance/Insurance		0.005	-0.000	0.005	-0.003	-0.003
× HTM Invested		[0.12]	[-0.00]	[0.14]	[-0.08]	[-0.08]
Finance/Insurance × Listed		0.084*	0.083*	0.017	0.011	0.011
		[2.12]	[2.02]	[0.37]	[0.24]	[0.24]
Real Estate × SOE		0.070***	0.068***	0.074***	0.072***	0.073***
		[3.86]	[3.75]	[4.26]	[4.01]	[4.02]
Real Estate × COE		-0.042	-0.042	-0.049	-0.038	-0.038
		[-0.94]	[-0.93]	[-1.13]	[-0.89]	[-0.89]
Real Estate × FIE		0.072**	0.069**	0.067**	0.051	0.052
		[2.96]	[2.88]	[2.73]	[1.90]	[1.91]
Real Estate		0.004	-0.000	0.005	-0.004	-0.004
× HTM Invested		[0.10]	[-0.01]	[0.13]	[-0.10]	[-0.09]
Real Estate × Listed		0.083*	0.081*	0.016	0.010	0.010
		[2.08]	[1.99]	[0.36]	[0.21]	[0.22]
Transport/Post/Telecom × SOE		0.069***	0.067***	0.073***	0.072***	0.072***
		[3.79]	[3.67]	[4.17]	[3.93]	[3.94]
Transport/Post/Telecom × COE		-0.046	-0.046	-0.051	-0.039	-0.039
		[-1.04]	[-1.01]	[-1.17]	[-0.93]	[-0.93]
Transport/Post/Telecom × FIE		0.068**	0.066**	0.059*	0.043	0.044
		[2.81]	[2.74]	[2.37]	[1.59]	[1.59]
Transport/Post/Telecom		-0.001	-0.006	-0.006	-0.015	-0.015

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Table 5 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
× HTM Invested		[-0.02]	[-0.15]	[-0.16]	[-0.38]	[-0.38]
Transport/Post/Telecom × Listed		0.083*	0.082*	0.015	0.010	0.010
		[2.07]	[1.99]	[0.32]	[0.21]	[0.21]
Other Services × SOE		-0.058**	-0.060**	-0.048**	-0.042*	-0.042*
		[-3.15]	[-3.25]	[-2.69]	[-2.27]	[-2.24]
Other Services × COE		-0.116*	-0.112*	-0.104*	-0.090*	-0.090*
		[-2.54]	[-2.43]	[-2.34]	[-2.09]	[-2.08]
Other Services × FIE		-0.006	-0.010	0.004	-0.005	-0.004
		[-0.22]	[-0.38]	[0.15]	[-0.17]	[-0.15]
Other Services		-0.080*	-0.084*	-0.067	-0.077	-0.077
× HTM Invested		[-1.99]	[-2.09]	[-1.65]	[-1.89]	[-1.88]
Other Services × Listed		0.039	0.034	-0.041	-0.045	-0.045
		[0.92]	[0.77]	[-0.86]	[-0.91]	[-0.90]
Controls						
Year			X	X	X	X
Size				X	X	X
Region					X	X
Preferential Policy						X
Observations	533927	533926	533926	526739	526738	526738
Adjusted R^2	0.055	0.068	0.076	0.078	0.083	0.083

t statistics in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The "Other" ownership category includes private corporations, non-stock corporations, sole proprietorship corporations and unlisted stock corporations. Size controls are the logarithm of end of year asset, and logarithm of annual average number of workers. Preferential policy controls are indicator variables of whether receive tax refund from State Taxation Administration or Ministry of Finance, whether receive technology related preferential treatment, whether receive preferential treatment on imported equipment. The effective VAT rate variable is winsorized at 5% level, while the size control variables are winsorized at 1% level.

5.2.3 Business Tax

The effective business tax rates exhibits an opposite pattern to that of effective VAT tax rate. In Table 6, on average, mining, quarrying, oil and gas extraction industry, and manufacturing industry have lower effective business tax rate, while utilities, construction and service industries

have higher effective business tax rate, compared to that of agriculture, fishing and forestry industry. Besides, SOEs, COEs, HK, TW or MO invested enterprises and listed corporations have higher effective business tax rate on average, compare to a corporation with other ownership structure. But the difference between FIEs and corporation with other ownership structure is not statistically significant from 0.

Model (1) shows the average effective business tax rate across industries, compared to agriculture, fishing and forestry industry. Model (2) includes the ownership structure, and interaction terms of ownership structure and industry. For example, the estimated effective business tax rate of SOEs in the real estate industry is on average $0.044 (= 0.044 + 0.019 - 0.019)$ higher than the average effective business tax rate of a corporation of other ownership structure in the agriculture, fishing and forestry industry.

Model (3) includes the year fixed effects, and model (4) adds logarithms of asset and worker numbers as size controls. As can be seen from column (4), magnitude of coefficients of mining, quarrying, oil and gas extraction, manufacturing, construction, finance and insurance, real estate, transportation, postal and telecommunication industries almost double the magnitude after including corporation size, while the interaction terms keep pretty stable.

Model (5) adds region dummies, and the coefficient of utilities industries reduced from -0.004 to -0.012, which becomes statistically significant. Model (6) adds preferential VAT treatment dummies, but the coefficients remain relatively stable.

In terms of industry-ownership interactions, SOEs have lower effective business tax rates in the transportation, postal and telecommunications industry, and higher effective business tax rates in finance and insurance and other service industries, compared to other ownership types.

Table 6: Regression of Effective Business Tax Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Industry						
Mining/Quarrying/Oil/Gas	-0.002***	-0.001***	-0.004*	-0.008***	-0.014***	-0.014***
	[-6.67]	[-3.73]	[-2.31]	[-3.53]	[-5.53]	[-5.53]
Manufacturing	-0.001**	-0.000	-0.005***	-0.012***	-0.013***	-0.013***
	[-3.01]	[-0.48]	[-3.36]	[-5.51]	[-5.27]	[-5.28]
Utilities	0.013***	0.012***	0.010***	-0.004	-0.012***	-0.012***
	[36.49]	[31.63]	[6.58]	[-1.57]	[-4.53]	[-4.53]
Construction	0.021***	0.024***	0.017***	0.041***	0.040***	0.040***
	[63.01]	[74.96]	[11.49]	[19.11]	[16.43]	[16.44]

Continued on next page

Table 6 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
Finance/Insurance	0.035***	0.037***	0.030***	0.053***	0.053***	0.059***
	[103.21]	[106.81]	[20.44]	[24.19]	[21.66]	[24.07]
Real Estate	0.041***	0.044***	0.036***	0.058***	0.056***	0.056***
	[120.04]	[134.35]	[25.04]	[26.77]	[23.25]	[23.26]
Transport/Post/Telecom	0.021***	0.025***	0.018***	0.042***	0.042***	0.042***
	[60.61]	[75.51]	[12.47]	[19.49]	[17.21]	[17.12]
Other Services	0.013***	0.012***	0.012***	0.004	0.005*	0.005*
	[38.44]	[37.88]	[8.40]	[1.80]	[2.16]	[2.13]
Ownership						
SOE		0.019***	0.018***	0.016***	0.016***	0.016***
		[14.50]	[14.38]	[12.75]	[12.46]	[12.31]
COE		0.009***	0.009***	0.009***	0.009***	0.009***
		[3.35]	[3.44]	[3.66]	[3.70]	[3.60]
FIE		0.003	0.003*	0.001	0.002	0.002
		[1.88]	[2.03]	[1.04]	[1.49]	[1.50]
HTM Invested		0.004*	0.005*	0.004*	0.004*	0.004*
		[2.27]	[2.55]	[2.23]	[2.35]	[2.34]
Listed		0.020***	0.020***	0.011**	0.010**	0.010**
		[6.11]	[5.98]	[3.11]	[3.02]	[3.02]
Industry × Ownership						
Mining/Quarrying/Oil/Gas		-0.004*	-0.004**	-0.007***	-0.006***	-0.006***
× SOE		[-2.54]	[-2.60]	[-4.85]	[-4.65]	[-4.55]
Mining/Quarrying/Oil/Gas		-0.010***	-0.011***	-0.008***	-0.008***	-0.008***
× COE		[-4.00]	[-4.27]	[-3.37]	[-3.43]	[-3.34]
Mining/Quarrying/Oil/Gas		0.001	0.001	-0.001	-0.002	-0.002
× FIE		[0.56]	[0.32]	[-0.76]	[-1.22]	[-1.22]
Mining/Quarrying/Oil/Gas		0.001	-0.000	-0.003	-0.004	-0.004
× HTM Invested		[0.35]	[-0.08]	[-1.49]	[-1.84]	[-1.82]
Mining/Quarrying/Oil/Gas		0.009*	0.008*	0.006	0.006	0.006
× Listed		[2.52]	[2.28]	[1.67]	[1.80]	[1.81]
Manufacturing × SOE		-0.001	-0.001	-0.003*	-0.003*	-0.003*

