Small and Medium Enterprises' Labor Productivity in Vietnam: A firm – level investigation

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ABSTRACT

Labor productivity has become a competitive advantage in this era of integration and firms should pay more attention in improving this index to help themselves developing. Since most of enterprises in Vietnam are in small and medium size with a vital role in the economy, supporting them would be necessary to boost economic growth for the country. This paper will investigate the determinants of labor productivity using descriptive statistics and cross sectional regression model with 1,943 small and medium enterprises in nine provinces of Vietnam. It is found that expense on labor is the most important factor affecting labor productivity of firms in all sectors and the key drivers for labor productivity vary in different sectors. Accordingly, policy recommendations will be implicated in varied contexts.

1. INTRODUCTION

SMEs in Vietnam can be considered as a vital element that assists in the economic growth. In the period of 2008-2012, there was a significant rise in the number of enterprises being active, reached approximately 347,000 companies (White paper, 2014). These SMEs can be state-owned, non-state-owned, or foreign invest and working in several sectors but their contribution to the country is undeniable. First, the establishment of a firm will create jobs for people, which can affect the GDP in a good way. Thus, firms take responsibility for the insurances of employees, union fee as a way to reduce the social security burden for the government. Secondly, a direct dedication of enterprises to the state budget is through taxes. The total contributions of SMEs in 2012 were estimated to be 34.26% of the

whole business sector. Also, the growth rate in taxes by SMEs was higher than the overall rate (VSIC, 2007). Accordingly, the Vietnamese government has paid more attention in supporting SMEs by creating a business environment to enhance the potential advantages of this sector. However, based on the data of International Labor Organization (ILO) in 2014, the labor productivity of the country is trivial compared to other nations in ASEAN Economic community. Many papers regarding labor issues in Vietnam have been conducted. Namely, *The impact of foreign direct investment on the labor productivity in host countries: the case of Vietnam* (Pham, 2008) measuring the impacts of FDI on Vietnamese labor productivity in general, *Vietnam's labor Productivity in Asian economic community* (Nguyen, 2015) with a focus on explaining main problems of labor productivity. Those investigations either approach the problems at the overall level or analyze the factors affecting labor productivity but none has centralized in labor productivity of SMEs, a main economic sector in Vietnam.

Hence, this paper will focus on more detailed information related to labor productivity at the SMEs level with the purpose of finding its key drivers after. In order to achieve reliable results, we used the small and medium enterprise survey supported by the Royal Embassy of Denmark in Vietnam (DANIDA) under the Business Sector Programme Support (BSPS). It was conducted under the collaboration between Central Institute for Economic Management (CIEM), the Institute of Labour Science and Social Affairs (ILSSA), the Development Economics Research Group (DERG) at the University of Copenhagen, and UNU-WIDER. It covers 2648 SMEs in nine provinces of Vietnam: Hanoi, Hai Phong, Ho Chi Minh City, Phu Tho, Nghe An, Quang Nam, Khanh Hoa, Lam Dong and Long An in 2015. By applying regression analysis with OLS and FGLS technique, we will estimate the factors affecting labor productivity in Vietnamese SMEs.

2. LITURATURE REVIEW

Defining the size of business is necessary to distinguish enterprises in a market and make it easier for policy-makers in supporting small and medium enterprises with effective projects. The first idea of a standardized definition was suggested in The European Commission 1996 and seven years later, a unique definition of small and medium enterprises was given to avoid differences in Community level data and national level data

due to inconsistencies of definitions. Nonetheless, a globally accepted small and medium enterprise definition is still an unsolved issue.

Generally, definitions of small and medium enterprises can be separated into three groups: defined by international institutions, by countries, and by industries (Berisha and Pula, 2015). Despite the diversity in definition, the abbreviation SME usually used in international organizations implies that it is an enterprise with criteria which are different from large companies (Nwankwo and Gbadamosi, 2011). The term SME will refer to small and medium enterprise throughout this paper.

