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Review Article

Literature Review on Determinants of Total Factor Productivity (TFP) at the Firm-Level

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Abstract: The assessment of factors affecting TFP growth at the firm-level has been mentioned by many researchers. This paper reviews the determinants of TFP at the micro level. The determinants of TFP examined in this paper are the following: technology, export activities, foreign direct investment, firm location, managerial ability, firm age, and other factors such as financial constraints, salary, capital structure, resource constraint. This is followed by a review of studies analysing multiple determinants of TFP because productivity has many affecting factors, and these factors often interact and create synergies. Omitting other important factors that affect productivity will result in misleading estimates of the production functions and productivity so several studies have addressed this issue by looking at multiple factors that affect productivity.

Keywords: determinants, Total Factor Productivity (TFP), enterprise, Vietnam.

1. INTRODUCTION

TFP is a measure of production efficiency of enterprises, a basis for production expansion and an important factor to ensure the quality of growth in depth, to ensure sustainable development as well as to improve competitiveness of enterprises. Total factor productivity analyses using micro-level data in various aspects have been widely employed by many researchers for both developed and developing countries. This is partly due to the increased availability of micro-level data and the development of different methodological approaches from the literature. Another major reason is that productivity growth at the micro level has been considered a key factor to yield economic growth at the macro level in the long run. Besides, a micro-level analysis of TFP enables us to understand what determines the differences in TFP across firms. As a result, it offers a better understanding of TFP than that attainable with aggregate data.

2. Overview of factors affecting Total Factor Productivity (TFP) at the firm-level

There are many factors that affect the Total Factor Productivity of a business, but most scholars around the world point out that at the enterprise level it is governed by the following factors:

Technology

Innovation and technological progress are seen as key drivers of TFP growth. Romer (1986, 1990) advocated endogenous knowledge generation as a factor for permanent economic growth. One of the key challenges of measuring innovation and its impact on TFP growth is identifying variables that are precisely representative of that purpose such as research and development (R&D), patent or foreign direct investment (FDI). For example, Castany *et al*. (2005) studied the impact of creative activities and the use of skilled labor on TFP growth using data from Encuesta sobre Estrategias Empresariales for Spanish manufacturing firms. He found that firm size limits R&D efficiency and thus indirectly affects TFP growth. Other studies focuses on the concept of knowledge, as the impact of factors such as Information and Communication Technology, patents or scientific publications has a positive effect on TFP growth (Chen and Dahlman, 2004). Calligaris *et al*. (2016) found that innovation (as measured by intangible assets such as R&D, branding, marketing) will drive productivity growth. Crass and Peters (2014) used panel data for German firms for the period 2006-2010 to check whether or not the intangible assets affect productivity at the firm level and found a positive relationship between productivity growth and R&D as well as the human factor (represented by training costs and the

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proportion of highly skilled labor).

Export Activities

The first view holds that TFP is likely to determine whether a firm exports into a new market or not because only the productive firms can able to pay the sunk costs when participating in the export market. It is the "self-selection" view. Roberts and Tybout (1997) analyzed the entry and exit of factories in four manufacturing industries in Colombia during the years 1981-1989 using a model in which the factory's current exports are a function of the variables of previous export experience (representing for sunk costs), observable characteristics (age, equity, and firm ownership that affect firm's profit from exports) and unobserved shocks. The research results show that a factory export decision in the current year is influenced by whether the company has previously exported or not. Specifically, a factory has a 60% higher probability of exporting in the current year than a factory that has never exported if it has exported in the previous year. This suggests that after overcoming the cost of entry, a company is more likely to continue exporting than a company that is still facing these costs. In addition, the authors find that once a factory leaves a foreign market, the costs for re-export are not much different than those faced by new exporters. Research shows that sunk costs constitute a barrier that a company must overcome in order to enter foreign markets. Only the most productive companies can overcome such barriers and thus choose to enter export markets themselves. When making a decision whether to export or not, a company is likely to consider various factors such as TFP. Thus, TFP can determine whether a company has chosen to enter a new markets or not.