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Table 6 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
		[-1.00]	[-0.74]	[-2.32]	[-2.33]	[-2.24]
Manufacturing × COE		-0.008**	-0.008**	-0.005*	-0.005*	-0.005*
		[-3.07]	[-3.17]	[-1.99]	[-2.14]	[-2.06]
Manufacturing × FIE		0.004**	0.004**	0.002	0.001	0.001
		[2.87]	[2.66]	[1.12]	[0.92]	[0.92]
Manufacturing		-0.000	-0.001	-0.004*	-0.004*	-0.004*
× HTM Invested		[-0.02]	[-0.38]	[-1.98]	[-1.99]	[-1.97]
Manufacturing × Listed		0.004	0.004	0.001	0.001	0.001
		[1.06]	[1.10]	[0.17]	[0.39]	[0.39]
Utilities × SOE		-0.011***	-0.010***	-0.013***	-0.012***	-0.012***
		[-7.91]	[-7.91]	[-9.61]	[-9.19]	[-9.05]
Utilities × COE		-0.012***	-0.013***	-0.009***	-0.008**	-0.008**
		[-4.43]	[-4.67]	[-3.47]	[-3.28]	[-3.20]
Utilities × FIE		0.001	0.000	-0.001	-0.001	-0.001
		[0.68]	[0.17]	[-0.89]	[-0.95]	[-0.96]
Utilities		0.002	0.001	-0.002	-0.002	-0.002
× HTM Invested		[0.95]	[0.41]	[-1.08]	[-0.90]	[-0.87]
Utilities × Listed		-0.008*	-0.008*	-0.008*	-0.007*	-0.007*
		[-2.22]	[-2.21]	[-2.23]	[-2.11]	[-2.11]
Construction × SOE		-0.019***	-0.018***	-0.016***	-0.015***	-0.015***
		[-14.25]	[-14.11]	[-12.42]	[-12.16]	[-12.01]
Construction × COE		-0.008**	-0.008***	-0.008***	-0.009***	-0.008***
		[-3.24]	[-3.33]	[-3.56]	[-3.59]	[-3.50]
Construction × FIE		-0.004*	-0.004*	-0.002	-0.003	-0.003
		[-2.31]	[-2.46]	[-1.51]	[-1.90]	[-1.91]
Construction		-0.003	-0.003	-0.003	-0.003	-0.003
× HTM Invested		[-1.50]	[-1.77]	[-1.48]	[-1.57]	[-1.55]
Construction × Listed		-0.018***	-0.018***	-0.008*	-0.008*	-0.008*
		[-5.26]	[-5.14]	[-2.31]	[-2.21]	[-2.20]
Finance/Insurance × SOE		-0.014***	-0.013***	-0.011***	-0.011***	-0.011***
		[-10.42]	[-10.30]	[-8.63]	[-8.21]	[-8.60]
Finance/Insurance × COE		-0.022***	-0.022***	-0.021***	-0.022***	-0.022***

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Table 6 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
		[-8.45]	[-8.83]	[-9.09]	[-8.97]	[-9.25]
Finance/Insurance × FIE		0.001	0.000	0.002	0.002	0.004*
		[0.34]	[0.19]	[1.55]	[0.99]	[2.40]
Finance/Insurance		0.000	-0.000	-0.000	-0.000	-0.000
× HTM Invested		[0.08]	[-0.21]	[-0.08]	[-0.18]	[-0.11]
Finance/Insurance × Listed		-0.016***	-0.016***	-0.007	-0.006	-0.006
		[-4.93]	[-4.80]	[-1.92]	[-1.78]	[-1.67]
Real Estate × SOE		-0.019***	-0.019***	-0.017***	-0.016***	-0.016***
		[-14.71]	[-14.59]	[-13.00]	[-12.72]	[-12.56]
Real Estate × COE		-0.008**	-0.008***	-0.008***	-0.008***	-0.008***
		[-3.22]	[-3.31]	[-3.47]	[-3.52]	[-3.42]
Real Estate × FIE		-0.003	-0.003*	-0.002	-0.002	-0.002
		[-1.83]	[-1.97]	[-1.13]	[-1.59]	[-1.60]
Real Estate		-0.004*	-0.005*	-0.004*	-0.005*	-0.005*
× HTM Invested		[-2.28]	[-2.57]	[-2.31]	[-2.44]	[-2.43]
Real Estate × Listed		-0.020***	-0.020***	-0.011**	-0.011**	-0.011**
		[-6.05]	[-5.92]	[-3.22]	[-3.14]	[-3.14]
Transport/Post/Telecom × SOE		-0.023***	-0.022***	-0.020***	-0.019***	-0.016***
		[-17.46]	[-17.44]	[-15.03]	[-14.85]	[-12.39]
Transport/Post/Telecom × COE		-0.008**	-0.008**	-0.008***	-0.008***	-0.008***
		[-3.10]	[-3.20]	[-3.35]	[-3.34]	[-3.29]
Transport/Post/Telecom × FIE		-0.004**	-0.004**	-0.003*	-0.004**	-0.004*
		[-2.68]	[-2.85]	[-2.09]	[-2.58]	[-2.52]
Transport/Post/Telecom		-0.005**	-0.006**	-0.005**	-0.006**	-0.006**
× HTM Invested		[-2.87]	[-3.18]	[-2.87]	[-2.99]	[-2.97]
Transport/Post/Telecom × Listed		-0.021***	-0.021***	-0.011**	-0.011**	-0.011**
		[-6.32]	[-6.17]	[-3.26]	[-3.22]	[-3.25]
Other Services × SOE		-0.003*	-0.003*	-0.008***	-0.008***	-0.008***
		[-2.06]	[-2.43]	[-6.41]	[-6.09]	[-5.92]
Other Services × COE		-0.003	-0.003	-0.003	-0.003	-0.003
		[-0.96]	[-1.21]	[-1.26]	[-1.38]	[-1.30]
Other Services × FIE		0.016***	0.014***	0.006***	0.005**	0.005**

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Table 6 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
		[10.30]	[9.51]	[3.97]	[3.18]	[3.18]
Other Services		0.013***	0.012***	0.002	0.001	0.001
× HTM Invested		[7.19]	[6.35]	[0.97]	[0.75]	[0.80]
Other Services × Listed		-0.007*	-0.007*	-0.013***	-0.012***	-0.012***
		[-2.08]	[-2.21]	[-3.62]	[-3.55]	[-3.55]
Controls						
Year			X	X	X	X
Size				X	X	X
Region					X	X
Preferential Policy						X
Observations	705823	705823	705823	688274	688273	688273
Adjusted R^2	0.282	0.336	0.353	0.450	0.453	0.456

t statistics in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The "Other" ownership category includes private corporations, non-stock corporations, sole proprietorship corporations and unlisted stock corporations. Size controls are the logarithm of end of year asset, and logarithm of annual average number of workers. Preferential policy controls are indicator variables of whether receive tax refund from State Taxation Administration or Ministry of Finance, whether receive public infrastructure related preferential treatment, whether receive preferential treatment on insurance related business. The effective business tax rate variable and the size control variables are winsorized at 1% level.

5.2.4 Excise Tax

As shown in Table 7, the manufacturing industry have a statistically significant higher effective excise tax rate than that of agriculture, fishing and forestry industry, and the magnitude of coefficients tripled after including year fixed effects in column (3), and remains robust with size controls in column (4) and region controls in column (5). After adding controls for deduction amounts, the coefficient decreased from 0.05 to 0.01, but is still statistically significant, which shows that the heterogeneity of effective excise tax rate in the manufacturing industry largely comes from preferential tax deductions and exemptions.