In the paper of Firouz (2010), labor productivity is measured by the production value and labor ratio while Papadogonas and Voulgaris (2005) used sales divided by labor.

The regression result from the model using OLS method of Papadogonas and Voulgaris (2005) shows that factors affecting labor productivity growth in Greek manufacturing firms are: the growth of fixed asset per labor, export status, and activity of Research and Development (R&D). Among these three variables, the capital per labor is the most major determinant of labor productivity, which implies that firms should invest in physical capital to gain higher productivity. On the other hand, variables that have a negative effect on labor productivity are: size of firm, growth in labor force and industry age. The negative effect can be explained that as compared to large firms, SMEs have better improvement in productivity since their characteristic is flexibility. Regarding labor productivity using sales divided by labor force, it will fall when increasing the employees, which explains for the negative relationship between labor productivity and growth of employment.

In the paper of Firouz (2010), factors affecting labor productivity positively are: the percent of labor with high education, capital intensity, R&D activity, firm size, export status, firm ownership status and wage. The positive relationship indicates that firms with high ratio of labors with college or higher diploma will have higher labor productivity. The same result with Papadogonas and Voulgaris's findings as an increase in capital, investment in R&D activity and firms being exporters will lead to gain in labor productivity. Firms owned by state perform lower labor productivity compares to firms with other legal status. Unexpectedly, factor that has negative impact on labor productivity is the ratio of spending on employment training and industrial expenses, which means the more capital invested in training labors, the lower labor productivity received. This is

contrary to the human capital studies and it can only be explained by considering the efficiency of training program. The phenomenon reflects the weakness of firms in investing in human capital when the quality does not match with capital expenditure.

3. Methodology

3.1. Concepts of labor productivity

Labor productivity determines an amount of goods produced within a labor unit. This definition can vary in every sector, it depends on what they focus (Song & AbouRizk, 2008). In this case, to project manager, speaking of labor productivity means a ratio between earned work hours and work hours used (Hanna et al., 2005). Labor productivity measurement also varies in different scale of study whether it is at national level, industry level or firm level. According to a universal definition given by International Labor Organization (ILO), explanation of labor productivity is simply the ratio between the volume measures of output and the volume measures of input used.

In a document issued by Organization for Economic Co-operation and Development (OECD) guiding to measure productivity, there are some widely used concepts for labor productivity evaluation separated into two main categories: gross-output based and value-added based.

- ***Labor productivity calculated by using gross-output***

Gross-output based labor productivity can be useful in measuring the labor requirements at industry level because it shows the ratio between the need of labor and physical output, which is expressed as the following formula:

$$\text{Labor productivity} = \frac{\text{Quantity index of gross output}}{\text{Quantity index of labor input}} \quad (1)$$

By using this formula, the labor productivity growth is dependent on the ratio between intermediate inputs and labor changes. Taking outsourcing as an example, when a company uses this service, it will be considered as an intermediate input as it replaces key factors of production including labor. The outcome of this replacement is the decline in labor input which leads to labor productivity rise. On the contrary, when that firm stops using outsourcing, the number of labors used increases and labor productivity will fall as a result. Since this method based on the number of labors instead of characteristics of the labor

force, it can't reflect the effectiveness gained from technology improvement or any changes in the inputs.

- ***Labor productivity calculated by using value-added***

Value-added labor productivity tends to be used in analysis of the link between micro and macro level such as industry's contribution to the economy or the relationship of wide labor productivity and economic growth, measured by:

$$\text{Labor productivity} = \frac{\text{Quantity index of value added}}{\text{Quantity index of labor input}} \quad (2)$$

The formula is similar to measurement of living standard, which is well known as income per capital. At the aggregate level, by changing working hours, labor force participation rates, unemployment, or demographic changes, productivity can represent living standards. Hence, this method is commonly used as a reference statistic in wage bargaining.