The opposite of "self-selection" is "learning by exporting" view. In this view, a firm learns how to be more productive and competitive through exporting. The more it exports, the more the firm is able to increase productivity. This is because by entering foreign markets, a firm faces a large number of competitors. To survive in such an environment, the firm will need to continuously improve productivity by taking measures to increase TFP. Furthermore, exporters can benefit from the trade interactions that exports bring, as noted by Grossman and Helpman (1991). For example, an international business entrepreneur has the opportunity to increase his or her knowledge base by interacting with foreign partners, learning from customer feedback and observing more advanced technologies, products and better ways of working. This knowledge can be put into practice in the enterprise to increase TFP. In addition to the many possible measures an exporter can take, improving products and processes and adopting machinery can potentially increase TFP. Thus, from the "learning by exporting" view, a firm can learn to increase productivity by engaging in export activities.

Bernard and Jensen (2004) analyzed the role of export activities in determining the US TFP growth rate in the manufacturing sector from 1983 to 1992 at the plant levels and industry levels. The independent variable is the export status of a firm at time t, which is expected to affect productivity growth at time t +1. The authors applied a regression method with cross-sectional data between TFP growth rates and several independent variables including a proxy variable for export. At the industry level, export growth is due to higher productivity, while the converse is not true. At the plant level, no strong evidence was found for the existence of "learning by exporting", so the results of the previous study were confirmed once again. In addition, the study also showed that the TFP of plants increased before entering the export market and during the accession process. This means that the most productive plants will choose to enter the export market by themselves. Employment and output growth rates were found to be much higher for exporters, and these rate continued after export activity commenced. Therefore, it seems that export activity supports TFP growth of exporting companies. In addition, at the industry level, it was found that 42% of TFP growth in the years 1983-1992 was due to a reallocation of output between plants, as exporters with relatively high TFPs grew rapidly in terms of employment and output compared to non-exporting plants with relatively low TFP. As a result, exporting firms contribute more to aggregate TFP growth in their industry than non-exporting firms. In the results of Bernard and Jensen (2004), exports do not seem to have a direct effect on TFP because exporting firms have higher employment and output. Ortega *et al*. (2013) studies the relationship between exports and the productivity of Chilean firms through four main hypotheses: self-selection hypothesis (where high productivity encourage exports), learning-by-innovating hypothesis (in which exports increase productivity), exporting-by-innovating hypothesis (where R&D is the determinant of exports) and the Innovating-by-exporting hypothesis (whereby exports promote innovation practices). They find that exports affect productivity more than productivity affects exports. De Loecker (2007) used a dichotomous dummy variable as proxy for the firm's probability to start exporting. By using firm-level data for 7,915 Slovenian manufacturing firms during the period of 1994-2000, he found that firms experienced productivity increases after starting to export, an effect that increased in the following years. Exporting firms were found to be 8.8% more productive on average.

Foreign Direct Investment

Company ownership also has an impact on TFP so this section will discuss the impact of company ownership on TFP and focus on foreign direct investment (FDI). A foreign-owned company is expected to have a higher TFP than companies with other types of ownership. FDI can directly affect the TFP of enterprises in which a foreign owner has

invested, or it can indirectly affect TFP through spillovers, expressed through different channels such as imitation/demonstration or imitation, labor mobility, exports, competition and backward or forward linkage.

Most of the empirical studies on the direct effect of foreign ownership on TFP have shown that FDI has a positive effect on the TFP. Harris (2002) studied the direct effect of foreign ownership on the TFP in the motor vehicle industry and four other UK manufacturing industries Pharmaceuticals, Electronic Data and Processing Equipment, Aircraft Equipment Manufacture and Repair, and Miscellaneous Foods) from 1980 to 1992. In this study, foreign ownership is a dummy variable, which will take the value of 1 according to geographical origin of each company owner (US, EU or Old Commonwealth Enterprise). The results indicate that foreign plants are more productive than UK-owned plants. In particular, plants owned by US and EU companies are more productive than local plants in the motor vehicle sector. In the other four industries, US-owned plants are more productive than local plants, while EU-owned plants are not more productive than local plants.

