

Tax Burden, Institutional Environment and Foreign Direct Investment Flow: From the Perspective of Asymmetric International Tax Competition

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The global economic uncertainty is mounting. Governments need to respond with supporting measures for long-term external environment changes as they lower tax burden to attract working capital. Based on the asymmetric tax competition theory, this paper constructs a theoretical model of tax burden, institutional transaction costs and FDI flow. It is found that one country's strength of institutional environment makes its equilibrium tax rate higher than that of another within certain limits of market size. Based on the data of 199 countries and regions from 2005 to 2018, this paper conducts an empirical analysis, proving that favorable institutional environment narrows the negative impact of tax burden on FDI flow. Moreover, it is showed that in small-market, low-income countries and regions, tax burden level has a larger negative impact on foreign direct investment (FDI) when institutional environment produces no positive impact; in large-market, high-income countries, the negative impact of tax burden is relatively weak but the institutional environment shows largely positive impact. This paper contributes some policy recommendations on how to make use of and improve institutional environment to meet challenges and impacts of the international economic climate.

Keywords: asymmetric tax competition, institutional environment, foreign direct investment, market scale

1. Introduction

In recent years, the global economic growth has slowed down, and the total foreign direct investment has stagnated and even declined. In parallel, major countries have made tax cuts to stimulate domestic and international capital flow. The average corporate income tax has dropped from more than 40% to about 20% over the past 20 years, according to the *Tax Policy Reform Report 2017*, published by the Organization for Economic Co-operation and Development (OECD). In December 2017 the two houses of the United States adopted the largest tax cut program in history, which

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sparked heated debate of each country on tax cuts. Global economic uncertainty, however, has mounted amid the severe pandemic situation. Lowering tax burden will put many countries under severe fiscal pressure. More complicated is that, unlike the interpretation of the classical tax-competition framework, the relationship between tax burden level and FDI flow varies significantly. Some developed countries attract more FDI with higher taxation, while others, especially those in backward regions, have smaller FDI inflow despite lower tax rates.¹ Governments therefore need to seek favorable policies according to local conditions and respond with supporting measures for long-term external environment changes, as they lower tax burden to attract working capital.

From the perspective of other factors influencing FDI destinations, globalization has intensified the flow of factors of production and the gap between raw material costs, infrastructure conditions and labor costs gradually narrowed. The difference in institutional environment remains large as an important factor for FDI distribution. Of particular concern is the fact that some countries with high tax burden possess favorable institutional environment and high net FDI inflow. So, will institutional environment regulate the negative impact of tax burden on FDI to some extent? How will countries and regions with different institutional environment and tax burden decide their policies, if the tax burden is taken into account? The answers need to be proved with practice data of countries all over the world.

Under the current economic development environment at home and abroad, it is of great practical significance to explore how to utilize and improve institutional environment to meet challenges and impacts of international economic climate and tax competition. Existing studies mostly examine tax competition and FDI flow separately (Buettner and Waamser, 2009) or the relationship between institutional quality and FDI flow (Lu, 1999; Jiang and Jiang, 2012), and overlook differences among countries. However, the research of putting tax burden, institutional environment and FDI flow into the same theoretical and empirical analysis framework is scarce, which will not be comprehensive enough for us to understand rules of international FDI flow.

The path of institutional environment impacting FDI is through the institutional transaction costs of businesses, which then impact the return on investment. To this end, this paper constructs a theoretical model by putting the tax burden, institutional transaction costs and FDI flow into the same framework, and makes an empirical analysis with relevant data of 199 major countries and regions from 2005 to 2018. The focus is on whether institutional environment will adjust the negative impact of tax burden on FDI, and on the heterogeneity among countries of different market

¹ According to the World Bank's figures on total tax rates and FDI, total tax rates of China, France, Japan, Brazil and other countries are above 50%, while those of South Africa, Cambodia, Saudi Arabia and Zambia are below 30%, or even as low as 16.8%. However, FDI stocks in China and other countries is significantly higher than that in South Africa and other countries.

sizes and development stages. The marginal contributions of this paper are as follows: first, it attempts to attribute institutional environment to institutional transaction costs, which is included in the corporate profit function, and establishes an asymmetric tax competition theoretical model of tax burden, institutional transaction costs and FDI flow to study the differences in equilibrium taxation of each country; second, the impact of institutional environment on tax burden in the process of attracting FDI is empirically examined and the alternative relationship between institutional environment and tax burden is confirmed; third, the heterogeneity of the above results is studied from the perspective of national characteristics, with market size and national development stage under control, to more scientifically explain the features of the current FDI flow, referred as a theoretical basis for the policy choices of different countries.