Among the ownership and industry-ownership interaction coefficients, it can be seen that listed corporations have a higher effective excise tax rate in the mining, quarrying, oil and gas extraction industry. In the manufacturing industry, SOEs have a higher effective excise tax rate, while HK, TW and MO invested have a lower effective excise tax rate, compared to other

ownership types.

Similar to the effective VAT rate analysis, the adjusted R^2 of this model is quite low, so there is more dispersion of the effective excise tax rate that can't be simply explained by industry and ownership structures, and needs further exploration.

Table 7: Regression of Effective Excise Tax Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Industry						
Mining/Quarrying/Oil/Gas	-0.000*	-0.000*	-0.000	0.000	0.000	0.001
	[-2.17]	[-2.40]	[-0.54]	[0.41]	[0.42]	[1.45]
Manufacturing	0.002***	0.002***	0.006***	0.006***	0.005***	0.001**
	[20.62]	[22.06]	[12.34]	[9.10]	[8.04]	[2.91]
Utilities	-0.000***	-0.000**	-0.000	0.001	0.001	0.001**
	[-3.52]	[-2.61]	[-0.91]	[0.94]	[1.32]	[2.68]
Construction	-0.000***	-0.000**	-0.000	0.000	0.001	0.001*
	[-3.59]	[-2.84]	[-0.93]	[0.83]	[1.20]	[2.56]
Finance/Insurance	-0.000***	-0.000*	-0.000	0.001	0.001	0.001**
	[-3.35]	[-2.08]	[-0.63]	[1.33]	[1.80]	[3.21]
Real Estate	-0.000***	-0.000**	-0.000	0.000	0.001	0.001*
	[-3.44]	[-2.70]	[-0.93]	[0.66]	[0.98]	[2.37]
Transport/Post/Telecom	-0.000***	-0.000**	-0.000	0.000	0.001	0.001*
	[-3.57]	[-2.75]	[-0.92]	[0.81]	[1.18]	[2.48]
Other Services	0.001***	0.001***	0.002***	-0.002**	-0.002***	-0.002***
	[14.01]	[11.61]	[4.20]	[-3.26]	[-3.88]	[-6.53]
Ownership						
SOE		0.000	0.000	0.000	0.000	0.000
		[0.68]	[0.72]	[0.31]	[0.25]	[0.45]
COE		-0.000**	-0.000*	-0.000	-0.000	-0.000
		[-2.84]	[-2.50]	[-1.60]	[-0.24]	[-0.45]
FIE		0.001	0.001	0.000	0.000	0.000
		[1.21]	[1.25]	[1.06]	[0.89]	[0.66]
HTM Invested		-0.000**	-0.000*	-0.000**	-0.000*	-0.000**
		[-2.84]	[-2.44]	[-2.86]	[-2.47]	[-3.01]
Listed		0.002	0.002	0.002	0.002	-0.001**

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Table 7 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
		[0.92]	[0.95]	[0.72]	[0.72]	[-2.93]
Industry × Ownership						
Mining/Quarrying/Oil/Gas		-0.000	-0.000	0.000	0.000	-0.000
× SOE		[-0.21]	[-0.26]	[0.10]	[0.04]	[-0.34]
Mining/Quarrying/Oil/Gas		0.000**	0.000**	0.000*	0.000	0.000
× COE		[3.01]	[2.63]	[2.57]	[1.28]	[1.52]
Mining/Quarrying/Oil/Gas		-0.001	-0.001	-0.001	-0.000	-0.000
× FIE		[-1.27]	[-1.32]	[-1.26]	[-1.10]	[-0.80]
Mining/Quarrying/Oil/Gas		0.000*	0.000	0.000	0.000	0.000*
× HTM Invested		[2.40]	[1.94]	[1.94]	[1.54]	[2.36]
Mining/Quarrying/Oil/Gas		0.004	.004	0.004	0.004	0.004***
× Listed		[1.38]	[1.36]	[1.55]	[1.52]	[4.38]
Manufacturing × SOE		0.001	0.001	0.000	0.000	-0.000
		[1.83]	[1.88]	[1.29]	[0.39]	[-0.19]
Manufacturing × COE		0.000	-0.000	0.000	-0.000	0.000
		[0.33]	[-0.25]	[1.02]	[-0.96]	[0.44]
Manufacturing × FIE		-0.001*	-0.001*	-0.001*	-0.001	-0.000
		[-1.97]	[-2.01]	[-2.56]	[-1.89]	[-1.36]
Manufacturing		-0.000**	-0.000***	-0.001***	-0.001***	-0.000
× HTM Invested		[-2.67]	[-3.42]	[-5.39]	[-4.87]	[-1.94]
Manufacturing × Listed		0.001	0.001	0.001	0.001	0.002***
		[0.62]	[0.63]	[0.46]	[0.39]	[7.50]
Utilities × SOE		-0.000	-0.000	-0.000	-0.000	-0.000
		[-0.73]	[-0.77]	[-0.35]	[-0.29]	[-0.48]
Utilities × COE		0.000**	0.000*	0.000	0.000	0.000
		[2.61]	[2.23]	[1.33]	[0.01]	[0.30]
Utilities × FIE		-0.001	-0.001	-0.000	-0.000	-0.000
		[-1.24]	[-1.28]	[-1.09]	[-0.94]	[-0.68]
Utilities		0.000**	0.000*	0.000**	0.000*	0.000**
× HTM Invested		[2.61]	[2.20]	[2.69]	[2.26]	[2.88]
Utilities × Listed		-0.002	-0.002	-0.002	-0.002	0.001**
		[-0.92]	[-0.95]	[-0.72]	[-0.72]	[2.91]

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Table 7 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
Construction × SOE		-0.000	-0.000	-0.000	-0.000	-0.000
		[-0.68]	[-0.72]	[-0.32]	[-0.26]	[-0.46]
Construction × COE		0.000**	0.000**	0.000	0.000	0.000
		[3.11]	[2.81]	[1.90]	[0.54]	[0.63]
Construction × FIE		-0.001	-0.001	-0.000	-0.000	-0.000
		[-1.21]	[-1.25]	[-1.06]	[-0.90]	[-0.66]
Construction		0.000**	0.000*	0.000**	0.000*	0.000**
× HTM Invested		[2.84]	[2.44]	[2.85]	[2.47]	[3.02]
Construction × Listed		-0.002	-0.002	-0.002	-0.002	0.001**
		[-0.92]	[-0.95]	[-0.72]	[-0.72]	[2.92]
Finance/Insurance × SOE		-0.000	-0.000	-0.000	-0.000	-0.000
		[-0.84]	[-0.91]	[-0.56]	[-0.51]	[-0.66]
Finance/Insurance × COE		0.000*	0.000	0.000	-0.000	0.000
		[2.08]	[1.64]	[1.07]	[-0.17]	[0.06]
Finance/Insurance × FIE		-0.001	-0.001	-0.000	-0.000	-0.000
		[-1.32]	[-1.38]	[-1.20]	[-1.09]	[-0.83]
Finance/Insurance		0.000*	0.000	0.000*	0.000	0.000*
× HTM Invested	[2.03]	[1.83]	[2.35]			
Finance/Insurance × Listed		-0.002	-0.002	-0.002	-0.002	0.001**
		[-0.94]	[-0.97]	[-0.74]	[-0.74]	[2.69]
Real Estate × SOE		-0.000	-0.000	-0.000	-0.000	-0.000
		[-0.71]	[-0.75]	[-0.37]	[-0.31]	[-0.48]
Real Estate × COE		0.000**	0.000*	0.000	0.000	0.000
		[2.70]	[2.36]	[1.61]	[0.27]	[0.47]
Real Estate × FIE		-0.000	-0.000	-0.000	-0.000	-0.000
		[-1.03]	[-1.06]	[-0.88]	[-0.71]	[-0.58]
Real Estate		0.000**	0.000*	0.000**	0.000*	0.000**
× HTM Invested		[2.87]	[2.48]	[2.84]	[2.44]	[3.09]
Real Estate × Listed		-0.002	-0.002	-0.002	-0.002	0.001**
		[-0.92]	[-0.95]	[-0.74]	[-0.74]	[2.80]
Transport/Post/Telecom × SOE		-0.000	-0.000	-0.000	-0.000	-0.000
		[-0.70]	[-0.74]	[-0.32]	[-0.26]	[-0.47]

