

# Statistical Model for Empirical Analysis of Corporate Income Tax on Labor Productivity and Revenue of Enterprises in Vietnam

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## ABSTRACT

*To verify the impacts of corporate income tax on labor productivity and revenue of enterprises in Vietnam, the research will conduct quantitative analysis based on the Enterprise Survey data of the General Statistics Office of Vietnam. The verification is focused on issues such as impacts of income tax on revenue of enterprises; comparison of the corporate income impact among regions; impacts of tax policy changes on revenue of enterprises; Impacts of corporate income tax on labor productivity and the relationship between corporate income tax and the number of people paid for social insurance in enterprises. Research results show that corporate income tax has positive impacts on the economy and enterprise development, which is reflected in the contribution rate to the State budget, improvement of labor productivity and economic growth in Vietnam. Nonetheless, in each stage, corresponding to the actual situation in the country and the world the impacts of corporate income tax provide different results.*

**Keywords:** tax, income tax, enterprises, economic growth, Vietnam.

**Mathematics Subject Classification:** 62P20, 91B64

**Journal of Economic Literature (JEL) Classification :** H29, C53

## 1. INTRODUCTION

Corporate income tax is a direct tax, collected on the final production and business results of an enterprise. Being a source of revenue and a part of the country's total tax, Corporate income tax plays an important role in every country. As stated by Solow (1956), tax policies have both positive and negative impacts on economic growth. Accordingly, not only may taxes have positive effects on the economic growth by new investment encouragement and promotion of business activities but taxes also may negatively affect economic growth such as distortion of investment decisions, prevention of employees' working effort and skills.

The research of Engen (1996) described 5 ways in which taxes may affect the economic growth, including (1) higher taxes may prevent the unreasonable investments of the market through the tax regulation of the State; (2) taxes may reduce labor supply growth by preventing the participation of labor force /or working hours or distorting career choices/or repurchasing labor qualifications, skills and training; (3) tax may also prevent the productivity growth by decreasing investments in research and development (R&D) and the development of "venture" capital for high technology sectors, whose spillover effects can boost the productivity of existing labor and capital in order to promote economic growth; (4) taxes may lead to distortion phenomena in investment when investors choose investment sectors with fewer taxes; (5) high taxes for labor supply source may distort the efficiency of human

capital use by preventing workers from working under the higher tax pressures when their incomes increase.

The theory of tax optimization was researched to decrease inefficiency and distortion in the market under economic constraints (Slemrod, 1990). According to standards of this theory, taxes should be chosen to maximize the welfare function with certain constraints (Mankiw et al., 2009). Besides, the tax optimization or establishment of a tax levy in the society so that benefits in the society are maximized, especially, social welfare maximization is significantly complicated and scarcely feasible. Various economists consider that the theory of tax optimization imposes ambiguous requirements in the modern and developed society, especially in public finance and social welfare.

As stated by Barro(1990), in the endogenous growth model, government spending and taxes impact the economic growth happening both in the short and long term. Nevertheless, taxation may distort the market and production costs then have influences on long-term growth. According to Solow (1956), in the exogenous growth model, known as the theory of new growth, although the fiscal policy does not affect the long-term growth, it is considered as the primary cause promoting production factors such as labor and technological progress which are determined outside the model.

Laffer curve (2004) is based on the supply and demand of the economy and often used to explain changes in economic growth from the supply side. This research has demonstrated that changes in tax rates will have impacts and effects on the economy. Besley & Persson (2013) believed that insufficient tax capacity and low tax revenue are existing in various developing countries, which is one of the main obstacles to economic development. Most of traditional tax theories and documents focus on the optimal design for tax schedules without paying much attention to different issues related to the tax system in general, including tax administration and tax compliance in enterprises.

Recently applied researches have also made significant progress in tax administration and tax compliance, especially with the availability of micro-data sets. However, empirical researches from developing countries are still relatively limited. Ineffective tax administration and high tax evasion may play a more significant role in developing countries as limiting the State capacity can adversely affect economic development. On the other hand, to design a fair and efficient tax system, policymakers need reliable empirical evidence on the behavioral effects of the entire tax system.