3.2. Cobb-Douglas Production Function

One of the most popular theories used in labor productivity study is the production function developed by Charles W. Cobb and Paul H. Douglas based on manufacturing industry of America in 1928. In Macroeconomics, there are four main factors of production: physical capital, labor, land, entrepreneurship. The Cobb-Douglas Production Function concentrates in two input factors, labor and capital, to reflect the relationship between them and the output produced. The Cobb-Douglas Production Function in a basic form is:

$$P(L, K) = b \times L^{\alpha} \times K^{\beta} \quad (1)$$

In this function, P is the outputs in financial worth produced by using the input of K and L in a year.

- L: labor input
- K: capital input
- b: total factor productivity
- α, β: elasticity coefficients of labor and capital, respectively.

From the Cobb-Douglas Production Function we have marginal productivity of labor, denoted by $\frac{\partial P}{\partial L}$. It can be calculated as below:

$$\frac{\partial P}{\partial L} = \frac{\partial [P(L,K)}{\partial L} = \alpha \times \mathrm{b} \times L^{\alpha-1} \times K^{\beta}$$

$$= \alpha \frac{b \times L^{\alpha} \times K^{\beta}}{L} = \alpha \times \frac{P}{L}$$

The quantity $\frac{P}{L}$ is the average output of labor, which is a measure of labor productivity used in several studies. To assess the effectiveness of capital on labor, we use this ratio $\frac{K}{L}$ *(See Papadogonas and Voulgaris, 2005).*

3.3. Research model and variables

Table 3. 1. List of variables and expected sign

Variables	Definition	Expected sign	
Dependent variable			
$\boldsymbol{LnLP_i}$	Logarithm of labor productivity (Labor productivity = total value-added divided by employment)		
Explanatory variable			
$\boldsymbol{Ln\frac{K_i}{L_i}}$	Logarithm of fixed assets per labor	+	Greenwood and Krusell (2006)
$\boldsymbol{Ln\frac{TLC_i}{L_i}}$	Logarithm of total labor cost per labor	+	Mühlau and Lindenberg (2003)
$\boldsymbol{LnAsset_i}$	Logarithm of total assets	+/-	Chen and Guariglia (2011)
$\boldsymbol{RD_i}$	Dummy (1 = firm has R&D, 0 = otherwise)	+	(Papadogonas and Voulgaris, 2005)
$\boldsymbol{Export_i}$	Dummy (1 = firm is an exporter, 0 = otherwise)	+	Hung et al. (2004)

$\boldsymbol{Age}$	Firm's age	+/-	Deichmann (2002), Desai and Goldberg (2009).
$\boldsymbol{ProL_i}$	Professionals' share of total workforce	+	Ngombo (2015)

There are several ways of measuring labor productivity but based on the empirical models and available dataset, labor productivity in this paper will be measured by the ratio of real value added and labor force. The predictors chosen for assessing influence on labor productivity are: fixed asset per labor, ratio of total labor cost and labor force, total asset, R&D activity, export status, firm's age and professionals' share of total workforce.

Similar to Papadogonas and Voulgaris., (2005) our estimated model using logarithm:

$$LnLP_i = \beta + \beta_1 Ln\frac{K_i}{L_i} + \beta_2 Ln\frac{TLC_i}{L_i} + \beta_3 LnAsset_i + \beta_4 RD_i + \beta_5 Export_i + Age + \beta_6 ProL_i + \mu_i$$

Where i represents firm, β is the intercept term, $\beta_1 \ldots \beta_6$ are coefficients and μ represents the error term. Variable description is shown as table 3.1, all the financial values are for the year 2014 with the unit of million VND.

With the purpose of measuring determinants for labor productivity in Vietnamese SMEs, we will start off with ordinary least squares (OLS) model to minimize the sum squared differences between the observed responses from the dataset collected. Moreover, to control heteroskedasticity, we will try another technique called Feasible Generalized Least Squares (FGLS) estimator.