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Table 7 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)
Transport/Post/Telecom × COE		0.000**	0.000*	0.000	0.000	0.000
		[2.75]	[2.39]	[1.61]	[0.25]	[0.46]
Transport/Post/Telecom × FIE		-0.001	-0.001	-0.000	-0.000	-0.000
		[-1.22]	[-1.26]	[-1.10]	[-0.93]	[-0.70]
Transport/Post/Telecom		0.000**	0.000*	0.000**	0.000*	0.000**
× HTM Invested		[2.75]	[2.35]	[2.63]	[2.25]	[2.74]
Transport/Post/Telecom × Listed		-0.002	-0.002	-0.002	-0.002	0.001**
		[-0.92]	[-0.95]	[-0.72]	[-0.73]	[2.85]
Other Services × SOE		0.001**	0.001**	-0.000	-0.000	0.000
		[3.16]	[3.15]	[-0.42]	[-0.41]	[0.46]
Other Services × COE		-0.000	-0.000*	-0.000	-0.000*	-0.000
		[-1.71]	[-2.09]	[-1.66]	[-2.28]	[-1.23]
Other Services × FIE		0.000	0.000	-0.001**	-0.001**	-0.001**
		[1.03]	[0.88]	[-2.91]	[-2.98]	[-2.71]
Other Services		0.002***	0.002***	0.001*	0.000*	0.000*
× HTM Invested		[11.61]	[11.38]	[2.48]	[2.21]	[2.27]
Other Services × Listed		0.003	0.002	0.001	0.001	0.002***
		[1.11]	[1.05]	[0.36]	[0.32]	[5.70]
Controls						
Year			X	X	X	X
Size				X	X	X
Region					X	X
Deduction and Exemption						X
Observations	629717	629717	629717	617833	617833	610549
Adjusted R^2	0.005	0.008	0.028	0.040	0.045	0.022

t statistics in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The "Other" ownership category includes private corporations, non-stock corporations, sole proprietorship corporations and unlisted stock corporations. Size controls are the logarithm of end of year asset, and logarithm of annual average number of workers. Deduction and exemption control variable is the total amount of deduction and exemption amounts of excise tax in thousand RMB. The effective excise tax rate variable, size, and deduction and exemption control variables are winsorized at 1% level.

5.2.5 EIT

After controlling for year fixed effects and size effect, it can be seen that the finance and insurance, and transportation, postal and telecommunication industries have lower effective EIT tax rates, as shown in 8 column (4). However, after controlling for the loss carry-forward, the coefficients of these two finance and insurance industries become insignificant.

Among ownership structure, it can be seen that on average FIEs, HK, TW or MO invested enterprises and listed corporations burden a lower effective EIT rate, but all coefficients become insignificant after controlling for loss.

The low adjusted R^2 issue also rises in this analysis, which leads us to the study on dispersion of effective EIT rates across industry and ownership structures.

Table 8: Regression of Effective EIT Tax Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Industry							
Mining/Quarrying/Oil/Gas	0.041***	0.043***	0.050***	-0.052***	-0.019	0.014	-0.007
	[20.10]	[18.52]	[9.12]	[-4.24]	[-0.79]	[0.52]	[-0.23]
Manufacturing	0.053***	0.059***	0.045***	0.009	-0.033	-0.006	-0.008
	[28.65]	[27.52]	[8.65]	[0.78]	[-1.56]	[-0.27]	[-0.28]
Utilities	0.031***	0.037***	0.022***	0.038**	0.002	0.021	0.014
	[15.38]	[15.51]	[3.97]	[3.06]	[0.08]	[0.83]	[0.47]
Construction	0.091***	0.094***	0.098***	0.005	-0.005	0.032	0.023
	[45.90]	[41.28]	[18.35]	[0.42]	[-0.19]	[1.12]	[0.69]
Finance/Insurance	-0.024***	0.005*	-0.039***	-0.084***	0.047	0.059	0.065
	[-12.22]	[2.08]	[-7.27]	[-7.06]	[1.12]	[1.27]	[1.25]
Real Estate	0.074***	0.075***	0.068***	-0.013	0.004	0.020	-0.002
	[36.80]	[32.71]	[12.63]	[-1.04]	[0.15]	[0.71]	[-0.06]
Transport/Post/Telecom	0.037***	0.074***	0.050***	0.064***	0.029	0.061*	0.051
	[18.02]	[30.11]	[9.21]	[5.16]	[1.14]	[2.08]	[1.53]
Other Services	0.060***	0.066***	0.055***	-0.025*	-0.024	0.006	0.003
	[32.23]	[30.76]	[10.67]	[-2.22]	[-1.11]	[0.25]	[0.10]
Ownership							
SOE		0.004	0.003	0.000	0.005	0.008	0.010
		[0.71]	[0.55]	[0.04]	[0.44]	[0.79]	[0.90]

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Table 8 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
COE		0.008	0.008	0.009	-0.014	-0.009	-0.011
		[0.66]	[0.67]	[0.75]	[-1.27]	[-0.89]	[-0.90]
FIE		-0.001	-0.002	-0.004	-0.016	-0.025**	-0.018
		[-0.14]	[-0.29]	[-0.46]	[-1.95]	[-2.61]	[-1.91]
HTM Invested		0.015	0.016	0.015	0.006	-0.005	-0.007
		[1.61]	[1.72]	[1.56]	[0.65]	[-0.53]	[-0.71]
Listed		-0.008	-0.008	-0.012	0.031	0.031	0.011
		[-0.57]	[-0.59]	[-0.85]	[1.02]	[1.04]	[0.44]
Industry × Ownership							
Mining/Quarrying/Oil/Gas		-0.013	-0.014*	-0.026***	-0.023	-0.025*	-0.027*
× SOE		[-1.92]	[-2.04]	[-3.80]	[-1.84]	[-2.04]	[-2.04]
Mining/Quarrying/Oil/Gas		-0.002	-0.003	0.006	0.009	0.005	0.005
× COE		[-0.14]	[-0.28]	[0.49]	[0.72]	[0.44]	[0.39]
Mining/Quarrying/Oil/Gas		-0.014	-0.016	-0.026**	-0.003	0.007	0.008
× FIE		[-1.52]	[-1.66]	[-2.69]	[-0.20]	[0.43]	[0.53]
Mining/Quarrying/Oil/Gas		-0.023*	-0.025*	-0.034**	-0.029	-0.013	-0.008
× HTM Invested		[-2.01]	[-2.23]	[-2.96]	[-1.65]	[-0.71]	[-0.46]
Mining/Quarrying/Oil/Gas		-0.070***	-0.073***	-0.112***	-0.044	-0.047	-0.029
× Listed		[-4.77]	[-5.03]	[-7.18]	[-0.67]	[-0.71]	[-0.44]
Manufacturing × SOE		-0.045***	-0.044***	-0.048***	-0.015	-0.018	-0.020
		[-7.27]	[-7.14]	[-7.51]	[-1.33]	[-1.65]	[-1.74]
Manufacturing × COE		-0.024	-0.024*	-0.020	0.012	0.008	0.008
		[-1.94]	[-1.99]	[-1.64]	[1.14]	[0.77]	[0.69]
Manufacturing × FIE		-0.011	-0.010	-0.016*	0.009	0.016	0.010
		[-1.43]	[-1.31]	[-2.07]	[1.07]	[1.72]	[1.06]
Manufacturing		-0.020*	-0.021*	-0.028**	-0.015	-0.004	-0.002
× HTM Invested		[-2.15]	[-2.28]	[-2.99]	[-1.61]	[-0.39]	[-0.18]
Manufacturing × Listed		-0.030*	-0.030*	-0.047**	-0.051	-0.050	-0.033
		[-2.14]	[-2.17]	[-3.17]	[-1.67]	[-1.69]	[-1.36]
Utilities × SOE		-0.016*	-0.015*	-0.010	-0.010	-0.013	-0.014
		[-2.46]	[-2.32]	[-1.57]	[-0.86]	[-1.17]	[-1.20]
Utilities × COE		0.008	0.008	0.005	-0.003	-0.006	-0.002