2. Literature Review and Research Thinking

Economic globalization has accelerated the international flow of production factors and tax competition. The gap between factors of production, infrastructure around the world are narrowing, but differences in institutional environment remain evident. Therefore, related research starts working on the impact of institutional environment on national taxation systems. Theoretical models and empirical studies have been applied demonstrating the impact of political systems on the determination of corporate tax rate and examining the role of economic and political volatility in the determination of corporate tax rate (Ghinamo *et al.*, 2010). The testable proposition from the theoretical model is that increased economic and political volatility lowers the corporate tax rate. The research supports the above hypothesis with an empirical analysis of large panel data sets in various countries from 1983 to 2003. Similarly, Chinese scholars (Kuang and Xiang, 2017) studied the destruction and transfer effects caused by international political conflicts with monthly time series data of China and Japan from 2006 to 2015, and found that lasting political conflicts would lead to corresponding tax competition and affect investment activities. Both prove the impact of institutional environment on taxation arrangement and the transmission mechanism is made possible through FDI flow. A shared conclusion is that institutional environment impacts tax policies by way of investment activities. The above research measures institutional environment mainly from the view of political stability, but it has been proved that, besides the political system, institutional factors such as power of discourse and accountability (Kolstad and Wiig, 2012), government efficiency (Globerman and Shapiro, 2002) have positive impact on attracting FDI, while government corruption has negative impact on FDI (Fredriksson *et al.*, 2003). To this end, we need to examine the relationship between institutional environment and taxation in the process of attracting FDI on the basis of multiple indicators.

On theoretical analysis, there is also room for improvement. The logical path of institutional environment impacting the total FDI of a country is to change the investment returns of business through institutional transaction costs (Javorcik and Wei, 2009). However, it is found that few studies have established theoretical analysis framework from the perspective of institutional transaction costs. In recent years, the classical model has been extended with the theoretical model of tax competition and capital flow. Related theoretical research of asymmetric tax competition holds that countries with regional advantages attract more transnational businesses at high taxation, if different characteristics and factors of each country is considered. However, these studies emphasize more on the market size advantages (Bucovetsky, 1991; Haufler and Wooton, 2010). It is reasonable to study whether countries with low institutional transaction costs attract more FDI at high taxation, based on the analytical framework of asymmetric tax competition model. But in theoretical analysis, we need to loosen the hypothesis of the same cost in existing models.

In the empirical analysis of existing studies, we find that: first, regarding the core variable of tax burden, most studies adopt corporate income tax rate to measure national tax burden (Barrios, 2012; Celine and Delios, 2008). This approach, however, inevitably overlooks the differences in tax structure among countries in international comparison. If only the corporate income tax among countries and regions is considered, corporate tax burden as a whole will be underestimated to varying degrees. Some scholars believe that the “total tax rate” indicator is more reasonable and feasible for the measurement of corporate tax burden (Li and Zang, 2017). The World Bank’s total tax rate takes all corporate tax-related terms as the numerator of the unified measure of tax burden and corporate pre-tax profit as the denominator. This paper tends to use the “total tax rate” indicator to compare the tax burden of each country horizontally. Second, the core explanatory variable of institutional environment is mainly measured by the indicators of international organizations. For example, some domestic studies select the Worldwide Governance Indicators (WGI) published by the World Bank for the measure of institutional environment (Jiang and Jiang, 2012), with the average of six sub-indicators as a general institutional quality indicator (Wang *et al.*, 2014). With WGI, the Principal Component Analysis (PCA) is applied and the performance of each sub-indicator is studied.

After the literature review, this paper has breakthroughs as follows: first, the theoretical model of asymmetric tax competition is applied and expanded, attempting to include institutional environment into the corporate profit function in the form of institutional transaction costs, which will make theoretical analysis more suitable for this research subject; second, the impact of institutional environment on the negative impact of tax burden in the process of attracting FDI is studied from a broader range of samples, including panel data of 199 major countries and regions worldwide; third, the heterogeneity of above results is examined from the aspect of national characteristics,

as the market size and national development stage are controlled, to more scientifically explain the characteristics of current FDI flow and provide a theoretical basis for policy choices of different countries.

3. Asymmetric Tax Competition Model-Based Theoretical Analysis

The theoretical model of this paper is based on the theoretical models of Haufler and Wooton (2010). Haufler and Wooton (2010) construct an oligopoly model that depicts two competing multinational firms from countries of different market sizes. The model accords with the practice of tax competition for transnational capital in major countries, but its hypothesis that the cost of running business in different countries is the same is inconsistent with the subject of our research. We therefore retain the hypothesis of market size differences but loosen the hypothesis of the same cost in the model. When the differences in institutional environment is attributed to the term of institutional transaction costs, it is reasonable to study whether countries with low institutional transaction costs attract more FDI at high taxation by employing the analytical framework of asymmetric tax competition model. On this basis, the impact of institutional transaction costs differences on the equilibrium taxation of two countries in the asymmetric tax competition model is further studied, so is the impact range of institutional transaction costs on the equilibrium taxation under the limit of market size.

3.1. Basic Hypothesis

3.1.1. Consumer Hypothesis

Suppose there are two countries in a region, a and b , which attract a certain number of firms. For the ease of analysis, suppose the number of firms is fixed at k and a homogeneous commodity is produced in an oligopolistic industry, labeled x . Besides, it is supposed that private products, i.e. the priced commodity z , are produced under certain perfectly competitive market conditions. Consumer preferences for commodities are the same in both countries, with a preference curve of:

$$u_i = \alpha x_i - \frac{\beta}{2} x_i^2 + z_i, \quad i \in (a, b) \quad (1)$$

Suppose the market size of country a is n ($1 > n > 0$) and country b is $1-n$. It is supposed that the income source of the residents in both countries is wage income and the profit income is attributed to the owners of capital residing in third countries. Each household around the region provides one unit of labor. The wage level in each

country is determined by the measurement industry in which the use of labor is the only input, supposed as w . Furthermore, the total business taxation represented by T_i is redistributed equally and once to consumers in each country. Budgetary constraints on representative consumers in both countries are as follows:

$$w + \frac{T_a}{n} = z_a + p_a x_a, \quad w + \frac{T_b}{1-n} = z_b + p_b x_b \quad (2)$$

p_i is the price of commodity x in country i . Supposing the inverse demand curve is $\alpha - \beta x_i = p_i$, the aggregate market demand curve for all consumers in each country is:

$$X_a = \frac{n(\alpha - p_a)}{\beta}, \quad X_b = \frac{(1-n)(\alpha - p_b)}{\beta}. \quad (3)$$