Zareh & Andreas (2016) argued that corporate behavior responds strongly to accounting the aspect where international financial reporting standards become mandatory. Corporate behaviors respond moderately to an administrative aspect, especially the frequency of tax payment decreases from every month to every quarter. Additionally, corporate behaviors have no response to a tax aspect created by the value added tax registration threshold. The author has another conclusion that companies respond to tax audits by adding extra 0.7-0.8 dollars in deductions reported to offset each dollar for audit costs. Corporate income tax will impact through three major channels which are capital gain, labor profit and price, to impact other channels. For instance, when corporate income tax is decreased, capital gain and labor profit will increase and the price will decrease.

The capital gain channel will affect domestic and foreign capitals, activities related to research and development (R&D) and capital-labor substitution. For domestic capital, capital-labor substitution will have an impact on capital accumulation and then investment capital. The impact on investment capital will affect the GDP scale. For foreign capital, spillover effects from FDI enterprises will affect productivity, leading to the impact on GDP growth rate.

Labor profit channels will have an impact on capital-labor substitution, labor productivity, consumption, and savings. Similarly, the labor profit channel will have impacts on the GDP scale through capital accumulation, import, export and GDP growth through labor productivity. In the price channel, consumption and savings, import and export and output prices of enterprises will be affected. This channel will also affect the GDP scale through consumption, savings, import, and export.

The effects of the second round are repeated through the effects of channels on the GDP scale, the GDP growth rate and the demand for capital and labor in enterprises.

## 2. THE MODEL ANALYZING IMPACTS OF CORPORATE INCOME TAX ON THE OUTPUT OF ENTERPRISES

### 2.1. Two-factor production function

Varian (1978) and Fuss & McFadden (1978) proposed that the output of the production process is affected by the input including capital and labor.

$$Y = F(K, L) \quad (1)$$

Where Y is output; K is capital; L is labor

Any enterprise always has to maximize its profits with the purpose of cost minimization. Accordingly, enterprises must limit input costs based on the marginal production value at each different price. Therefore,

$$F_L - \lambda w = 0 \quad (2)$$

$$F_K - \lambda r = 0$$

Where w and r are labor and capital costs and exogenous variables;

$\lambda$  is the Lagrange multiplier representing the cost-constraint satisfaction, assuming that output prices are homogeneous, which means the output price is constant during the review.

Enterprises will expand production under cost constraints given by:

$$C^0 - wL - rK = 0 \quad (3)$$

The rate of equation (2) is the marginal rate of technological substitution in the equation of price factor to maximize profits of enterprises with w and r, respectively, as labor cost and capital cost. Allen (1938, p.341) defined the elasticity of substitution between labor and capital is the same as the relative change in the input costs of these two factors. Hence:

$$\delta = \frac{d \ln(K/L)}{d \ln(w/r)} = \frac{d \ln(K/L)}{d \ln(F_K/F_L)} = \frac{F_L F_K}{Y F_{LK}} \quad (4)$$

The wage elasticity of labor demand is the output constant and the constant r is

$$\eta_{LL} = -(1-s)\delta < 0 \quad (5)$$

Where  $s = wL/Y$  is the rate of labor cost per unit of output, meaning that the output elasticity constant of labor that is smaller than technology ( $\delta$ ) when the labor rate is larger due to the inverse correlation in changing capital when wages increase. Accordingly, the elasticity of demand is determined as follows:

$$\eta_{LK} = -(1-s)\delta > 0 \quad (6)$$

Equations (5) and (6) reflect the degree of substitution along the Isoquant. When the wage rate increases, production costs of output increase; and when the output price increases, the amount of output marketed will be reduced. The effect scale depends on the elasticity of production demand, ( $\eta$ ) and the rate of labor in total cost (possibly determined under the form of % increase). Therefore, these 2 equations can be rewritten as follows:

$$\eta_{LL} = -(1-s)\delta - s\eta \quad (7)$$

$$\eta_{LK} = (1-s)(\delta - \eta) \quad (8)$$

Results in equations (7) and (8) are crucial theories of labor demand and in the production function. These equations show the effect of wages on demand-side factors.

With the approach of minimizing costs with binding output, the total cost which is the sum of products from maximizing benefits of input demand and the factor price can be written as follows:

$$C = C(w, r, Y) \quad (9)$$

$$C_i > 0, C_{ij} > 0, i, j = w, r$$

As stated in Shephard's lemma (Varian, 1978), the labor demand and the capital of enterprises with fixed output can be rewritten from the cost function given by  $L^* = C_w$  and  $K^* = C_r$ . These two equations are used to estimate the direct effect of price and output factors on input costs such as capital and labor and can be written by:

$$C(w, r, Y) = YC(w, r, 1) \quad (10)$$

Where Y is in linear form.