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Table 8 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		[0.60]	[0.56]	[0.34]	[-0.18]	[-0.46]	[-0.12]
Utilities × FIE		-0.010	-0.009	-0.006	0.011	0.020	0.012
		[-1.22]	[-1.15]	[-0.74]	[1.13]	[1.78]	[1.10]
Utilities		-0.016	-0.017	-0.014	-0.005	0.005	0.008
× HTM Invested		[-1.55]	[-1.67]	[-1.41]	[-0.41]	[0.39]	[0.58]
Utilities × Listed		-0.025	-0.025	-0.020	0.011	0.013	0.037
		[-1.64]	[-1.68]	[-1.23]	[0.31]	[0.35]	[1.13]
Construction × SOE		-0.011	-0.011	-0.015*	-0.001	-0.005	-0.007
		[-1.68]	[-1.71]	[-2.29]	[-0.12]	[-0.42]	[-0.52]
Construction × COE		-0.021	-0.021	-0.016	0.015	0.008	0.009
		[-1.66]	[-1.75]	[-1.29]	[1.18]	[0.66]	[0.67]
Construction × FIE		-0.012	-0.013	-0.016	0.037	0.043	0.036
		[-1.18]	[-1.27]	[-1.56]	[1.70]	[1.92]	[1.62]
Construction		0.007	0.005	0.005	-0.021	-0.015	-0.009
× HTM Invested		[0.62]	[0.41]	[0.44]	[-1.14]	[-0.80]	[-0.44]
Construction × Listed		-0.028	-0.027	-0.054**	-0.022	-0.024	-0.004
		[-1.53]	[-1.49]	[-2.87]	[-0.36]	[-0.38]	[-0.06]
Finance/Insurance × SOE		-0.042***	-0.032***	-0.034***	-0.007	-0.010	-0.027
		[-6.33]	[-4.94]	[-5.00]	[-0.33]	[-0.43]	[-1.15]
Finance/Insurance × COE		0.071***	0.064***	0.056***	0.002	-0.003	-0.011
		[5.63]	[5.21]	[4.48]	[0.14]	[-0.20]	[-0.70]
Finance/Insurance × FIE		-0.004	-0.004	-0.011	0.006	0.004	-0.011
		[-0.44]	[-0.39]	[-1.13]	[0.25]	[0.16]	[-0.48]
Finance/Insurance		-0.023	-0.022	-0.030*	0.187***	0.205***	0.205***
× HTM Invested		[-1.63]	[-1.64]	[-2.18]	[13.30]	[11.80]	[11.61]
Finance/Insurance × Listed		-0.063***	-0.056***	-0.062***	-0.064*	-0.068*	-0.052
		[-4.46]	[-4.06]	[-4.20]	[-2.03]	[-2.14]	[-1.93]
Real Estate × SOE		-0.012	-0.012	-0.010	-0.016	-0.020	-0.024
		[-1.79]	[-1.73]	[-1.42]	[-1.25]	[-1.63]	[-1.84]
Real Estate × COE		-0.011	-0.012	-0.004	-0.008	-0.013	-0.007
		[-0.75]	[-0.89]	[-0.28]	[-0.47]	[-0.73]	[-0.35]
Real Estate × FIE		0.007	0.008	0.002	0.009	0.017	0.009

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Table 8 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		[0.88]	[0.93]	[0.24]	[0.85]	[1.42]	[0.73]
Real Estate		-0.016	-0.018	-0.021*	-0.026*	-0.016	-0.014
× HTM Invested		[-1.63]	[-1.84]	[-2.13]	[-2.40]	[-1.40]	[-1.19]
Real Estate × Listed		-0.010	-0.008	-0.028	-0.054	-0.057	-0.035
		[-0.58]	[-0.49]	[-1.61]	[-1.48]	[-1.60]	[-1.11]
Transport/Post/Telecom		-0.086***	-0.082***	-0.076***	-0.011	-0.014	-0.017
× SOE		[-13.17]	[-12.65]	[-11.25]	[-0.88]	[-1.08]	[-1.25]
Transport/Post/Telecom		-0.026*	-0.027*	-0.032*	-0.004	-0.008	-0.001
× COE		[-1.97]	[-2.06]	[-2.39]	[-0.27]	[-0.50]	[-0.08]
Transport/Post/Telecom		-0.085***	-0.081***	-0.064***	0.038*	0.042*	0.036*
× FIE		[-10.43]	[-9.93]	[-7.43]	[2.34]	[2.48]	[2.09]
Transport/Post/Telecom		-0.113***	-0.111***	-0.100***	-0.018	-0.007	-0.004
× HTM Invested		[-11.44]	[-11.27]	[-9.94]	[-1.20]	[-0.43]	[-0.28]
Transport/Post/Telecom		-0.124***	-0.117***	-0.110***	-0.074*	-0.073*	-0.053*
× Listed		[-8.76]	[-8.47]	[-7.39]	[-2.38]	[-2.37]	[-2.09]
Other Services × SOE		-0.020**	-0.019**	-0.026***	-0.007	-0.011	-0.014
		[-3.21]	[-3.12]	[-4.09]	[-0.68]	[-1.02]	[-1.19]
Other Services × COE		-0.018	-0.018	-0.012	0.021	0.017	0.019
		[-1.46]	[-1.49]	[-0.99]	[1.89]	[1.52]	[1.52]
Other Services × FIE		-0.035***	-0.034***	-0.045***	0.020*	0.027**	0.020*
		[-4.54]	[-4.51]	[-5.85]	[2.28]	[2.71]	[2.07]
Other Services		-0.043***	-0.045***	-0.058***	-0.010	0.001	0.004
× HTM Invested		[-4.51]	[-4.72]	[-6.13]	[-0.99]	[0.10]	[0.34]
Other Services × Listed		-0.079***	-0.080***	-0.099***	-0.049	-0.047	-0.027
		[-5.59]	[-5.78]	[-6.67]	[-1.57]	[-1.56]	[-1.07]
Controls							
Year			X	X	X	X	X
Size				X	X	X	X
Loss Carry-forward					X	X	X
Region						X	X
Deduction and Exemption							X
Observations	696345	696345	696345	684129	73875	73875	68134

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Table 8 – continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adjusted R^2	0.021	0.035	0.041	0.052	0.086	0.088	0.082

t statistics in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The "Other" ownership category includes private corporations, non-stock corporations, sole proprietorship corporations and unlisted stock corporations. Size controls are the logarithm of end of year asset, and logarithm of annual average number of workers. Loss control is the logarithm of loss from previous years. Deduction and exemption control variable is the total amount of deduction and exemption amounts of enterprise tax in thousand RMB. The effective EIT rate variable, size, loss carry-forward and deduction and exemption control variables are winsorized at 1% level.

6 Dispersion in Tax Wedges and Misallocation

In this section, we conduct the following 5 analysis to understand the dispersion in effective tax rates of VAT, Business Tax, Excise Tax and EIT. First, we plot density distributions of effective tax rates by each year to see the shape of distribution across levels of effective tax rates. Second, we draw scatter plots of effective tax rates against each percentile assets to see how effective tax rates would change with firm size. Third, we plot density distribution of effective tax rates by industry in 2008 to explore the heterogeneity of effective tax rates across industry. Next, we do the same exercise to plot by ownership structure in 2008. Last, we use available deduction and exemption data of tax payable to construct a counterfactual effective tax rate, and compare it to the actual effective tax rate.

In Figure 7 Panel (A), most corporations pay either 0% effective VAT rate or a level that is lower than statutory VAT rate. There are a group of corporations that pay an effective VAT rate that is above the statutory rate. Besides, it can be seen that a small group of corporations clumping at effective VAT rate of 1 and at the right tail with effective VAT rate more than 2, across all years. Panel (B) shows that the effective VAT rate declines with corporation asset size. Panel (C) displays the heterogeneity in effective VAT rate distributions across industries. Specifically, the majority of corporations in the mining/quarrying/oil/gas extraction industry and the utilities industry pay about 13% effective VAT rate, which is the statutory rate applied to products in those two industries. However, it can be seen that there is a significant group of manufacturing corporations clumping at 0% effective VAT rate, which implies that the manufacturing corporations that pays 0% effective VAT rate is one of the reasons that the overall distribution of effective VAT rate is shifted left. As for ownership structure, SOEs, FIEs and