3.1.2. Manufacturer Hypothesis

Suppose that the asymmetry between a and b is not only reflected in the market size, but in institutional transaction costs differences caused by the differences in institutional environment. Without loss of generality, it is supposed that corporate cost in country a is not higher than that in country b , i.e. $\omega_a \leq \omega_b$. For ease of analysis, supposing the corporate cost in country a is $\omega_a = \omega$ and in country b is $\omega_b = \omega + \phi$, their difference is referred as institutional transaction costs.

Suppose that the cost per unit product exported is τ , so the marginal cost of products sold by manufacturers to countries outside the place of investment increases to $\omega_a + \tau$ or $\omega_b + \tau$. Pre-tax profit function for each manufacturer is:

$$\pi_a = (p_a - \omega)\chi_{aa} + (p_b - \omega - \tau)\chi_{ba}, \quad \pi_b = (p_a - \omega - \phi - \tau)\chi_{ab} + (p_b - \omega - \phi)\chi_{bb} \quad (4)$$

Among which π_j represents the pre-tax profit of a manufacturer located in country j and χ_{ij} the sales of manufacturers in country j , $i, j \in (a, b)$. Suppose that k_a manufacturers are located in country a and k_b in country b , $k_a + k_b = k$. Suppose that equilibrium output is χ_{aa}^* , χ_{ab}^* , χ_{ab}^* , χ_{bb}^* . Manufacturers in country a maximize $(p_a - \omega)\chi_{aa}$ when the investment decision is χ_{aa}^* .

$$\text{There should be, } p_a = \alpha - \frac{\beta}{n} [k_b \chi_{ab}^* + (k_a - 1) \chi_{aa}^* + \chi_{aa}].$$

The first-order condition is:

$$\alpha - \omega - \frac{\beta}{n} [k_b \chi_{ab}^* + (k_a - 1) \chi_{aa}^*] - \frac{2\beta}{n} \chi_{aa}^* = 0$$

When equation (3) is combined and equation (4) is maximized, the equilibrium output level (5) of each manufacturer is derived, i.e.,

$$\begin{aligned}\chi_{aa} &= \frac{n(\alpha - \omega + \phi k_b + k_b \tau)}{\beta(k+1)}, \chi_{ba} = \frac{(1-n)[\alpha - \omega + \phi k_b - (1+k_b)\tau]}{\beta(k+1)}, \\ \chi_{ab} &= \frac{n[\alpha - \omega - \phi - \phi k_a - (1+k_a)\tau]}{\beta(k+1)}, \chi_{bb} = \frac{(1-n)[\alpha - \omega - \phi - \phi k_a + k_a \tau]}{\beta(k+1)}.\end{aligned}\quad (5)$$

Suppose that trade costs are low enough to ensure $\chi_{ab} > 0, \chi_{ba} > 0$, that is, the products of each manufacturer will be exported to foreign markets. Besides, both countries attract the same number of businesses with the same market size and institutional transaction costs, i.e., $k_a = k_b = \frac{k}{2}$, and the following constraint is concluded:

$$\phi < 2(\alpha - \omega) - \tau \quad (6)$$

Suppose that the above constraint is also satisfied in the following analysis. The constraint means that the differences in institutional transaction costs between the two countries is below a critical ceiling, beyond which all businesses will only choose to manufacture in the lower-cost country, while the other country has too large a cost disadvantage to invest, regardless of its market size and taxation status.

The equilibrium prices of each market is:

$$p_a = \frac{\alpha + k_b(\omega + \phi) + k_a\omega + k_b\tau}{k+1}, p_b = \frac{\alpha + k_a\omega + k_b(\omega + \phi) + k_a\tau}{k+1} \quad (7)$$

Consumer prices fall in both countries as the total number of businesses, k , increases, thus intensifying competition of oligopoly industries. And in each country, consumer prices are a rising function of the number of active businesses in another country. That is, owning more local manufacturers will intensify domestic competition and lower consumer prices, regardless of the industrial scale.

The pre-tax profit of manufacturers in each country is derived, when substituting equations (5) and (7) into equation (4), i.e.,

$$\begin{aligned}\pi_a &= \frac{n(\alpha - \omega + \phi k_b + k_b \tau)^2}{\beta(k+1)^2} + \frac{(1-n)[\alpha - \omega + \phi k_b - (1+k_b)\tau]^2}{\beta(k+1)^2} \\ \pi_b &= \frac{n[\alpha - \omega - \phi - \phi k_a - (1+k_a)\tau]^2}{\beta(k+1)^2} + \frac{(1-n)[\alpha - \omega - \phi - \phi k_a + k_a \tau]^2}{\beta(k+1)^2}\end{aligned}\quad (8)$$

Suppose that corporate profits are subject to a one-time tax imposed by the host country, and that t_i is the tax paid by firm i , then the total tax is:

$$\forall i \in (a, b) \quad T_i = t_i k_i. \quad (9)$$

The tax differences between the two countries is $\Delta \equiv t_a - t_b$. When choosing an investment destination, a firm compares its net profits in two countries to select a more profitable one. For businesses, the industry's location equilibrium feature is $\pi_a - t_a = \pi_b - t_b$.