In the opinion of Sato & Koizumi (1973), the elasticity of substitution can be rewritten as follows:

$$\Delta = CC_{w,r} / C_w C_r \quad (11)$$

Then, the elasticity of demand-side factors is rewritten by:

$$\eta_{LL} = -(1 - m)\delta \quad (12)$$

$$\eta_{LK} = (1 - m)\delta \quad (13)$$

Where m is the rate of labor in total cost.

From the assumption of factors under the marginal constraint,  $m = s$  when the production function and cost function are linear, then the formulas (12) and (13) become the formulas (5) and (6).

## 2.2. Cobb-Douglas Production Function

Cobb-Douglas Production Function is written by:

$$Y = TFP * L^\alpha K^\beta \quad (14)$$

Where  $\alpha$  and  $\beta$  are parameters

$\alpha + \beta < 1$  showing that performance decreases with scale

$\alpha + \beta = 1$  showing that the performance is constant with scale

$\alpha + \beta > 1$  showing that performance increases with scale.

TFP is technological progress.

According to Romer (1990), it is shown that knowledge and innovation in production will affect TFP. Castany et al. (2005) stated that TFP is influenced by investments in research and development (R&D) and the labor quality will have impacts on TFP. Additionally, Dabla-Norris et al. (2010) indicated that import-export activities and innovation activeness will change TFP in enterprises. Accumulated assets of enterprises and R&D activeness also create higher TFP (Crass & Peter, 2014). As a result, it can be seen that TFP depends on characteristics of the enterprise and can be denoted in the following general form:

$$TFP = f(X) \quad (15)$$

Where X is the collection of factors representing characteristics of the enterprise, such as its type, size, number of operational years, its involvement in industrial parks, its import and export-related activities and corporate income tax.

Using logarithms for two parts of the equation (15) and replacing TFP with X, the following equation is obtained:

$$\text{Log}(Y_{i,j}^t) = \mu \text{Log}(X_{i,j}^t) + \alpha \text{Log}(K_{i,j}^t) + \beta \text{Log}(L_{i,j}^t) + u_{i,j}^t \quad (16)$$

Equation (16) shows the impact of the output factors of enterprises, in which the corporate income tax will be one of the elements constituting the X factor. Thus, this equation is very convenient in assessing the impact of corporate income tax on the output of enterprises.

## 2.3. Model of impacts of corporate income tax on labor productivity

OECD introduced the concept of labor productivity which is understood as the rate of output to input, where the output is goods produced or services provided and the input is resources used to create the goods and services. Therefore, choosing different inputs and outputs will create different labor

productivity indicators. Firouz (2010) argued that labor productivity is measured by the rate of production value to labor, while Papadogonas & Voulgaris (2005) suggested that labor productivity can be measured by the rate of revenue to the number of employees.

Factors affecting labor productivity include:

(1) *Education and training*: Theories and practices largely stated that education and training level affects labor productivity, particularly as shown in researches of Schultz (1961), Becker (1964), Welch (1970) and Mincer (1974).

(2) *Physical capital*: physical capital is considered based on assets, in which information technology related to production support plays an important role in promoting labor productivity (Berndt et al., 1992; Lichtenberg, 1993); Brynjolfsson & Hitt, 1995); Papadogonas & Voulgaris, 2005).

(3) *Wage*: The wage of employees can be changed according to the relationship between the manager and employees; for that reason, employees must always try to improve their labor productivity and work efficiency (Mühlau & Lindenberg, 2003);

(4) *Enterprise size*: size can strongly determine the R&D activities of an enterprise. Small enterprises do not have enough financial resources or have unequal financial resources to large enterprises for R&D investment (Papadogonas & Voulgaris, 2005). Especially, enterprise size has positive relevance to labor productivity (Snodgrass & Biggs, 1995; Biesebroeck, 2005; Van Ark & Monnikhof, 1996; Baldwin et al., 2002; Baldwin & Gu, 2003; Leung et al., 2008);

(5) *The number of operational years of enterprises*: The number of operational years of enterprises has a reverse correlation with labor productivity because young, new enterprises are usually small or medium-sized ones with in-depth knowledge, skilled workers, better capabilities and newer technologies (Karlsson & Nystrom, 2003);

(6) *Enterprises with import and export activities*: Labor productivity of exporting enterprises is higher than that of non-exporting enterprises (Papadogonas & Voulgaris, 2005);

(7) *Productivity difference between business types*: labor productivity in private enterprises is higher than in state-owned ones (Ehrlich et al., 1994; Parker & Martin, 1995; Frydman et al, 1999; Tian, 2000, Laurin & Bozec, 2001).