A more general study was performed by Harris and Robinson (2003), in which they analyzed the direct impact of foreign ownership on TFP using plant-level data from companies in 20 British manufacturing industries in the period of 1974-1995. In general, foreign-owned plants are more productive than UK-owned plants. Foreign owned plants have a positive impact on TFP in the UK manufacturing sector by driving local plants to catch up with best practices. Plants owned by US companies are more productive than local plants in most areas, but this productivity advantage appears to have diminished over time. Meanwhile, EU plants performed better than UK-owned plants in some industries, while others performed worse. In addition, the TFP of EU-owned plants has decreased over time, suggesting that they are not necessarily better performing than UK-owned plants. Meanwhile, the impact of FDI on TFP in plants owned by the Old Commonwealth and Southeast Asian countries is not clear. These results show that foreign firms have a comparative advantage that enables them to become more productive than local firms.

Zhou *et al*. (2002) analyzed the direct effect of FDI on the productivity of Chinese firms in the period 1992-1995. The sample is taken from the General Statistics Office of China and includes 450,000 companies, accounting for 90% of China's total industrial output. However, this sample only includes medium and large companies. Company performance is measured in value added per employee. While this metric is quite effective, a measure of TFP would be a better value since TFP considers all the inputs used in a company's production process. Using OLS estimates, the results show that firms based in geographic regions with higher FDI levels and the longer existence of FDI tend to be more productive than firms located in regions with lower FDI levels and the shorter existence of FDI. On the other hand, firms in industries with high levels of FDI and longer existence of FDI tend to have lower productivity. Based on these results, FDI seems to have opposite effects on domestic firms, depending on whether the firm belongs to a high-FDI region or to a high-FDI industry.

While the studies mentioned above have analyzed the direct effects of FDI on the TFP, other studies have analyzed the indirect effects of FDI on TFP through spillover effects from foreign-owned companies to local companies. According to Crespo and Fontoura (2007), the spillover effects of FDI can be transmitted through five channels: imitation/demonstration or imitation, labor mobility, export, competition and through commercial relationships, or linkages, with domestic firms. In general, empirical studies have shown the existence of indirect effects of FDI on TFP. Girma and Wakelin (2007) analyzed the indirect effects of FDI on TFP in the UK electronics industry in 1980 and 1992. The authors assess the different effects of FDI on regions receiving the support of the UK government compared to those that don't have support. The type of FDI is represented by a variable with three variants: one denoting regional intra-industry spillovers; one denoting inter-regional intra-industry spillovers; and one denoting local inter-industry spillovers. The findings of this study indicate that FDI has a positive indirect effect on TFP through regional spillovers, both intra- industry and inter-industry. However, they did not find any evidence of inter-regional spillover among firms in the same industry. In addition, firms located in the government-subsidized sector do not see particular benefits from FDI, which suggests that domestic plants are not capable of absorbing the full benefits of FDI spillover.

In addition to the horizontal FDI spillover, Suyanto *et al*. (2012) examined the indirect effects of FDI through the competitive channel for 568 companies in the Indonesian chemical and pharmaceutical sectors from 1988 to 2000. Foreign direct investment is represented by a dummy variable that takes the value of zero if the company has no foreign ownership and takes the value of 1 if it has foreign ownership. Research results show that intra-industry spillovers have a positive impact on TFP. Furthermore, companies that invest in R&D benefit more than those that do not invest in R&D. In addition, the productivity spillover effect of FDI will be higher when in the presence of competition. This result shows that competition will motivate business managers to take actions to improve TFP to deal with threats from both actual and potential competitors.

Regarding the channel of imitation/demonstration or imitation of FDI, Ben Hamida and Gugler (2009) analyzed the intra-industry spillover of FDI using Swiss firms' data on the productivity of foreign firms in the manufacturing and service sectors in 1998 and 2001. The aim of this study is to analyze the intra-industry FDI spillover on productivity, as measured by the share of foreign firms' sales in an industry. Specifically, this study analyzes how the share of sales changes with the level of the firm's absorptive capacity. When firm heterogeneity in absorptive capacity is not considered, the FDI spillover does not exist, but when this heterogeneity is taken into account, the FDI spillover is demonstrated through imitation/demonstration channels for companies investing in R&D, helping businesses build absorption capacity. This implies that in order to benefit from the FDI spillover through imitation/demonstration channel, firms must build a high level of absorptive capacity, for example through R&D investments.