Using equation (8), the number of businesses attracted by each country will be derived:

$$k_a = \frac{k}{2} + \frac{(2n\tau + \phi - \tau)[2\alpha - 2\omega - \phi - \tau]}{2(\phi - \tau)^2 + 8n\tau\phi} - \frac{\Delta\beta(k+1)}{2(\phi - \tau)^2 + 8n\tau\phi}; \quad k_b = k - k_a \quad (10)$$

3.1.3. Government Department Hypothesis

With the equilibrium prices in equation (7) and the market demand function in equation (3), consumer returns are summarized as:

$$W_a = nu_a = S_a + T_a + nw; \quad W_b = (1-n)u_b = S_b + T_b + (1-n)w, \quad (11)$$

Where S_i is the total consumer surplus for country i in market x :

$$S_a = \frac{n[k(\alpha - \omega) - k_b(\tau + \phi)]^2}{2\beta(k+1)^2}; \quad S_b = \frac{(1-n)[k(\alpha - \omega) - k_a(\phi + \tau)]^2}{2\beta(k+1)^2}. \quad (12)$$

3.2. Equilibrium Tax Differences between Two Countries Under Institutional Transaction Costs Differences

After the equilibrium tax differences between the two countries under the condition of the same market size are first derived, equation (13) is obtained, i.e.,

$$s(t_a^* - t_b^*) = \frac{\phi[6(\alpha - \omega) - 3(\phi + \tau)]}{\beta(6k+5)} \quad (13)$$

Among which s represents the same market size of the two countries, and it can be seen from equation (13) that there are differences in equilibrium taxes between the two countries during Nash equilibrium. So the general conclusion we have is that the two governments will still levy different levels of taxes under the same market size and Nash equilibrium, and the tax differences are sourced from different institutional transaction costs of the two countries. Further, judging the size of equilibrium taxes of the two countries on the basis of the conditions of equation (6), it is concluded: $s(t_a^* - t_b^*) > 0$. Then the theoretical proposition 1 is obtained: when other conditions stay the same, countries with better institutional environment have higher equilibrium taxes, and are more capable and motivated to levy higher taxes in international tax competition.

After basic results under the symmetry of market size are obtained, the more general case that there are differences in market size and institutional environment between the two countries is studied. With the same approach as above, the following is derived,

$$As(t_a^* - t_b^*) = \frac{(\phi + (2n - 1)\tau)[6(\alpha - \omega) - 3(\phi + \tau)]}{\beta(6k + 5)} \quad (14)$$

Among which As stands for the asymmetry of market size and differences. When the market size of the country (country a , as it previously supposed to be) with relatively low institutional transaction costs is large, or the cost differences are large

enough ($n > \frac{1}{2} - \frac{\phi}{2\tau}$, $\phi > (1 - 2n)\tau$), it is determined that the equilibrium taxation

of country a is higher than that of country b . Therefore, country a , with relatively low institutional transaction costs, is allowed to levy higher taxes on an equilibrium basis, while country b , with relatively high costs, must compensate for the adverse effects brought by the location of businesses and thus levy lower taxes. And with the widening gap between institutional transaction costs of the two sides, the gap between equilibrium taxes will be increasingly large.

Theoretical proposition 2 is derived: when country a with better institutional environment has a market size above a certain floor, its equilibrium taxation will be higher than that of country b , and lower when below this market size floor. That is to say, when one country's institutional environment is better than another's, there are certain intervals that make it necessary for the country to attract businesses with lower taxation.

4. Empirical Research Design and Results

The deep relationship between tax competition, institutional environment and

FDI flow and the propositions of theoretical model need to be further supported by empirical research. In this paper, relevant data and measurement models are applied for the following empirical research.

4.1. Measurement Model

For verifying the basic impact of tax burden and institutional environment on FDI, the following measurement model is constructed:

$$FDI = \alpha + \beta_1 totax + \beta_2 avzh + \sum \lambda x_i + \varepsilon$$

Among them, the explained variable FDI is the net inflow of foreign direct investment. $totax$ is the core explanatory variable, which measures the tax burden of each country. $avzh$ stands for institutional environment. X_i indicates other control variables, including GDP (market size), $gdpsp$ (market potential), $labor$ (number of labor), $urban$ (level of urbanization), $industry$ (share of industrial added value), $resours$ (abundance of natural resources), etc.

Furthermore, in controlling individual fixed effects and time fixed effects, the following measurement model is constructed:

$$FDI_{it} = \alpha_1 + \beta_1 totax_{it} + \beta_2 avzh_{it} + \sum \lambda x_{it} + \sum \gamma_i z_i \delta + \varepsilon_{it}$$

For studying the impact of institutional environment on the sensitivity of FDI to tax burden, interaction terms are added to the fixed effects model and the following model is constructed:

$$FDI_{it} = \alpha_1 + \beta_1 totax_{it} + \beta_2 avzh_{it} + \sum \lambda x_{it} + \beta (totax_{it} - \overline{totax_{it}})(avzh_{it} - \overline{avzh_{it}}) + \sum \gamma_i z_i \delta + \varepsilon_{it}$$

Among them, x_{it} indicates other control variables, z_i individual features that stay unchanged with time, and ε_{it} disturbing terms.