On the basis of researches conducted by Papadogonas & Voulgaris (2005), Firouz et al. (2010) on factors affecting labor productivity in enterprises, the author provides the model to assess the impact of R&D on labor productivity as follows:

$$\ln Prod_{i,t}^j = \beta_0 + \beta_1 \ln r_{i,t}^j + \beta_2 \ln w_{i,t}^j + \beta_3 \ln tax_{i,t}^j + \beta_4 \ln age_{i,t}^j + \beta_5 \ln sector_{i,t}^j + \beta_6 \ln ownership_{i,t}^j + \beta_7 \ln size_{i,t}^j + u_{i,t} \quad (17)$$

Where Prod is labor productivity, calculated on Value Added of enterprises business value added (VA) divided by employees;

$r$  - the level of capital equipment on labor, calculated on total assets of the enterprise divided by total labor;

$w$  - the average total cost per employee including items such as salaries, rewards, and others;

$Tax$  - tax rate on the profit of the enterprise;

$Size$  - Size of the enterprise;

$age$  - the number of operational year of the enterprise in the sector;

$sector$  - the variable indicating sector specificity;

$ownership$  - the variable indicating the production form of the enterprise;

$size$  - the variable indicating the enterprise size;

$t$  - the variable indicating time,  $i$  and  $j$  indicating the enterprise  $i$  in sector  $j$ .

Basically, the above model is similar to the model of Papadogonas & Voulgaris (2005) and Firouz et al. (2010); however, the author has added the tax rate on profit, a variable affecting the R&D level of

an enterprise, which will have effects on technological progress and change labor productivity in the enterprise.

## 2.4. Research data

The research uses the Enterprise Survey Dataset of the General Statistics Office of Vietnam (GSO) for the period 2000-2017. Started in 2001, this is the dataset surveyed annually by GSO. The purpose of this survey is to collect basic information for management, policy-making, and socio-economic development planning, national, local enterprise development, investors, enterprises and cooperatives. In this dataset, the research removed observations made by statistical error, such as variable in the capital, the number of employees, age of the enterprise with negative signs or incomplete answers or undeclaration of tax code.

## 3. MODEL ESTIMATION RESULTS

### 3.1. Impacts of income tax on revenue of enterprises

In order to assess the impacts of corporate income tax on the revenue of enterprises, the author conducted model estimation (16). Detailed estimation results are stated in the following table:

Table 1: Impacts of income tax on revenue of enterprises

| Variable                         | (1)                       | (2)                       | (3)                       | (4)                       | (5)                       |
|----------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Labor                            | 0.524***<br>(0.00260)     | 0.522***<br>(0.00260)     | 0.521***<br>(0.00260)     | 0.523***<br>(0.00260)     | 0.421***<br>(0.00243)     |
| Source                           | 0.327***<br>(0.000989)    | 0.325***<br>(0.000990)    | 0.323***<br>(0.000991)    | 0.326***<br>(0.000989)    | 0.231***<br>(0.000946)    |
| Tax rate on profit               | -0.0721***<br>(0.000492)  | -0.0714***<br>(0.000492)  | -0.0718***<br>(0.000492)  | -0.0719***<br>(0.000492)  | -0.0544***<br>(0.000461)  |
| Age of the enterprise            | 0.0660***<br>(0.000614)   | 0.0660***<br>(0.000613)   | 0.0662***<br>(0.000610)   | 0.0655***<br>(0.000614)   | 0.0621***<br>(0.000530)   |
| Sector                           | -0.00379***<br>(0.000100) | -0.00360***<br>(0.000100) | -0.00360***<br>(9.98e-05) | -0.00367***<br>(0.000100) | -0.00339***<br>(9.05e-05) |
| Type of enterprise               | 0.472***<br>(0.0127)      | 0.427***<br>(0.0127)      | 0.410***<br>(0.0126)      | 0.416***<br>(0.0129)      | 0.259***<br>(0.0109)      |
| Enterprise size based on labor   | 0.0341***<br>(0.00263)    | 0.0330***<br>(0.00262)    | 0.0330***<br>(0.00262)    | 0.0341***<br>(0.00263)    | 0.0322***<br>(0.00246)    |
| Importing                        |                           | 0.230***<br>(0.00597)     |                           |                           |                           |
| Exporting                        |                           |                           | 0.276***<br>(0.00466)     |                           |                           |
| Involved in industrial parks     |                           |                           |                           | 0.171***<br>(0.00738)     |                           |
| Enterprise size based on revenue |                           |                           |                           |                           | 1.485***<br>(0.00326)     |
| Constant                         | -1.215***<br>(0.0267)     | -1.122***<br>(0.0268)     | -1.090***<br>(0.0267)     | -1.108***<br>(0.0271)     | -1.879***<br>(0.0231)     |
| Observations                     | 1,168,646                 | 1,168,646                 | 1,168,646                 | 1,168,646                 | 1,168,646                 |
| Number of enterprise groups      | 296,402                   | 296,402                   | 296,402                   | 296,402                   | 296,402                   |
| Hausman test                     | Random                    | Random                    | Random                    | Random                    | Random                    |