Regarding the FDI spillover on productivity through labor mobility, Todo *et al*. (2009) analyzed how workers of multinational enterprises' (MNEs) spread knowledge to other local company. The analysis was performed in a Chinese High-Tech Cluster, using panel data for 798 manufacturing companies for the period of 2000-2003. Knowledge spillovers from MNEs are measured in two ways: the total workforce of MNEs, and the number of educated workers. The results show the existence of a FDI spillover in the industry through the labor mobility channel, which is represented by the employment of educated workers. Workers can learn by working for multinational enterprises' that have advanced technology, and when these workers move to local companies or set up their own companies, they can apply their knowledge and the creative skills that they learned, leading to a higher TFP. However, the analysis in this study only concerns one technology cluster, so the results are limited in assessing the overall impact of FDI spillovers on TFP through labor mobility.

Yu and Sheng (2012) analyzed the FDI spillover on the productivity of Chinese manufacturing firms in the period 2000-2003. The spillover is divided into three types: horizontal spillover (arising from firms within the same industry), backward spillover (indigenous firms are suppliers to FDI enterprises) and forward spillovers (local firms are customers consuming products of FDI enterprises). The research results show that the positive forward spillovers on enterprise productivity through the import of quality intermediate goods and equipment from foreign companies. However, horizontal spillovers and backward spillovers negatively affect TFP. As a result, the overall results are not as positive as expected. Another conclusion drawn from the study is that the firms that benefit most from the presence of foreign firms are large and medium-sized firms that are not in the state sector and engaged in export activities.

In summary, the above studies have analyzed the importance of firm ownership, especially FDI for the productivity of firms. Results from empirical studies show that FDI has both direct and indirect effects on productivity. Direct impact when a local company receives investment from a foreign company and benefits from technology, superior know-how, or innovative managerial and machinery. Indirect impact when a local company does not receive investment from a foreign company but operates in the same geographic area and benefits from spillover through the technology channel. This indirect effect occurs through five different channels: imitation/demonstration, labor mobility, exports, competition, and commercial relationships, or backward and forward linkages with domestic company. Studies also suggest that in order to receive the greatest benefit from the indirect effects of FDI, it must have it must have absorptive capacity, or the ability to absorb, and use knowledge for productive purposes. A company with higher absorptive capacity is likely to be more productive than a company with lower absorptive capacity.

Firm location

Harris and Moffat (2012) measured factors affecting TFP by using dataset in UK from 1997 to 2006 for most industries in both manufacturing and services sectors. City spillovers are measured by dummy variables that take the value of 1 if the plant is located in a large city and take the value of 0 if it is not. The used estimation method is SYS-GMM. The results show that plants located in cities have higher TFP than others located in the same region, but outside the cities.

Pan and Zhang (2002) studied the effect of city size on the productivity of 119,970 firms across 28 industries in 224 cities. City size is represented by urban population. The results show that when the city size doubles, the firm's productivity increases by 3.6%. When this effect is further disaggregated, it is found that productivity gains are mainly due to the concentration of firms in the same industry, as measured by total industry sales, rather than urban growth that is measured by the urban population. Although this study is the only one study conducted at the corporate level in China, it also shows that being based in a city offers companies a range of benefits that can be lead to an increase in TFP.

Managerial Ability

The empirical research results show that good management has a positive impact on TFP.

Ichinowski *et al*. (1997) studied the effect of human resource management (HRM) on the productivity of 36 production lines owned by 17 steel companies. Productivity is measured as a percentage of the time that the production line has run. In this study,

human resource management includes activities such as: bonuses, recruitment and selection, teamwork, job safety, flexible work assignment, skills training and communication. The research results show that the system of human resource management measures is a decisive factor for productivity. However, if only a single HRM measure is implemented, the impact on productivity is small. This suggests that in a company, introducing a single HRM measure is unlikely to significantly improve TFP. However, to make a huge impact on TFP, firms need to combine many measures in human resource management. From these research results, one can infer that the introduction of human resource management measures system will lead to productivity improvement. However, this needs to be done with extreme caution because the research only focuses on steel companies and the sample size is too small, with only 36 production lines.