3.4. Data description and analysis

Enterprises in this survey are classified by micro, small and medium using the number of labors criteria defined by World Bank. There are two firms with no data of sector and seven firms with more than 300 labors so after categorizing as shown in table 3.3, total number are 2,639 firms working in 20 sectors. Among these enterprises, micro-sized firms account for the largest proportion of approximately 75% while medium-sized firms only

occupy a small share of 5.8%. As it can be seen from table 3.2, the dominant sectors in this data set are: food and beverages, fabricated metal products, wood, rubber, furniture, jewelry and music equipment, etc. and apparel. After excluding observations with missing values, there are 1,943 firms available for statistical analysis, categorized by 19 sectors but we will rearrange as table 3.3 to focus more in these six major sectors.

Table 3. 2. Size of enterprises by sector

Sector	Micro	Small	Medium
Food and beverages	734	80	24
Fabricated metal products	375	61	13
Wood	230	51	10
Furniture, jewelry, music equipment, etc.	126	31	7
Rubber	90	44	24
Apparel	69	46	22
Non-metallic mineral products	59	30	8
Textiles	56	25	5
Publishing and printing	65	19	2
Leather	41	12	8
Paper	27	22	10
Electronic machinery, computers, radio, etc.	30	20	9
Chemical products etc.	23	24	6
Services	21	11	2
Basic metals	20	6	2
Motor vehicles etc.	8	3	1
Recycling etc.	7	3	0
Refined petroleum etc.	6	2	1
Other transport equipment	4	2	1
Tobacco	1	0	0
Total	1,992	492	155

Table 3. 3. Observations for statistical analysis

Sector	Number of firms
Food and beverages	436
Fabricated metal products	375
Wood	225

Rubber	152
Furniture, jewelry, music equipment, etc.	137
Apparel	120
Others	498
Total	1,943

Taking an overall look at the variables' summary statistics in table 4.1, we can see that average professionals' share of total labor is rather low with only 4% and the maximum value of this variable is only 75%. This indicates low ratio of employees with college degree or higher in the present Vietnamese SME survey. Average age of these firms is 14.52 implies that they have been working for more than 14 years. The value of this variable ranges from 1 to 60 showing that the most recent established firm is from a year before this survey and the oldest firm has 60 years in operation. For export status of firm, only 9% of them are exporters and more than half of the observations have no investment in R&D activity.

Table 3. 4. Summary statistics

	Obs	Mean	Standard deviation	Min	Max
Dependent variable					
Log value added per labor	1936	4.32	0.70	-2.71	8.16
Explanatory variable					
Log total assets	1943	7.63	1.50	3.09	13.20
Log fixed assets per labor	1943	4.93	1.40	-3.11	9.33
Log total labor cost per labor	1943	3.54	0.58	0.00	4.91
Firm's age	1943	14.53	9.67	1.00	60.00
Professionals' share of total labor	1943	0.04	0.07	0.00	0.75

R&D	1943	0.48
Export	1943	0.09

Table 3. 5. Average values classified by sector

Sector	Average fixed assets (million VND)	Average labor (people)	Average total labor cost (million VND)	Average labor productivity (million VND)
Food and beverages	4,313.42	13.92	589.37	88.23
Fabricated metal products	2,494.53	11.97	608.75	101.82
Wood	1,732.10	16.47	616.08	74.01
Rubber	5,322.64	26.88	1,351.73	120.08
Furniture, jewelry, music equipment, etc.	5,265.25	14.07	741.46	99.23
Apparel	3,448.25	33.83	1,712.47	87.35
Others	6,476.75	22.82	1,183.17	104.80

Table 3.5 indicates that average fixed assets of rubber is the highest among six sectors which reflects a large investment in physical capital of rubber sector. It also has the highest average labor productivity in all sectors of the survey. Meanwhile, firms in apparel sector seem to use a large number of labor with 34 people, even higher than the other sectors besides the six major sectors and the number is almost triple than fabricated metal product. As a result, the total labor cost for apparel sector also occupies for the largest value.