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

(Source: Calculation of the author)

Table 1 shows that labor and capital have positive impacts on the revenue of enterprises. In particular, the elasticity coefficient of capital and labor based on revenue is about 0.52 and 0.33 respectively.

This means that when labor and capital increase by 1%, revenue can increase by 0.52% and 0.33% respectively.

The rate of income tax to the profit of enterprises is negative and approximately - 0.07, which shows that when the rate of income tax to the profit of enterprises increased by 1%, the revenue would decrease by -0.07%. In other words, if the rate of corporate income tax to profits decreases, the enterprise revenue will increase. In the past years, the corporate income tax in Vietnam has been constantly reduced, which will stimulate the development of enterprises and increase enterprise revenue.

The coefficients of sector factors, type of enterprise and labor size are statistically significant, which shows that enterprises operating in different sectors, types of enterprises and sizes will have certain effects on their revenue.

When considering other factors such as whether enterprises engage in export and import activities, whether they are located in industrial parks or whether they operate in revenue size, the coefficients are statistically significant. This implies that enterprises engage in import and export activities and they are located in an industrial park that will have more positive impacts on the revenue of the enterprise than that of other enterprises. Besides, the coefficient of capital size factor also has statistical significance, which indicates that enterprises with revenues higher than 20 billion still generate greater revenue than the others although they have to bear tax rates higher than those of enterprises with revenues less than 20 billion.

### 3.2. Comparison on impacts of corporate income tax among regions in Vietnam

Vietnam has 6 vital economic regions; however, this research analyzes three economic regions: the Red River Delta, the Southeast of Vietnam; and the other regions. Only 3 out of 6 regions are chosen for the analysis as the enterprise density is concentrated mainly in these regions and insignificantly in the other regions.

Table 2: Comparison on impacts of corporate income tax among regions in Vietnam

| Variable                           | Red River Delta           | Southeast of Vietnam      | Other regions             |
|------------------------------------|---------------------------|---------------------------|---------------------------|
| Labor                              | 0.554***<br>(0.00518)     | 0.548***<br>(0.00437)     | 0.488***<br>(0.00414)     |
| Source                             | 0.314***<br>(0.00189)     | 0.293***<br>(0.00163)     | 0.377***<br>(0.00169)     |
| Tax rate on profit                 | -0.0531***<br>(0.000940)  | -0.108***<br>(0.000805)   | -0.0428***<br>(0.000835)  |
| Age of the enterprise              | 0.0501***<br>(0.00119)    | 0.0751***<br>(0.00105)    | 0.0672***<br>(0.000968)   |
| Sector                             | -0.00298***<br>(0.000196) | -0.00670***<br>(0.000160) | -0.00166***<br>(0.000170) |
| Type of enterprise                 | 0.474***<br>(0.0232)      | 0.433***<br>(0.0181)      | 0.193***<br>(0.0283)      |
| Enterprise size based on the labor | 0.0218***<br>(0.00519)    | 0.0510***<br>(0.00447)    | 0.0176***<br>(0.00413)    |
| Constant                           | -1.055***<br>(0.0498)     | -1.150***<br>(0.0383)     | -0.696***<br>(0.0589)     |
| Observations                       | 310,297                   | 417,785                   | 440,564                   |
| Number of enterprise groups        | 86,366                    | 114,336                   | 95,700                    |
| Hausman test                       | Random                    | Random                    | Random                    |