Given the above measurement models, it is predicted that the $totax$ coefficient is negative, i.e., under certain other conditions, the higher the tax burden, the lower the country's FDI inflow. The coefficient of institutional environment is estimated to be positive, that is, FDI tends to enter regions with favorable institutional environment. If the interactive-term coefficient is positive, it means that the negative impact of taxation on FDI is weakened by institutional factors; and if the interactive-term coefficient is negative, but the absolute value of the coefficient of tax variables decreases, it indicates that favorable institutional environment reduces the negative impact of taxation on the choice of FDI location. Otherwise, institutional environment has no such impact.

4.2. Data Source and Variable Descriptive Statistics

There are two considerations in adopting the data from 2005–2018. Over the past 15 years the increase and volatility of net FDI inflow have attracted wide attention. Besides, since 2005, the World Bank has systematically totaled the tax burden of countries. Among them, the data of total tax rate is conducive to the horizontal comparison of tax burden at the business level in various countries, and it is also one of the core indicators in this paper. To this end, the objective rules of FDI flow is described to some extent with the data of 14 years since 2005.

This paper selects relevant indicators from WGI (World Governance Indicators) database to measure institutional environment. With the basic data of six dimensions, such as power of discourse and accountability, administrative efficiency and regulatory system, the first-order principal component of sub-indicators is taken to measure the overall institutional environment, and the performance of each sub-indicator is observed separately.¹ As mentioned in the literature review, we tend to use the World Bank's total tax rate to measure the tax burden of each country. Data on total tax rates, net FDI inflow and other national characteristics are derived mainly from publicly available data of international institutions such as the World Bank, the International Labor Organization (ILO), the International Monetary Fund (IMF) and the World Intellectual Property Organization (WIPO) for 2005–2018. Data are compiled for 14 years for 199 countries and regions, and the descriptive statistics are shown in Table 1.

Table 1. Descriptive Statistics of Variables

Variable name	Number of samples	Mean	Standard deviation	Minimum value	Maximum value	Indicator interpretation
<i>lnFDI</i>	2478	20.7	2.5	10.4	27.3	Logarithmic value of net FDI inflow
<i>totax</i>	2422	44.2	31.1	7.4	285.9	Tax burden (World Bank's indicator of total tax rate)
<i>avzh</i>	2650	48.9	26.5	0.3	99.8	Institutional environment
<i>var</i>	2650	49.2	29.0	0.0	100.0	Sub-indicator of institutional environment (power of discourse and accountability)
<i>pvr</i>	2650	48.3	28.7	0.0	100.0	Sub-indicator of institutional environment (political stability)
<i>ger</i>	2650	48.9	29.0	0.0	100.0	Sub-indicator of institutional environment (government efficiency)

¹ In view of the small missing data, the moving average method is adopted to interpolate the missing data of sub-indicators when calculating the overall institutional level.

Variable name	Number of samples	Mean	Standard deviation	Minimum value	Maximum value	Indicator interpretation
<i>rqr</i>	2650	48.9	28.8	0.0	100.0	Sub-indicator of Institutional environment (regulatory quality)
<i>rlr</i>	2650	48.6	28.8	0.0	100.0	Sub-indicator of institutional environment (legal rules)
<i>ccr</i>	2650	48.5	29.0	0.0	100.0	Sub-indicator of institutional environment (quality of corruption)
<i>industry</i>	2480	26.9	13.3	2.1	87.8	Share of Industrial added value in GDP
<i>lnmarket</i>	2617	24.1	2.4	16.8	30.7	Market size (GDP + commodity services (Import–Export))
<i>gdpsp</i>	2593	3.8	5.3	−62.1	123.1	Market potential (GDP growth rate)
<i>urban</i>	2667	56.8	23.3	9.4	100.0	Level of urbanization (proportion of urban population)
<i>resours</i>	2618	8.3	12.3	0.00	74.1	Rent of natural resources
<i>lnlabor</i>	2485	15.1	1.8	10.5	20.5	Logarithmic value of labor number

4.3. Empirical Results

4.3.1. Basic Regression Results

The basic empirical regression results are shown in Table 2. The OLS analysis of robustness is first made from clustering to id. The coefficient of tax burden variable is negative and prominent, while the coefficient of institutional environment variable is positive and prominent. The results confirm the theoretical hypothesis that the lower the general tax burden on business and the better the institutional environment are, the higher the net FDI inflow in a country will be when other conditions are the same. At the same time, the results of such control variables as the share of industrial added value, the level of urbanization, and the market potential are in line with expectations.

In controlling the possible missing variables that remain unchanged with the year but vary from countries or regions, and the missing variables that remain unchanged among countries or regions but vary with the year, the Hausman test is performed. The fixed effects model applied in this paper is confirmed by testing. The estimation coefficients and the visibility of the two-way fixed effects model are reduced, but the estimation results support the above results. It is concluded that FDI tends to flow to regions with lower tax burden or better institutional environment worldwide.