Table 3.6 provides data of firms with R&D investment and export status in each sector. It is easy to see that, most of firms that has R&D activity are in food and beverages

sector, followed by fabricated metal products with nearly 18% of firms. Almost the same percentages with each other found in sectors such as wood, rubber, and apparel. Only 4.41% of firms with R&D orientation are in furniture, jewelry and music equipment, etc. sector, which accounts for the smallest part and the same result found in proportion of exporter for this sector. Apparently, wood and apparel have most of the exporters in six sectors with approximately 17%.

Table 3. 6. R&D and export status by sector

Sector	Proportion of firms with R&D investment (%)	Proportion of exporters (%)
Food and beverages	25.83	13.74
Fabricated metal products	17.98	7.69
Wood	8.61	17.58
Rubber	9.36	6.59
Furniture, jewelry, music equipment, etc.	4.41	3.85
Apparel	8.18	17.03
Others	25.62	33.52

4. Empirical result

Regression results from both OLS and FGLS shows that factors which have positive relationships with labor productivity are: the ratio of fixed assets per labor, total labor cost per labor, professionals' share of total labor, R&D, and export status. On the other hand, firm's age is found to have a negative effect on labor productivity in both results of FGLS and OLS method. The negative sign implies that firms with longer year of operation have lower labor productivity.

In OLS regression, total assets affects labor productivity positively but FGLS result indicates an opposite sign. Even so, this variable is not statistically significant in both models, which indicates that firm's size does not affect labor productivity. Another difference is that in FGLS model, R&D status and firm's age has become more significant than in OLS result. Using FGLS approach as a method to deal heteroskedasticity means that we accept changes in the coefficients. Fortunately, the differences are not too large

and still it is considered as a better method than OLS when heteroskedasticity occurs. Therefore, its estimators are more reliable and we will analyze the result of FGLS model.

Table 4. 1. Regression result

Dependent variable: Log of value added per labor		
	(1)	(2)
Independent variable	OLS-Robust	FGLS
Log total assets	0.00893	-0.0113
	(0.0155)	(0.0155)
Log fixed assets per labor	0.0813***	0.0755***
	(0.0123)	(0.0136)
Log total labor cost per labor	0.648***	0.690***
	(0.0331)	(0.0284)
Professionals' share of total labor	0.0981	0.273
	(0.225)	(0.206)
R&D	0.0349	0.0513*
	(0.0265)	(0.0264)
Firm's age	-0.00419**	-0.00641***
	(0.00203)	(0.00120)
Export	0.0424	0.0661
	(0.0490)	(0.0577)
Sector		
i.Food and beverages	0.152***	0.180***
	(0.0401)	(0.0403)
i.Fabricated metal products	0.0771*	0.107***
	(0.0395)	(0.0385)
i.Wood	-0.0161	0.0391
	(0.0430)	(0.0446)
i.Rubber	0.100*	0.134**
	(0.0539)	(0.0609)
i.Furniture, jewelry, music equipment, etc.	0.0301	-0.0113
	(0.0656)	(0.0465)
i.Apparel	-0.0519	0.0258
	(0.0484)	(0.0518)
Including dummy	**Yes**	**Yes**
Constant	1.539***	1.560***
	(0.128)	(0.106)
Observations	1,936	1,936
R-squared	0.378	0.358

The ratio of fixed assets and labor, total labor cost per labor, and firm's age appears to have the most significant influence on labor productivity at the level of 1%. R&D status also affects labor productivity but at a less significant level.

The coefficient of log fixed assets per labor is 0.0755 implies that if we increase the ratio of fixed assets per labor by 1%, labor productivity will rise 0.0755%. The positive effect is consistent with the study by Papadogonas and Voulgaris, (2005) and Firouz et al., (2011), which support the idea that when firms invest more in physical capital, labor productivity will be improved. Such relationship is because when firms have more investment in fixed assets, more capital could be used for information and communication technology (ICT), which allows firms to improve the production process, structure of organization, and external relation (Leoni, 2008), as mentioned in paper by Chao et al. (2013). Consequently, firms will experience a rise in labor productivity.