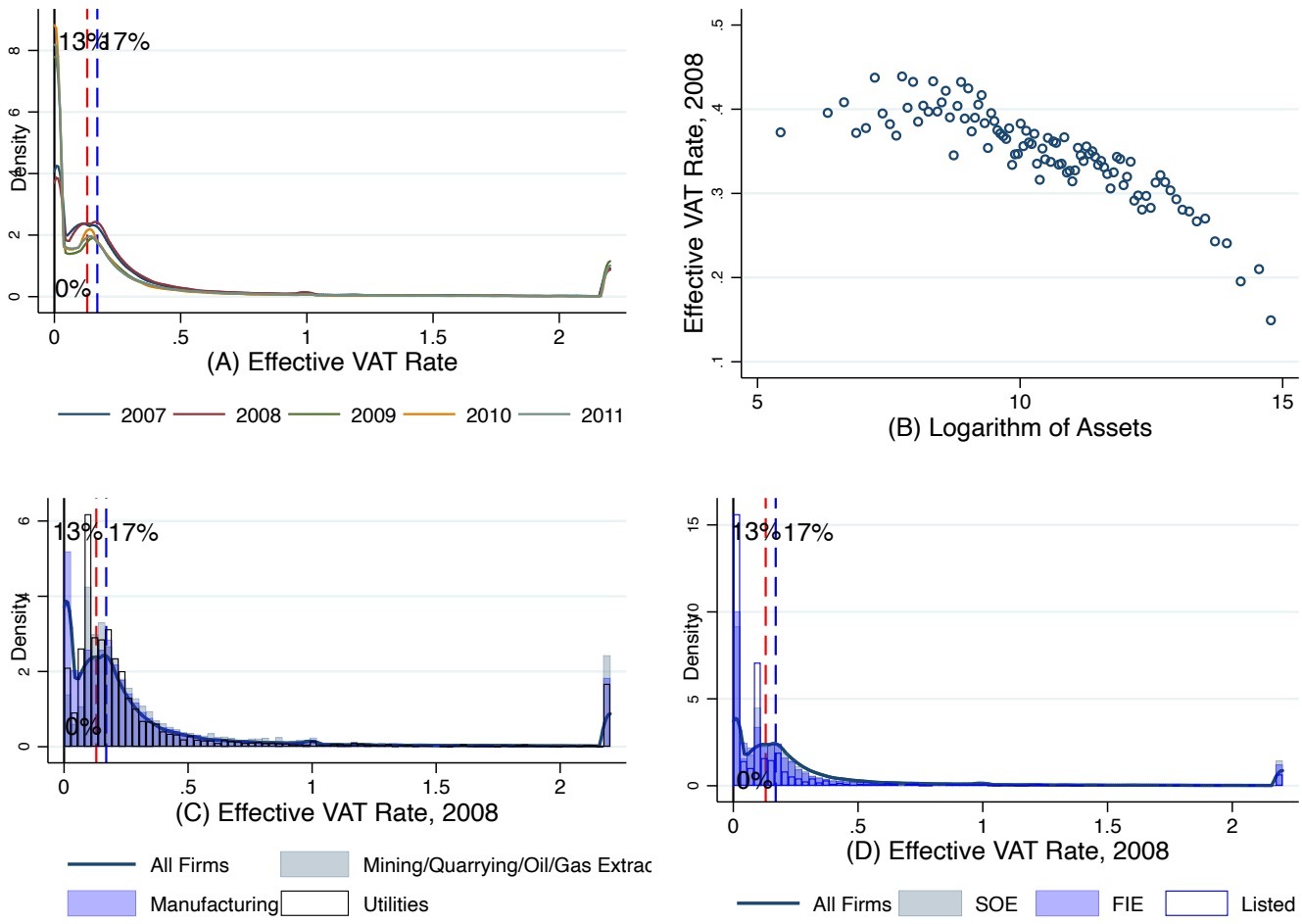


Figure 7: **Dispersion in Effective VAT Tax Rates**

Notes: This figure displays the distribution of effective VAT rates from 2007-2011, plots the relationship between effective tax rates and the percentile of logarithm of asset, and decomposes the distribution by industry and ownership structure in 2008, respectively. The effective VAT tax rates are winsorized at 5% level. The figure Panel (A) shows that there is a group of corporations that pay 0% effective VAT rate, while some pay a higher effective VAT rate higher than the statutory rate. Besides, Panel (B) shows the effective VAT rates has a negative correlation with size of assets. Compared to mining/quarrying/oil/gas extraction, and utilities industries, manufacturing corporations appear more often to pay 0% effective VAT rate, as shown in Panel (C). Panel (D) shows that compare to overall distribution, larger fractions of SOEs, COEs and listed corporations pay at 0% or a lower than 13% effective VAT rate.

especially listed corporations are more likely to pay 0% and a lower than 13% effective VAT rates, compared to the overall distribution, as shown in Panel (D).

Figure 8 Panel (A) shows that there are a large share of corporations pay 0% effective Business Tax rate. The next two largest groups of corporations pay around the 3% and 5% statutory Business Tax rates. Panel (B) shows that Business Tax has a positive correlation with asset size, which is in contrast to that between effective VAT rate and asset size mentioned above. In Panel (C), we focus on the distribution of effective Business Tax in contribution, real estate, finance and insurance, and transportation/postal/telecommunication industries, which are mainly subject to Business Tax. Panel (C) shows that construction and transportation/postal/telecommunication industries mainly pay Business Tax at around 3%, while real estate and finance and insurance industries mainly pay Business Tax at 5%. Noticeably, there are a group of corporations in the finance and insurance industry that either pay 0% effective Business Tax rate, or 3% Business Tax rate. As for ownership structure, most listed corporations pay around 5% effective Business Tax rate, while FIEs pay either 0% or 5% effective Business Tax rate and SOEs are relatively equivalently distributed across 0%, 3%, 5% effective Business Tax rate levels, as shown in Panel (D).

Figure 9 Panel (A) shows that the effective Excise Tax rates are concentrated at the left end of tail, that is, 0% effective Excise Tax rate, which is consistent across industry decomposition and ownership structure decomposition, as shown in Panel (C) and Panel (D), respectively. Panel (B) displays that the correlation between effective Excise Tax rates and size of assets oscillates but is overall positive. Panel (D) shows that a small group of listed corporations pay a non-zero Excise Tax, while other corporations are mostly concentrated around 0% effective Excise Tax rates.

Figure 10 Panel (A) shows that the overall distribution of effective EIT rates approaches a multi-modal distribution with two large quantities of corporations concentrating at 0% and the statutory 25% EIT rate. Panel (B) displays an inverted-U shape correlation between effective EIT rates and size of assets, which implies that the effective EIT rate first increases with corporation size, reaches a peak and then decreases as corporations become larger. Panel (C) shows that the majority of corporations in finance and insurance industry concentrate at 0% effective EIT rate, while most corporations in the construction industry pay at 25% EIT. Last, Panel (D) shows that a large number of listed corporations pay at 0% EIT, and the effective EIT rates of FIEs varying from 0% to 25%.

Given the fact that the deduction and exemption amounts in tax payable for VAT and Business Tax are available in 2007, 2010 and 2011, and deduction and exemption amounts in EIT payable are available from 2008, we add the deduction and exemption amount back to the tax payable to calculate the counterfactual effective tax rates in 2010. As shown in Figure 11, there