Table 2. Basic Regression Results

<i>lnFDI</i>	OLS		FE (1)		FE (2)	
<i>totax</i>	−0.007*** (−4.37)	−0.006*** (−4.63)	−0.003*** (−2.94)	−0.003*** (−2.79)	−0.002* (−1.73)	−0.002** (−2.16)
<i>avzh</i>	0.038*** (20.14)	0.019*** (9.35)	0.017*** (3.38)	<i>avzh</i>	0.038*** (20.14)	0.019*** (9.35)
<i>industry</i>		0.021*** (5.98)		<i>industry</i>		0.021*** (5.98)
<i>gdpsp</i>		0.076*** (7.47)		<i>gdpsp</i>		0.076*** (7.47)
<i>urban</i>		0.050*** (21.95)		<i>urban</i>		0.050*** (21.95)
_cons	19.046*** 140.28	16.361*** 92.33	19.930*** 77.38	_cons	19.046*** 140.28	16.361*** 92.33
Regional fixed effects	NO	NO	YES	Regional fixed effects	NO	NO
Year fixed effects	NO	NO	NO	Year fixed effects	NO	NO
N	2269	2181	2269	N	2269	2181

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, and the following tables are the same.

4.3.2. Regulatory Effect of Institutional Environment on Sensibility of FDI to Tax Burden

The interactive item of institutional environment and tax burden indicators will verify the regulatory effect of institutional environment on the sensitivity of FDI to tax burden. By adopting different models and adding different control variables, the robust results shown in Table 3 are obtained. It is found that the interaction term coefficient is positive and most of the results significant, which accords with the previous theoretical speculation: the negative impact of tax burden on net FDI inflow is weakened by favorable institutional environment. FDI is less sensitive to tax burden in regions with favorable institutional environment.

The analysis confirms that institutional environment and tax burden mentioned in existing studies are somewhat alternative in attracting FDI (Fatica, 2010; Wang *et al.*, 2014). It explains that FDI flows to regions with higher tax burden but better institutional environment across the globe. In response to the wave of international tax cuts, governments may develop appropriate responding strategies to improve their institutional environment, rather than simply cutting their tax burden.

Table 3. Results After Addition of Interactive Items

<i>lnFDI</i>	OLS				FE	
<i>totax</i>	-0.024*** (-8.25)	-0.024*** (-8.24)	-0.025*** (-8.43)	-0.006*** (-2.89)	-0.006*** (-2.96)	-0.008*** (-3.73)
<i>avzh</i>	0.013*** (3.28)	0.014*** (3.45)	0.014*** (3.43)	0.012** (2.02)	0.012** (2.06)	0.011* (1.85)
<i>avzhtotax</i>	0.001*** (6.97)	0.001*** (7.09)	0.001*** (8.55)	0.000 (1.60)	0.000* (1.53)	0.000** (2.00)
<i>gdpsp</i>		0.043*** (4.48)	0.048*** (4.42)		0.022*** (5.18)	0.022*** (4.47)
<i>industry</i>			0.052*** (14.50)			0.029*** (5.36)
Regional fixed effects	NO	NO	NO	YES	YES	YES
Year fixed effects	NO	NO	NO	NO	NO	NO
_cons	19.851*** (112.09)	19.634*** (105.77)	18.048*** (83.19)	20.056*** (74.48)	19.992*** (73.81)	19.316*** (63.21)
N	2269	2243	2181	2269	2243	2181

4.3.3. Performance of Sub-Indicators

With the two-way fixed effects model, the performance of sub-indicators of institutional environment is further examined, including the power of discourse and accountability, political stability, administrative efficiency, regulatory system, legal rules and corruption governance.

The analysis shows that (see Table 4): among the six sub-indicators, only the coefficient of the power of discourse and accountability is not significant, while the others are significantly positive. It is seen that most institutional indicators have a positive impact on FDI, and two indicators: regulatory quality and legal rules, perform well at a coefficient of 0.013 and 0.011 respectively.

Table 4. Performance of Sub-Indicators of Institutional Environment

<i>lnFDI</i>	<i>var</i>	<i>pvr</i>	<i>ger</i>	<i>rqr</i>	<i>rlr</i>	<i>ccr</i>
<i>totax</i>	-0.003** (-2.40)	-0.003** (-2.33)	-0.002** (-2.28)	-0.002** (-1.98)	-0.003** (-2.30)	-0.003** (-2.29)
<i>industry</i>	0.033*** (6.12)	0.033*** (6.03)	0.035*** (6.37)	0.033*** (6.13)	0.034*** (6.22)	0.033*** (6.12)
<i>gdpsp</i>	0.028*** (5.45)	0.028*** (5.43)	0.029*** (5.57)	0.028*** (5.54)	0.029*** (5.65)	0.029*** (5.56)
<i>urban</i>	0.035** (2.54)	0.038*** (2.78)	0.034** (2.52)	0.036*** (2.64)	0.035*** (2.60)	0.034** (2.50)
<i>var</i>	0.006 (1.39)					
<i>pvr</i>		0.006** (2.46)				