In the same way, labor productivity will increase 0.690% if we rise 1% of total labor cost per labor. Since the coefficient of total labor cost per labor is higher, we can say that labor productivity is more responsive to changes in total labor cost per labor. In the research of Crépon et al., (1998), Lööf and Heshmati (2002), wage is positively correlated with labor productivity. Though we use the total labor cost per labor ratio, it has similar nature with wage and even more extensive as it measures the value received by labor including wage and benefit. The regression result is also consistent with the theory of efficiency wages that the labor force will be more motivated to do their jobs and try to increase their level of productivity.

The positive relationship between labor productivity and R&D status means that investing in R&D activity will lead to labor productivity improvement, which is consistent with the technological progress as observed in endogenous growth models (Romer, 1990). In which, he observes that the reason why firms are able to produce more output today from a given quantity of capital and labor than could be produced a century or two ago is because labor productivity has grown due to technological progress arising from research and development (R&D). In this case, at the significance level of 5%, firms with R&D activity have 0.0541% higher labor productivity.

Although in the studies of Papadogonas and Voulgaris (2005) and Firouz et al. (2010), firm's age found to have no influence on labor productivity, the negative effect of this variable on labor productivity in the paper of Ospina and Schiffbauer (2010) is similar with

the present result and it indicates that labor productivity in these firms decrease over time. We can also understand that firms with a longer operation time have lower labor productivity than new established firms. The coefficient indicates that labor productivity in these firms decrease $e^{0.00664}$= 1.00666% after one year of operation. Since the average age of these firms is more than 14 years, which means many of them were established around the year 2000 or even longer ago. There have been several changes from the government in trade policy, which led to market shift and trade expansion (MOIT, 2012). From this context of Vietnamese economy, we assume that old management culture in these firms is the reason for negative effect on labor productivity because new established firms clearly have advantage of being adapt to new policy and response rapidly with market shocks.

Considering the coefficient of each sector, food and beverages, fabricated metal products, and rubber have higher labor productivity than firms in other sector.

Factors that do not affect labor productivity are: export status, total assets, and professionals' share of total labor. In order to have a more specific look at the relationship between these variables in firms classified by sector, we will regress with six dominant sectors using FGLS technique.

The given result in table shows that the ratio of total labor cost per labor has impact on labor productivity in all sectors at the significance level of 1%, the coefficient is also higher than other variables. This confirms the idea that spending on labor cost will lead to higher labor productivity than changing any other variables, no matter what sector firms are working in. The capital intensity, however, only shows significance in some sectors such as food and beverages, wood, rubber, and apparel. Labor productivity in rubber and wood sector are less likely to be affected by the ratio of fixed assets per labor as compared to food and beverages and apparel. Firm's age also appears to be more significant in furniture, jewelry, music equipment, etc. sector than in apparel, others are not affected by firm's age. R&D orientation seems to affect labor productivity in rubber sector only. Different from the result of regression with all observations, firm's size represented by log total assets, has influence on labor productivity of firms in wood and apparel sector. Export status as well only shows the positive relationship with labor productivity in food and beverage and wood sectors only. The number of college degree holders in labor force shows more significant affection to labor productivity of rubber than furniture, jewelry, music equipment, etc.

sector. In sum, determinants of labor productivity for each sector are different, depending on the characteristic of each sector in the economy.