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

(Source: Calculation of the author)

It can be seen from Table 2 that the total number of enterprises in the Red River Delta accounts for about 26.55%, the Southeast of Vietnam takes up about 35.75% and the other regions constitute for about 37.7%. Estimated results indicate that when labor and capital increase, revenue increases. Nonetheless, the difference here is that the labor coefficient of the Red River Delta and the Southeast of Vietnam is higher than that of other regions and the capital impact of the Red River Delta and the Southeast of Vietnam is lower than that of other regions. This means that the role of labor in enterprises in the Red River Delta and Southeast of Vietnam is more vital than in the other regions meanwhile enterprises in the other regions are more highly dependent on capital investment.

There is an obvious difference between the impacts of corporate income tax on the revenue of enterprises in different regions. Particularly, the elasticity coefficient of the tax rate on the profit of enterprises in the Red River Delta, Southeast of Vietnam and other regions, respectively is -0.05; -0.11 and -0.04.

Hence, the tax rate on the profit of enterprises in Southeast Vietnam has greater impacts on revenue than those located in other regions. Accordingly, when the tax rate on the profit of enterprises increases by 1%, the revenue of enterprises in the Southeast of Vietnam decreases by 0.11% while that in the Red River Delta and other regions only decreases about 0.05% and 0.04%.

### 3.3. Impacts of tax policy changes on revenue of enterprises

To analyze the impacts of tax policy on revenue of enterprises over the past years, the research estimated model (16) and added policy dummy variables for 2003, 2009, 2013 and 2016. These are the time marks for the promulgation of Law on Corporate Income Tax. In particular, dummy variables are created by taking the years before the promulgation of the Law on Corporate Income Tax as 0 and the subsequent years as 1.

Table 3: Impacts of tax policy changes on revenue of enterprises

| Variable                       | 2003                      | 2008                      | 20013                     | 2016                      |
|--------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Labor                          | 0.524***<br>(0.00260)     | 0.523***<br>(0.00260)     | 0.526***<br>(0.00261)     | 0.530***<br>(0.00260)     |
| Source                         | 0.326***<br>(0.000994)    | 0.334***<br>(0.00101)     | 0.325***<br>(0.00102)     | 0.330***<br>(0.000987)    |
| Tax rate on profit             | -0.0718***<br>(0.000493)  | -0.0749***<br>(0.000501)  | -0.0711***<br>(0.000505)  | -0.0688***<br>(0.000493)  |
| Age of the enterprise          | 0.0662***<br>(0.000615)   | 0.0628***<br>(0.000622)   | 0.0672***<br>(0.000628)   | 0.0722***<br>(0.000613)   |
| Sector                         | -0.00378***<br>(0.000100) | -0.00374***<br>(0.000100) | -0.00379***<br>(1.00e-04) | -0.00379***<br>(9.96e-05) |
| Type of enterprise             | 0.472***<br>(0.0127)      | 0.468***<br>(0.0127)      | 0.473***<br>(0.0126)      | 0.464***<br>(0.0125)      |
| Enterprise size based on labor | 0.0342***<br>(0.00263)    | 0.0325***<br>(0.00263)    | 0.0340***<br>(0.00263)    | 0.0307***<br>(0.00262)    |
| Tax policy in 2003             | 0.0335***<br>(0.00501)    |                           |                           |                           |
| Tax policy in 2008             |                           | 0.0658***<br>(0.00218)    |                           |                           |
| Tax policy in 2013             |                           |                           | 0.0191***<br>(0.00214)    |                           |
| Tax policy in 2016             |                           |                           |                           | 0.282***<br>(0.00335)     |
| Constant                       | -1.248***<br>(0.0272)     | -1.162***<br>(0.0268)     | -1.229***<br>(0.0267)     | -1.280***<br>(0.0265)     |
| Observations                   | 1,168,646                 | 1,168,646                 | 1,168,646                 | 1,168,646                 |
| Number of id                   | 296,402                   | 296,402                   | 296,402                   | 296,402                   |
| Hausman test                   | Random                    | Random                    | Random                    | Random                    |

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

(Source: Calculation of the author)

Table 3 demonstrates that dummy variables of tax policies for 2003, 2008, 2013 and 2016 are all positive and statistically significant, which means that after the State adjusted the Corporate Income Tax, it had already impacted the revenue of enterprises positively. Regarding the impacts of variables such as capital, labor, the tax rate on profit, enterprise age, enterprise type and enterprise size based on labor, results are similar to estimates above. However, the impact coefficient of the tax rate on profit had different changes from time to time applying the Law on Corporate Income Tax.