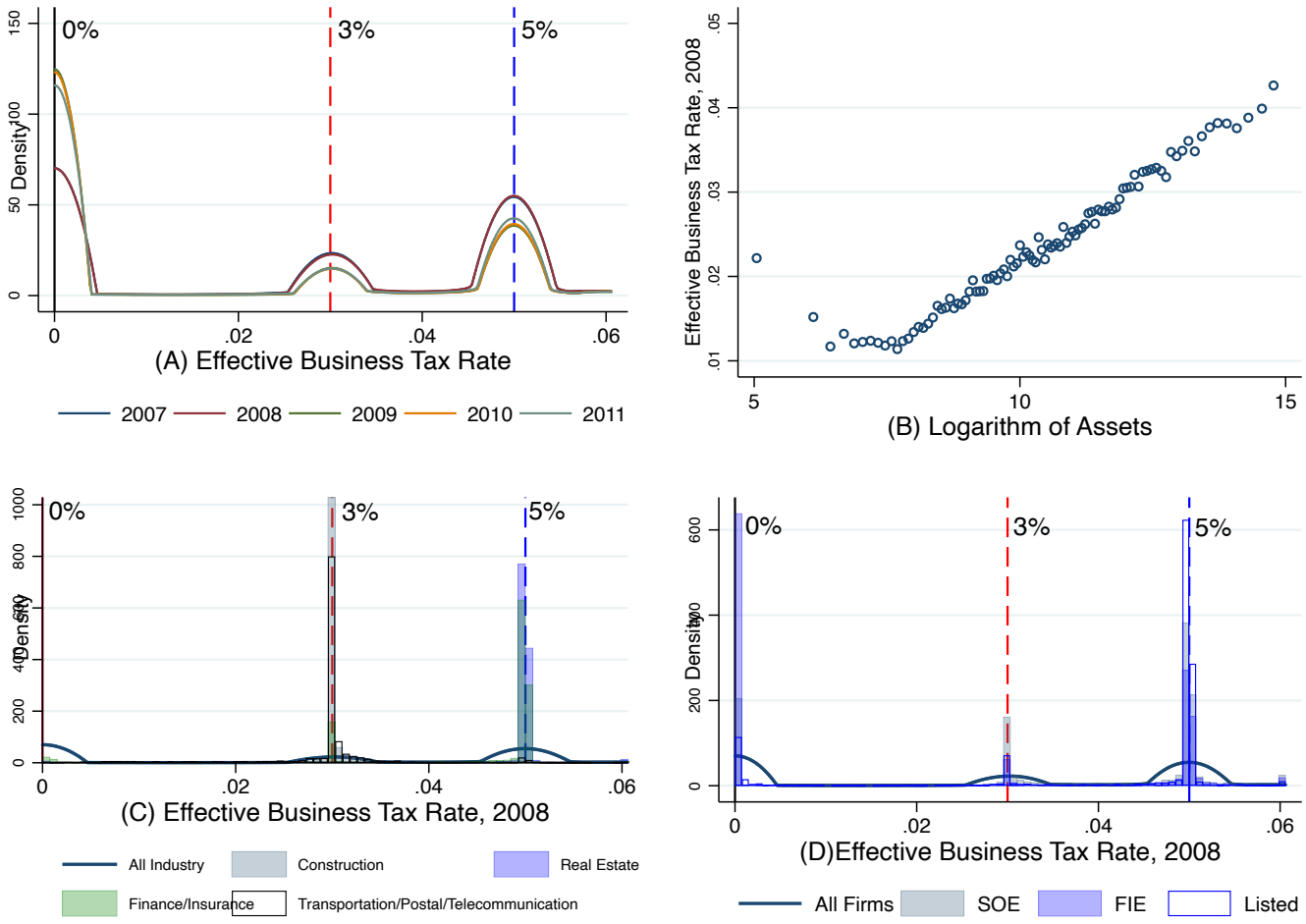


Figure 8: **Dispersion in Effective Business Tax Rates**

Notes: This figure displays the distribution of effective Business Tax rates from 2007-2011, plots the relationship between effective tax rates and the percentile of logarithm of asset, and decomposes the distribution by industry and ownership structure in 2008, respectively. The effective Business Tax rates are winsorized at 1% level. The figure shows that there is a positive correlation between effective Business Tax rates and size of assets. Besides, some corporations in the finance and insurance industry pay either 0% or 3% effective Business Tax rate. In addition, FIEs are concentrated at around 0% and 5% effective Business Tax levels, while listed corporations is very concentrated around 5% and SOEs are evenly distributed across 0%, 3% and 5% effective Business Tax rates.

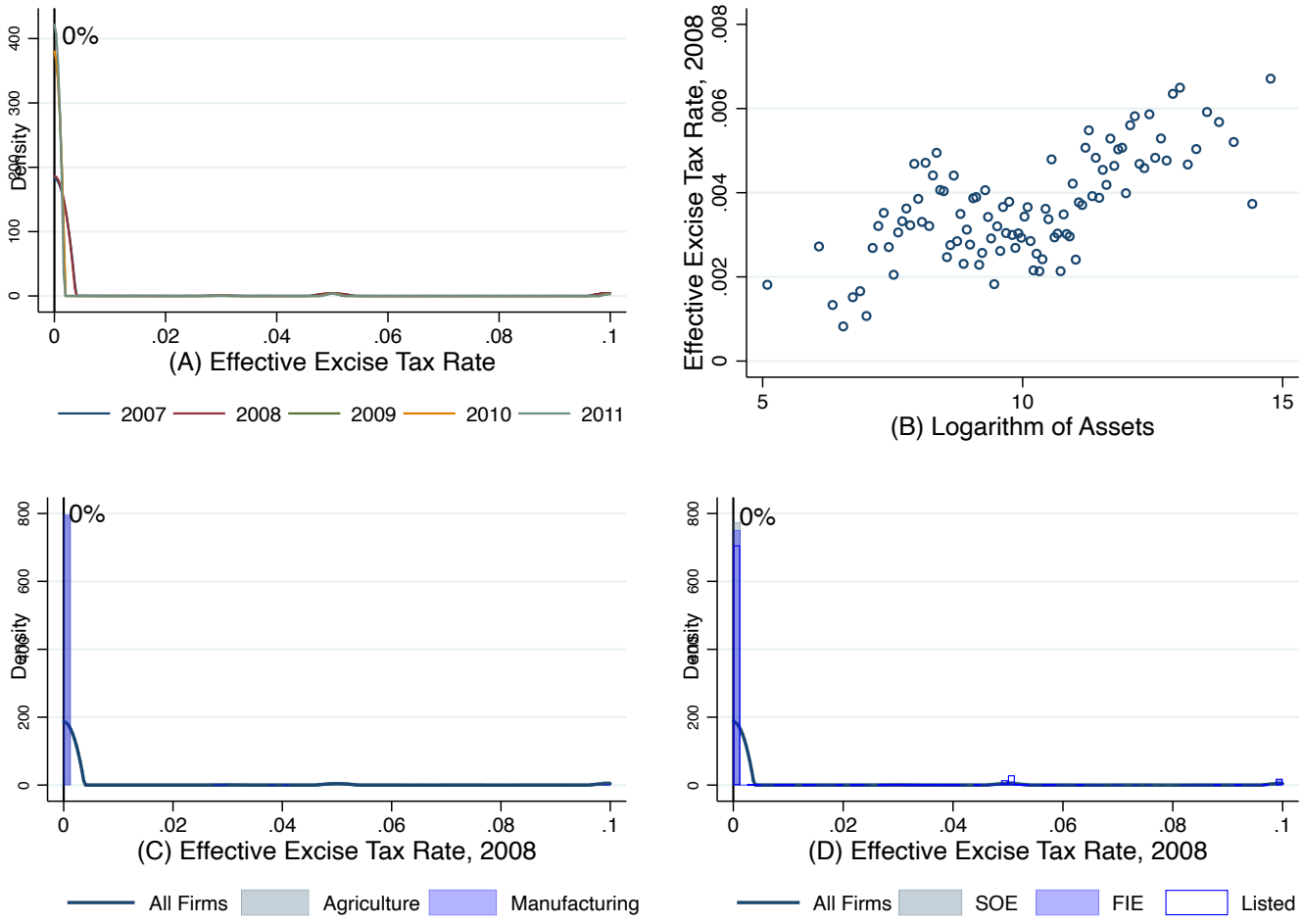


Figure 9: **Dispersion in Effective Excise Tax Rates**

Notes: This figure displays the distribution of effective Excise Tax rates from 2007-2011, plots the relationship between effective tax rates and the percentile of logarithm of asset, and decomposes the distribution by industry and ownership structure in 2008, respectively. The effective Excise Tax rates are winsorized at 1% level. The figure shows the effective Excise Tax is very concentrated at 0.