Lazear (2000) analyzed productivity improvements due to changes in salary by examining the output produced by 3,000 workers in an auto glass company over a 19-month period. Instead of analyzing a system of measures as Ichinowski *et al*. (1997), the study only focuses on the salary measure. When payment was switched from hourly salary to salary per product, the output per worker improved by 44%. This is due to changes in the way wages are paid, which has spurred workers to increase their efforts and increase the company's ability to hire and retain the most productive workers. Although there is a strong increase in productivity, whether or not this accompanied by a reduction in quality as workers focus on quantity of output. Since the observation unit is the worker, the study has a larger sample than the study of Ichinowski *et al*. (1997). In addition, this study has focused on specific management methods. Although changing payroll practices has a positive effect on productivity, it does not mean that other human resource management activities do not have a positive impact on improving productivity. Furthermore, since the results of the study only focus on a specific activity within a company, the results cannot be extended to other industries.

Bloom and Van Reenen (2007) conducted a more comprehensive study, assessing the impact of 18 management practices through a survey of 732 medium-sized companies in the United States, France, Germany and the United Kingdom. Management practices was measured through the responses of business managers to five different issues: monitoring, operations, goals, and incentives. The study shows that, in all countries studied, measures of management practices are positively related to firm performance, including TFP. So it seems that good management practices have a positive effect on productivity. Poorly managed companies are mostly family-owned and operate in a low-competition environment. In family-owned companies, CEOs are family members, are less likely to be well managed. For the second reason, in a low-competition environment, low-productivity companies can still exist and company managers do not take measures to upgrade their management activities which are supposed to increase TFP. In a more competitive environment, low-productivity firms are likely to exit the industry while allowing the more productive firms to grow and gain market share.

In a follow-up study, Bloom and Van Reenen (2010) applied the same research methodology to a larger sample of 5,850 companies in 17 countries. The results show that in the United States, Japan and Germany have the highest management scores, while other countries such as China, Brazil and India have the lowest scores. By measuring the correlation between measures of enterprise performance, among which are enterprise productivity and management measures, the research results show a positive effect. However, because they are correlated, the results may indicate that good management practices lead to higher productivity or that higher productivity leads to the adoption of good management practices.

In summary, the studies of Ichinowski *et al*. (1997) and Lazear (2000) indicate that when companies adopt good management practices, productivity is likely to improve. However, because these analyzes were limited to one area, the results could not be extended to other disciplines. On the other hand, the studies of Bloom and Van Reenen (2007; 2010) have covered more companies, sectors and countries and their research shows that there is a positive relationship between management measures and productivity. However, since the relationship is represented by a correlation relationship, it is not possible to indicate which is the outcome of the other.

Firm age

A firm is expected to become more productive as it ages, this is known as the “survival effect”. As a firm matures, it accumulates knowledge according to a process defined by Arrow (1962) as “learning by doing”, which create improvements in TFP. “Learning is the product of experience. Learning can only take place through the attempt to solve a problem and therefore only takes place during activity” (Arrow, 1962, p.155). This suggests that a firm's knowledge acquisition occurs not only through iterative processes in production, but also through solving problems encountered during operations. In addition, “as plants age, managers accumulate experience, gain from learning by doing, undertake new investments, or achieve economies of scale, all of which can improve plant-level productivity vel” (Jensen *et al*., 2001, p. 323). Furthermore, over time, firm become more knowledgeable about the markets in which they operate and learn how to better respond to customer needs, input sources and process them.

Jensen *et al*. (2001) proposed a relationship between TFP and firm age. The authors argue that new firms entering an industry may be more productive than existing firms. This is because new firms can use more recent and innovative methods or technologies. As a result, older firms are less productive than younger firms because of the so-called “vintage effect.” Marshall (1890) also indicatedthat older firms can stagnate, making it impossible for them to adjust as quickly to the dynamic market environment as their younger firms. Hannan and Freeman (1984) also suggest that a firm's negative actions are often due to the so-called "inertia effect", whereby firms are unable to adjust their structure and strategies in a dynamic environment, making it impossible for them to exploit the opportunities offered by the environment. In summary, the above arguments suggest that there is no unilateral relationship between firm age and TFP but rather a positive relationship due to the “survival effect” or a negative relationship due to the “vintage” or "inertia" effect.