<i>lnFDI</i>	<i>var</i>	<i>pvr</i>	<i>ger</i>	<i>rqr</i>	<i>rlr</i>	<i>ccr</i>
<i>ger</i>			0.007** (1.99)			
<i>rqr</i>				0.013*** (3.85)		
<i>rlr</i>					0.011*** (2.96)	
<i>ccr</i>						0.008** (2.21)
Regional fixed effects	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES
_cons	17.070*** (21.93)	16.896*** (21.77)	16.986*** (21.79)	16.604*** (21.28)	16.732*** (21.41)	16.990*** (21.93)
N	2181	2181	2178	2178	2181	2178

5. Heterogeneity Analysis and Robustness Test

5.1. Heterogeneity Analysis

5.1.1. Heterogeneity Analysis of Market Size

The theoretical analysis finds that a country with better institutional environment will have higher equilibrium taxation than another only if its market size exceeds a certain limit. In verifying the theoretical proposition, the samples are grouped according to their market size: large, medium and small, for regression analysis.¹ The results indicate that (see Table 5): (1) in the small-market group, the negative impact of taxation is greater and institutional environment has no expected positive impact on FDI; (2) in medium- and large-market groups, the negative impact of taxation on FDI is smaller; (3) comparing the results of the three groups, the large-market group has the greatest positive impact, followed by the small- and medium-market groups.

Possible interpretation for the empirical results is that large-market countries tend to have better institutional environment, which is helpful for safeguarding the objective demand of FDI for long-term benefits. Since developing institutional environment will take a long time and high costs, it is easier and more effective to lower tax burden to attract FDI for small-market countries. Therefore for small-market countries to attract FDI, the policy of low-tax burden is more useful than the perfection of institutional

¹ Drawing on the research of Yi *et al.* (2014), the value of market size level is measured as GDP plus imports of goods or services minus exports. Referred to this approach, the author groups 160 sample countries into two groups based on their market size, large and small. However, considering the large difference between data values, the samples are divided into three groups in this paper.

environment that reduces institutional transaction costs. For large-market countries, the negative impact of tax burden on FDI is slightly weaker and the positive impact of institutional environment is stronger.

Table 5. Heterogeneity Analysis 1: Grouping According to Market Size

<i>lnFDI</i>	OLS			FE		
	Small	Medium	Large	Small	Medium	Large
<i>totax</i>	−0.009*** (−6.62)	−0.011*** (−3.97)	0.009*** (3.23)	−0.003** (−1.99)	−0.010*** (−2.84)	0.01 (1.39)
<i>avzh</i>	−0.010*** (−2.75)	−0.002 (−0.81)	0.026*** (10.63)	0.005 (0.59)	0.024*** (2.96)	0.026** (2.47)
<i>industry</i>	0.025*** (4.42)	−0.013*** (−3.85)	−0.024*** (−4.62)	0.040*** (3.62)	0.034*** (4.43)	0.020** (1.99)
<i>gdpsp</i>	0.070*** (5.25)	0.057*** (5.32)	0.078*** (5.31)	0.013 (1.51)	0.034*** (4.36)	0.044*** (4.37)
<i>urban</i>	0.017*** (4.59)	0.029*** (11.95)	0.006* (1.87)	0.050** (2.29)	0.080*** (5.78)	0.054*** (2.70)
Regional fixed effects	NO	NO	NO	YES	YES	YES
Year fixed effects	NO	NO	NO	NO	NO	NO
_cons	17.669*** (63.39)	19.577*** (95.21)	21.079*** (60.16)	15.281*** (15.00)	14.404*** (15.51)	16.346*** (9.09)
N	658	794	729	658	794	729

5.1.2. Heterogeneity of Market Size and Stage of Economic Development

However, these results are not entirely consistent with the practical experience in attracting FDI worldwide. Some developing countries, such as India, face high institutional transaction costs, despite their larger markets, and tax incentives are mostly adopted to attract FDI. Next, we need to look at the practical experience of countries at different stages of development. So we attempt to control both the market size and the national development stage to analyze heterogeneity.

International organizations and the academic community have many classifications over national development stages. The World Bank's classification takes into account per capita GDP, as well as economic, social, technological, competitiveness, etc. It is more scientific and convincing. Based on the World Bank's classification, we group samples into high-income and low-income countries, which are:¹ small-market and low-income countries, small-market and high-income countries, large-market and

¹ The grouping of High- and low-income countries is based on the World Bank classification. Due to data limitations, we reduce the number of groupings. The World Bank's low- and lower-middle-income countries and regions are combined as the low-income sample and high-income and upper-middle-income income ones as the high-income sample.

low-income countries, and large-market and high-income countries. It is found (see Table 6) that the coefficient of tax burden variable in the first group is -0.010 , which is significantly higher than that in other groups, while the indicator of institutional environment is not significant and the absolute value of the coefficient is small; in the fourth group, the absolute value of the coefficient of institutional environment is the largest and the tax burden has no negative effect on FDI.