Table 4: Elasticity coefficient of the tax rate on profit

|                                          | Elasticity coefficient of the tax rate on profit |
|------------------------------------------|--------------------------------------------------|
| The general policy for the entire sample | -0.0721                                          |
| Tax policy in 2003                       | -0.0718                                          |
| Tax policy in 2008                       | -0.0749                                          |
| Tax policy in 2013                       | -0.0711                                          |
| Tax policy in 2016                       | -0.0688                                          |

Source: Calculation of the author

It can be shown from Table 4 that after the recession in 2008, the tax rate on profit had a strong impact on enterprise revenue when the elasticity coefficient of the tax rate on profit in 2008 was -0.0749, higher than that under the tax policy in 2003 and higher than the average level for the entire sample. Nevertheless, adjustments in corporate income tax policies in 2013 and 2016 have brought positive effects on enterprise development. Accordingly, the impact coefficient of the tax rate on the profit of tax policy in 2013 and 2016 is about -0.0711 and -0.0688 respectively. This implies that the way the Government's operating policies, especially corporate income tax policy, has been more effective in supporting and promoting enterprise development.

### 3.4. Impacts of corporate income tax on labor productivity

To estimate the impact of corporate income tax on labor productivity in enterprises, the research estimated a model (17).

Table 5: Impact of corporate income tax on labor productivity

| Variable                       | General                  | Red River Delta          | Southeast of Vietnam      | Other region              |
|--------------------------------|--------------------------|--------------------------|---------------------------|---------------------------|
| Capital costs                  | 0.197***<br>(0.000682)   | 0.214***<br>(0.00127)    | 0.192***<br>(0.00112)     | 0.169***<br>(0.00120)     |
| Labor costs                    | 0.673***<br>(0.00116)    | 0.584***<br>(0.00189)    | 0.676***<br>(0.00231)     | 0.748***<br>(0.00207)     |
| Tax rate on profit             | -0.0459***<br>(0.000389) | -0.0394***<br>(0.000758) | -0.0316***<br>(0.000609)  | -0.0689***<br>(0.000681)  |
| Enterprise age                 | 0.0285***<br>(0.000234)  | 0.0244***<br>(0.000480)  | 0.0328***<br>(0.000394)   | 0.0279***<br>(0.000357)   |
| Sector                         | 0.00113***<br>(5.30e-05) | 0.00246***<br>(0.000102) | 0.000880***<br>(8.67e-05) | 0.000440***<br>(8.76e-05) |
| Enterprise type                | 0.207***<br>(0.00434)    | 0.286***<br>(0.00828)    | 0.165***<br>(0.00619)     | 0.105***<br>(0.00930)     |
| Enterprise size based on labor | -0.0190***<br>(0.000776) | 0.00961***<br>(0.00156)  | -0.0172***<br>(0.00124)   | -0.0426***<br>(0.00133)   |
| Constant                       | -2.057***<br>(0.0114)    | -2.553***<br>(0.0217)    | -1.833***<br>(0.0175)     | -1.637***<br>(0.0229)     |
| Observations                   | 1,069,300                | 280,850                  | 388,408                   | 400,042                   |
| Enterprise group               | 291,700                  | 85,064                   | 112,158                   | 94,478                    |
| Hausman test                   | Random                   | Random                   | Random                    | Random                    |

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

(Source: Calculation of the author)

Table 5 shows that the coefficients of capital and labor cost are both positive and statistically significant. Increasing capital and labor costs will increase labor productivity in enterprises, which means when capital and labor costs increase, enterprises will seek to increase labor productivity instead of raising capital and labor. Subsequently, when the capital and labor costs increase by 1%, the labor productivity in enterprises will increase by 0.2% and 0.67% respectively. For other regions, it can be seen that the coefficient of capital costs is low and labor costs is quite different from those of the Red River Delta and the Southeast of Vietnam. The reason is that the technical issues of enterprises in these regions may be inferior to those in the other two regions whereas labor costs are cheaper.