Jensen *et al*. (2001) studied the development of labor productivity in manufacturing plants in the United States from 1963 to 1992. The “vintage effect” is measured by the change in labor productivity of the newer plants compared to older ones when entering their respective industries. “Survival effect” is measured by the change in labor productivity of existing plants over time. Both of these effects were found to have positive contribution to the overall growth in labor productivity in the manufacturing sector. In particular, the higher productivity of new plants compared to older plants suggests that newer plants carry the latest and the best technology, indicating the existence of “vintage effect”. At the same time, Jensen *et al*. (2001) also demonstrate the existence of a “survival effect”, since plants existing in an industry become more productive over time.

Majumdar (1997) studied a sample of 1,020 Indian firms to analyze the effects of firm size and firm age on productivity and profitability over the period of 1998-1994. Firm age is measured by the number of years that the firm’s data has been recorded in the database. The results show that older firms are more productive than younger firms, while being less profitable. From these results, it is inferred that the more mature a firm becomes, the more efficient it becomes. This shows that older firms have learned a lot through the work process would become experienced. This is completely consistent with the study by Jensen *et al*. (2001), which showed the existence of a “survival effect”. However, India has a different institution from the United States, which is characterized by greater barriers to entry and exit of the industry.

Another study in a developing country, Fernandes (2008) analyses 575 manufacturing companies in Bangladesh in five different manufacturing industries and found a non-linear relationship between firm age and TFP. This finding suggests that firms are likely to start off at a low level of productivity, then increase over time as firms "learn" by making investments, entering new markets and updating new technology. At a certain age, companies reach the "maturity stage", from which their productivity declines as their knowledge becomes obsolete. Coad *et al*. (2013) analyzed the relationship between firm age and various measures of productivity. This was done with a sample of 62,259 Spanish manufacturing firms from 1998 to 2006. Similar to Fernandes (2008), Coad *et al*. (2013) found that as firm become older, they improve their productivity levels in addition to increasing profits, growing in size, and using less leverage. On the other hand, at a certain age, firms begin to experience a decrease in efficiency in terms of increasing productivity, sales and profits.

In addition, a firm has the ability to better understand the market environment in which it operates over time. This understanding will allow the firm to satisfy customer needs and provide better inputs, both of which are likely to lead to higher TFP. However, as firms mature to a certain extent, the effect of age on TFP becomes more negative due to difficulties in adapting to dynamic external factors and uncertain environment as well as not keeping up with both best practices in industry and the latest technology.

The above empirical evidence on the relationship between firm age and TFP suggests that when firms enter an industry with available best-practice technology, they are likely to have higher labor productivity than the existing plants. Then, at a certain point, the effect of firm age on TFP can be positive as firms learn from experience. By solving problems in the manufacturing process and learning from them, firms can have the ability to achieve higher levels of TFP.

Other factors

Financial constraints also play an important role in economic growth, savings and investment decisions, and thus, TFP growth. The effect of this variable for example perfect financial markets stimulates long-term investments in productivity-enhancing projects (Aghion *et al*., 2007). To a certain extent, investments in risky opportunities that are often associated with R&D can be constrained because companies must hold a solid financial position in order for banks to lend to needed resources (Fazzari *et al*., 1988). The European Commission (2014) reports that TFP growth of firms is constrained by the availability of internal funds, particularly small firms, suggesting a link between productivity growth and internal finance.

Capital structure is also mentioned as it is associated with bankruptcy risk and can restrict a company from obtaining the fund to invest in productivity-enhancing activities. Jensen (1986) shows

that higher debt levels promote managers' efforts to increase firm performance to avoid bankruptcy. Productivity can be enhanced for firms with high debt levels because workers can work harder against the potential for bankruptcy (Nickel and Nicolitsas, 1999). Köke (2001) studied the impact of financial pressures on productivity growth for German manufacturing firms and found that financial pressures have a positive effect on productivity growth and this effect is larger when the bank debt is high.

The salary also has an impact on TFP growth. Gehringer *et al*. (2013) examines the factors that increase the total factor productivity of 17 EU countries in the period 1995-2007, finding that wages (wage unit, salary per worker) are the main factor impact on TFP growth. They assume that more productive workers are paid more and therefore industries that employ higher productive workers also have higher TFPs.