Table 4. 2. FGLS regression result by sector

Dependent variable: Log of value added per labor						
Independent variable	(1) F&B	(2) Metal	(3) Wood	(4) Rubber	(5) Furniture	(6) Apparel
Log total assets	-0.0149	0.0204	-0.0787**	0.0289	0.0240	-0.162***
	(0.0352)	(0.0354)	(0.0322)	(0.0579)	(0.0872)	(0.0404)
Log fixed assets per labor	0.0915***	0.0434	0.0690**	0.0761*	0.0926	0.113***
	(0.0313)	(0.0311)	(0.0268)	(0.0451)	(0.0819)	(0.0347)
Log total labor cost per labor	0.558***	0.634***	0.736***	0.813***	0.709***	1.036***
	(0.0494)	(0.0529)	(0.0556)	(0.111)	(0.187)	(0.0900)
Professionals' share of total labor	0.554	-0.646	-0.602	-1.553**	3.136*	-0.471
	(0.592)	(0.428)	(0.606)	(0.716)	(1.783)	(0.558)
R&D	0.0416	-0.0145	-0.0621	0.214**	0.196	-0.0388
	(0.0495)	(0.0502)	(0.0576)	(0.0951)	(0.157)	(0.0805)
Firm's age	-0.00118	-0.00270	-0.000258	-0.00395	-0.0344***	-0.0109**
	(0.00207)	(0.00226)	(0.00256)	(0.00399)	(0.00649)	(0.00539)
Export	0.294*	-0.0843	0.413***	0.0246	-0.109	0.0543
	(0.158)	(0.183)	(0.106)	(0.192)	(0.509)	(0.120)
Including dummy	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Constant	2.031***	1.797***	1.842***	0.862**	1.588***	1.373***
	(0.164)	(0.189)	(0.223)	(0.413)	(0.603)	(0.333)
Observations	434	374	224	152	137	119
R-squared	0.372	0.394	0.501	0.384	0.348	0.602

5. Conclusion

Regression result using FGLS method shows that four out of seven variables are statistically significant, which means these factors have impact on labor productivity of SMEs:

- Capital intensity, calculated by the ratio of fixed assets per labor, has a positive effect on labor productivity. In other words, increasing physical capital will make labor productivity improved, which is consistent with the growth theory of Solow. This factor is found to be determinants of labor productivity in food and beverages, wood and apparel sector.

- Total labor cost per labor strongly affects labor productivity in a positive way. It plays an important role in all sectors with high significance level and responsiveness, especially in apparel. The result indicates that increase expense on labor is the most effective way to gain growth in labor productivity, supporting wage-efficiency model.
- Firm's age negatively affects labor productivity, this phenomenal reflects the downward trend in labor productivity of firms with long time of operation. Combined with the context of Vietnamese economy in that period, conservatism in operation management is believed to be the cause of negative effect to labor productivity. Therefore, new firms with the advantage of flexibility are more likely to adjust for fitting in new era.
- Having a positive influence at the significance level of 5%, R&D orientation is also a vital driver for growth in labor productivity as the result is similar with empirical results, supporting growth model of Romer (1990).

Moreover, after regressing with firms in each sectors, other variables are found to have impact on labor productivity as well. Particularly, firm's size influences labor productivity negatively in apparel sector at significance level of 1% and in rubber sector at significance level of 5%. Such negative sign also appeared in study by Papadogonas and Voulgaris (2005) indicating growth of labor productivity in small enterprises over time.

The ratio of labor with high education can be an influencer to labor productivity in rubber and furniture, jewelry, music equipment, etc. sector at significance level of 5% and 10%. Negative sign found in rubber sector reflects the characteristic of this sector though it is contrast to human capital theory. It has been stated in previous chapter that the sectorial need of manual workers instead of academic certificated workers is a reason for the negative impact. Nevertheless, result from regression with furniture, jewelry, music equipment, etc. sector have supported for human capital theory that firms with more high educated labor will grow their labor productivity (Sandra and Lynch, 1996).

Export status found to have positive sign in wood sector at significance level of 1% and in food and beverages at level of 10%, which is consistent with empirical results such as Hung et al. (2004) and Girma et al. (2004). Exporters in these sectors may gain labor productivity by involving in competition of international market and earn experience through export process.

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