Impacts of the tax rate on profit on labor productivity of enterprises are negative, meaning that increasing the tax rate on profit will decrease labor productivity in enterprises. The reason is that when the tax rate on profit increases, investment decreases, especially investment in technology development in enterprises; thus, labor productivity in enterprises will be decreased. According to estimated results, when the tax rate on profit increases by 1%, the labor productivity of enterprises will decrease by 0.046% for the entire sample, 0.039% for the Red River Delta, 0.032% for the Southeastern of Vietnam and 0.069% for the other regions.

Coefficients of enterprise age, sector, enterprise type and enterprise size are all statistically significant, which proves the impacts of these variables on the labor productivity of enterprises.

### 3.5. Verification on the relationship between corporate income tax and the number of people paid for social insurance in enterprises

Estimated results indicate that when the tax rate on profits of enterprises increases by 1%, the number of people paid for social insurance in enterprises will decrease by 0.003%. Vietnam has made positive changes in the Law on Corporate Income Tax and labor-related issues. However, the corporate income tax will be a significant barrier to consider during the implementation of employees' social insurance policies...

Table 6: Verification of the relationship between corporate income tax and the number of people paid for social insurance in enterprises

| Variable               | The number of people paid for social insurance |
|------------------------|------------------------------------------------|
| The tax rate on profit | -0.00295***<br>(0.000539)                      |
| Constant               | 1.586***<br>(0.00389)                          |
| Observations           | 776,084                                        |
| The number of groups   | 239,003                                        |

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Calculation of the author

## 4. CONCLUSIONS AND RECOMMENDATIONS

It can be shown from the above research results that the corporate income tax plays a vital role in the Vietnamese economy and accounts for a large proportion of the total budget revenue in the early 2000s. Notwithstanding, Vietnam has implemented a series of corporate income tax policies to

support enterprise development and promote economic growth. Therefore, although the scale of corporate income tax has increased, the proportion of corporate income tax in total budget revenue has been decreasing over the years. Besides, the tax rate has also gradually decreased and is more in conformity with the general trend of the world.

Estimated results also showed that corporate income tax has a positive impact on labor productivity growth in the long term. Economic growth can be promoted through labor productivity growth since the Government uses tax revenues to invest in infrastructure and economic targets, which are the fulcrum to promote long-term economic growth. Besides, the analysis results on the reaction of shocks to changes in corporate income tax demonstrated that positive signs from the reduction of corporate income tax will increase labor productivity, FDI and decrease prices in the economy.

Regarding the micro perspective, when the corporate income tax rate on profits decreases, it will increase revenue labor productivity in enterprises. Additionally, there is a difference in the impacts of corporate income tax on output and labor productivity across sectors in different regions. Test results show that if the corporate income tax rate on profit decreases, it will increase the number of employees paid for social insurance in enterprises in Vietnam.

Certain policy implications can be made, based on the research results, as follows:

*First of all*, The corporate income tax plays a vital role in economic development. During the past years, Vietnam has implemented laws related to corporate income tax to support enterprises and promote economic growth. However, besides the positive aspects achieved, the reduction of corporate income tax and tax incentives can hurt the business environment. As a result, when implementing policies related to tax reduction and incentives, it is necessary to consider and apply appropriate rates to the Vietnamese economy.

*Secondly*, Corporate income taxes in different sectors, enterprise types and regions will have different effects on revenue and labor productivity in enterprises. Therefore, the application of corporate income tax in different sectors, enterprise types and regions need to be flexible and satisfying needs of enterprises.

*Thirdly*, in addition to corporate income tax incentives for preferred sectors and enterprises, the Government needs to flexibly examine and consider the application of tax rates to each specific enterprise and sector.

*Fourthly*, Results about the impacts of tax policy changes indicated positive effects of the reduction of corporate income tax on enterprise revenue. Notwithstanding, tax adjustments in the upcoming years need to be examined and considered the reduction amount to fit with the development of the economy, enterprises and in line with the development trend of the world.

*Last but not least*, to avoid losses of state budget revenue, Vietnam needs to strengthen the inspection and supervision of the enterprise's tax payment. Furthermore, it is necessary to focus on simplifying administrative procedures and increasing the application of information technology in the tax declaration and payment process.

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