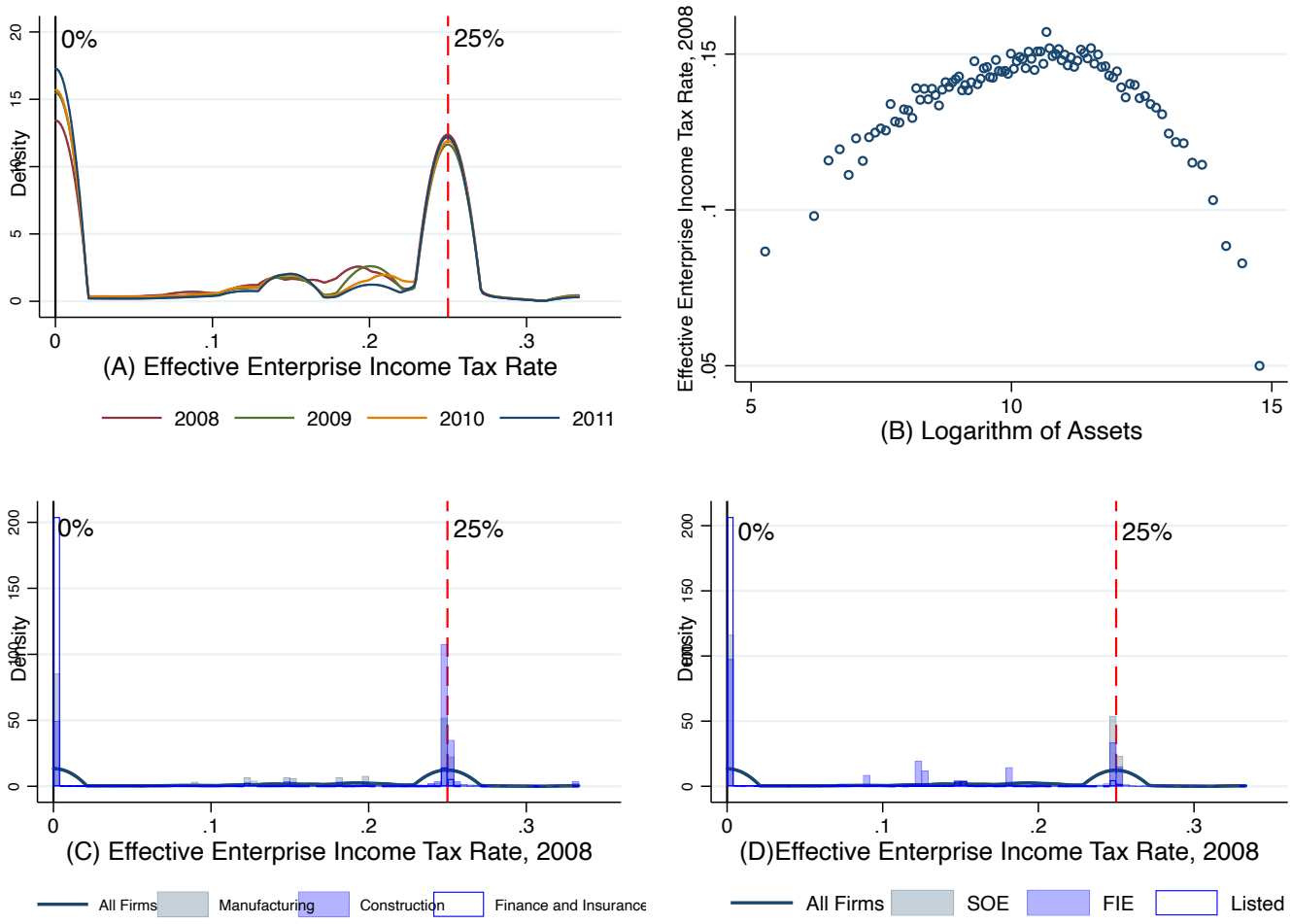


Figure 10: **Dispersion in Effective EIT Rates**

Notes: This figure displays the distribution of effective EIT rates from 2007-2011, plots the relationship between effective tax rates and the percentile of logarithm of asset, and decomposes the distribution by industry and ownership structure in 2008, respectively. The effective EIT rates are winsorized at 1% level. The figure shows the effective EIT distribution has two big peaks at 0% and 25%. Panel (B) shows that correlation between effective EIT rates and asset size is an inverted-U shape. In addition, a large share of finance and insurance corporations and listed corporations concentrate at 0% effective EIT rates.

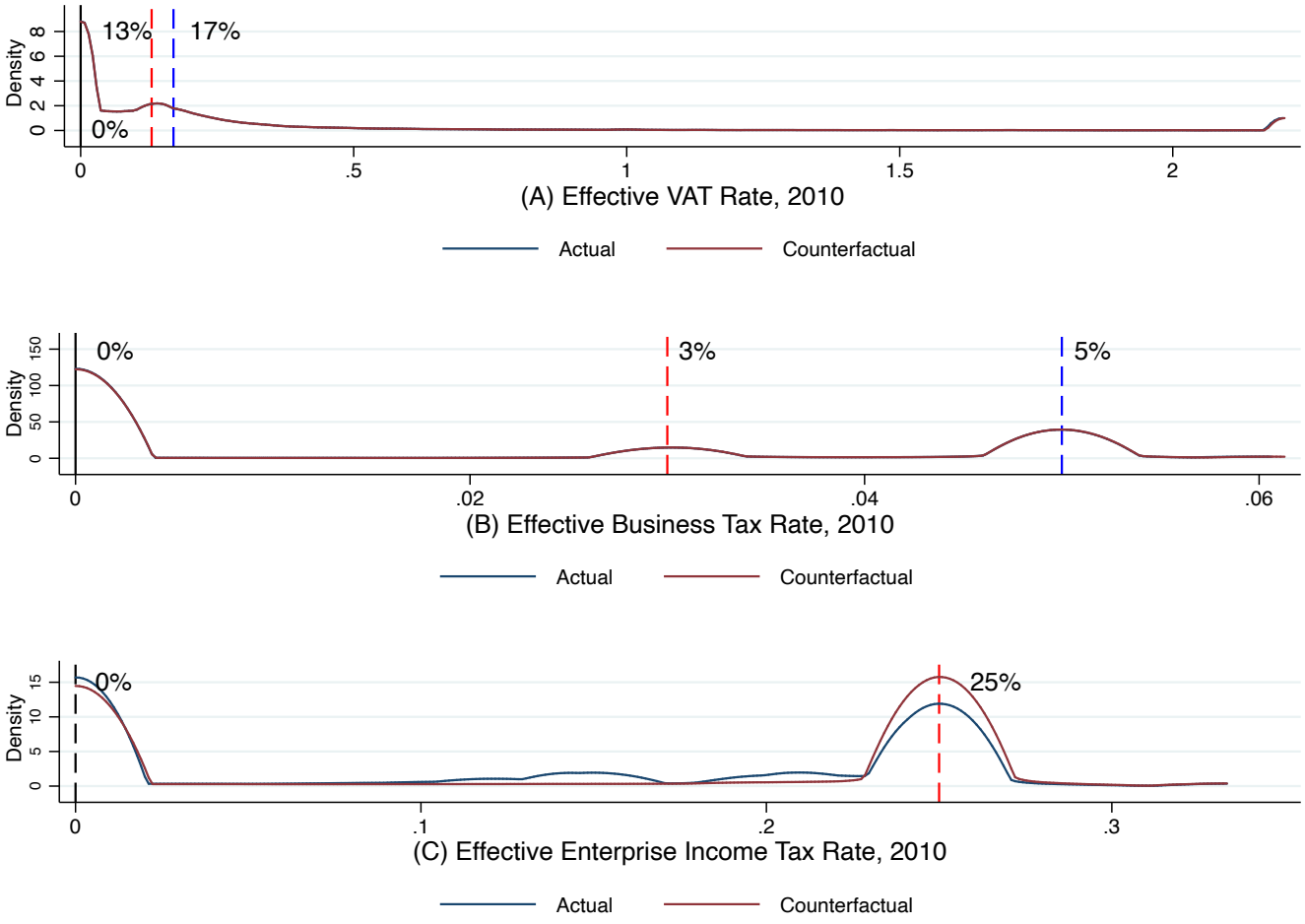


Figure 11: **Actual and Counterfactual Effective Tax Rates, 2010**

Notes: This figure displays the actual and counterfactual effective tax rates of VAT, Business Tax and EIT in 2010. The counterfactual effective tax rates are calculated by adding deduction and exemption amounts in tax payable to the actual tax payable, and then dividing by the original tax base. The actual and counterfactual effective VAT tax rates are winsorized at 5% level, while the actual and counterfactual effective Business Tax and EIT rates are winsorized at 1% level. The figure shows that deduction and exemption amounts in tax payable are one of the main reasons that drive dispersion in effective EIT rates across corporations, but not in that of effective VAT rates or effective Business Tax rates.

is no obvious difference between the actual and counterfactual effective tax rates of VAT and Business Tax. However, compared to actual effective EIT rates, Panel (C) shows that there will be less corporations paying 0% EIT and more paying around 25% EIT under the counterfactual regime. This result implies that deductions and exemptions in tax payable are not the main reason for dispersion in effective VAT or Business Tax rates, but is one of main factor that drives dispersion in effective EIT rates.

7 Conclusion

TO BE COMPLETED.

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