Table 6. Heterogeneity Analysis 2: Grouping According to Market Size and Development Stage

$\ln FDI$	(1)	(2)	(3)	(4)
<i>totax</i>	-0.010^{***} (5.25)	0.002 (0.48)	-0.002^* (-0.59)	0.025^{**} (6.77)
<i>avzh</i>	0.001 (0.17)	0.025^{***} (6.12)	-0.022^{***} (-3.84)	0.037^{***} (10.09)
<i>industry</i>	0.036^{***} (3.94)	0.035^{***} (5.37)	0.047^{***} (5.92)	0.017^{***} (2.93)
<i>gdpsp</i>	0.143^{***} (5.02)	0.088^{***} (4.08)	0.073^{***} (4.67)	0.063^{***} (3.67)
<i>urban</i>	0.052^{***} (6.62)	0.050^{***} (12.76)	0.032^{***} (6.86)	0.051^{***} (11.77)
<i>_cons</i>	15.760^{***} (32.01)	15.101^{***} (34.19)	17.894^{***} (55.43)	14.150^{***} (34.98)
N	315	633	544	676

Note: Models (1) ~ (4) are small-market and low-income countries, small-market and high-income countries, large-market and low-income countries, and large-market and high-income countries, respectively.

To some extent, the above results explain the practical problems of attracting FDI in recent years. For some small-market, low-income countries in Africa, while their institutional environment is hard to improve in the short term, the policy of lowering tax rate is an effective strategy competing for FDI. It is not difficult to find, according to the World Bank figures, that Africa has the largest tax cuts, whether at the corporate income tax or the total tax rate. Some developing countries, such as India, have relatively large markets but are still among low-income countries, whose institutional transaction costs will be hard to change in the short term, and lowering tax rates will be more effective for attracting FDI. For countries such as China and Brazil with large markets and at middle and high income levels, improving business environment and cutting institutional transaction costs are also recommended policy choices at current.

5.2. Robustness Test

(1) Remove tax shelter samples. Countries and regions such as Luxembourg, Switzerland, and China's Hong Kong SAR have large net FDI inflow, but the core indicators and sample mean are largely different, so these samples are not included

in the robustness test.¹ The results show that the coefficient of the interaction term between institutional environment and tax burden is positive, and the regression results of primary explanatory variables are apparent.

(2) Control endogeneity. FDI impacts a country's institutional environment (Tian *et al.*, 2018). There is a certain causal relationship between these two, and measurement models inevitably have endogenous problems. In domestic studies on FDI, the lag period of core explanatory variables is taken as a tool variable to reduce such endogenous problems (Yang and Li, 2019). Based on this approach, this paper takes the lag term of institutional environment as a tool variable for panel GMM estimation. Relevant tool variables have passed the validity test. It is showed that the coefficient of the interaction term between institutional environment and tax burden is significant and positive, indicating that institutional environment weakens the negative impact of tax burden on FDI, and our empirical results are robust.

(3) Transform core explanatory variables and interpreted variables. This paper replaces the data from WGI system with those in the World Bank's Business Environment Report, and the total tax rate with the profit tax to measure the tax burden. The robustness of results is finally confirmed.

6. Conclusion and Enlightenment

Against the background of slowing global economic growth, growing economic uncertainty and mounting pressure on government fiscal expenditure, the research on how to use and improve institutional environment to meet challenges and shocks of international economic climate and tax competition is of great practical significance. Based on existing models of asymmetric tax competition, this paper constructs a theoretical model by putting tax burden, institutional environment and FDI flow into the same analytical framework. Theoretical analysis shows that countries with favorable institutional environment attract more multinational businesses with high taxation. However, limited by market size, institutional environmental advantages will make the equilibrium taxation of one country higher than that of another only to a certain extent. Then, this paper makes an empirical analysis with the data of FDI and tax burden of 199 countries and regions from 2005 to 2018, in combination of the two-way fixed effects model. The alternative role of institutional environment and tax burden in attracting FDI is studied, as well as the heterogeneity among countries of different market sizes and development stages. Empirical analysis shows that all institutional factors except the power of discourse and accountability have a prominent impact on the sensitivity of FDI to tax burden. Further research shows that

¹ Sample countries or regions not included in our list are: Bahamas, Nauru, Switzerland, Liechtenstein, China's Hong Kong SAR, Panama, Cyprus, Luxembourg, Netherlands.

in small-market, low-income countries and regions, the tax burden has a significant negative impact on FDI, while the positive impact of institutional environment is not significant; in large-market, high-income countries and regions, institutional environment has a positive impact on FDI. The robustness of empirical results is finally confirmed.

The total FDI has skyrocketed when the Chinese government launched a large number of tax incentives since the 1990s. As China's market and per capita national income continue to rise, the government has reduced tax incentives for FDI and introduced tax policies with similar treatment for Chinese and foreign businesses. In addition to the global economic slowdown in recent years, a "tax and fee cuts" policy has been pursued for stimulating domestic and foreign businesses to invest. However, with the pandemic impact since 2020, major countries are under greater fiscal pressure, and the policy space for cutting tax burden is further compressed. The understanding of FDI liquidity orientation law obtained through theoretical and empirical analysis is beneficial for the government to make correct policy choices. In light of the international economic developments and national conditions, China's policy choices will be: lowering tax burden to attract FDI remains feasible but not the only effective policy choice. Pros and cons of institutional environment, market size and development stage in China will be comprehensively weighed, with efforts to attract effective and quality FDI by improving institutional building, developing a better business environment and lowering institutional costs. Key areas include the regulatory system, legal rules and corruption control. A better institutional environment needs optimized industrial regulation, information disclosure, complete laws, fair trade system, and relaxed market access, as well as administrative legislation and enforcement for corruption, and intensified governance and crackdown on commercial bribery.

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