Vo Van Dut *et al*. (2017) also examined the impact of resource quality on the overall productivity of Vietnamese enterprises through the economic growth model of Solow (1956). Using data from the Vietnam enterprise survey data of World Bank in 2015 and 2009, combined with linear regression model by least squares estimation method, hypothesis testing is the positive relationship between the quality of capital and labor and the total productivity of Vietnamese enterprises, thereby coming to the conclusion that the hypothesis is fully supported after controlling factors that belong to the characteristics of enterprises.

Pham the Anh and Nguyen Duc Hung analyze the impact of business environment institutions and corporate management on the productivity and performance of Vietnam's enterprises in the period 2006-2012. Regression of panel data with fixed effects shows that any improvement in business environment can increase business results of enterprises. In which, labor training, legal quality and contract protection have the strongest influence. This finding is an affirmation of the need to implement policies related to improving the quality of the business environment to improve the productivity and performance of Vietnamese enterprises in the coming time.

Studies analyzing many factors affecting TFP

The studies mentioned above often focus on analyzing how a company's productivity is affected by one or a few factors. Although these studies have provided quite in-depth analyzes, they still have certain limitations. Productivity has many affecting factors, and these factors often interact and create synergies. Omitting other important factors that affect productivity will result in misleading estimates of the production functions and productivity. Several studies have addressed this issue by looking at multiple factors that affect productivity. A company can take many measures to drive TFP growth better by looking at a wide range of potential factors affecting TFP. Studies that analyze multiple factors affecting productivity often differ from the studies mentioned above in terms of estimation methods, samples adopted, and influencing factors included in the analysis.

Yao *et al*. (2007) considered factors affecting TFP including: firm size, company ownership, direct sales and human resources. To calculate the efficiency scores of companies, this study applied Data Envelopment Analysis (DEA). TFP growth was then measured by the Malmquist index, and the study used a Tobit regression model to estimate the effect of the determinants on TFP. The sample size is quite small, including 22 companies in the insurance industry in the period 1999-2004. Despite the small sample size, the empirical results show that firm size, direct sales, and human capital have a positive effect on firm productivity. However, contrary to what has been suggested by previous studies on ownership, state-owned companies show better performance than non-state owned ones. The authors argue that this is a result of the dominance of SOEs in the industry because these companies are supported by the Government, and by the characteristics of the industry itself, in which customers emphasize brand name, trust and reliability.

Li *et al*. (2010) examined the influence of institutional factors on firms' productivity: regional differences in commercialization and existence of market segmentation. They also consider factors that determine productivity such as: exports, R&D, interest payments, firm age, firm size, management level and company ownership. Furthermore, the study also analyzed the relationship between TFP, exports, finance and innovation. This study used a sample of 647,987 enterprises in 30 industries in the period 1999-2007. This data is taken from the National Bureau of Statistics of China.

(NBS), which includes medium and large companies with at least RMB 5 million in revenue. Although this sample seems to be representative of China's Industry, it is still better to consider small firms because the TFP's determinants of small firms will be added. In this study, TFP was estimated using the translog production function and semi-parametric approach of Levinsohn and Petrin (2003). The results show that companies based in regions with faster commercialization are more productive. On the other hand, companies based in more segmented regions tend to have lower productivity. Overall, the results indicate that regional imbalances and differences in commercialization and market segmentation have different effects on productivity.

Different from the above studies, Shen and Song (2013) only focus on iron and steel industry in the period 1998-2007. The factors affecting TFP in this study include capital intensity, share of total revenue

generated by new products, market share in the iron and steel industry, Herfindahl index of the industrial concentration level, firm size, market reform index, and export's share of total revenue. Although the sampling source was the same as previous studies, the size of this study was significantly smaller, with the number of firms ranging from 1,654 in 1998 to 4,929 in 2007. To estimate TFP, the authors used the one-step GMM Wooldridge (2009) method and tested the robustness of the results by using the methods of Olley and Pakes (1996), Levinsohn and Petrin (2003) and Ackerberg *et al*. (2007). The results show that TFP increases during the analyzed period and factors such as R&D investment, firm size, market share and market reform have a positive impact on TFP. On the other hand, TFP is negatively affected by market monopoly power and capital intensity. Furthermore, the factors affecting productivity are different among firms with different characteristics, such as differences in firm size, ownership, and location. It seems that, for small firms, market share positively affects productivity, while R&D affects productivity negatively. In contrast, for large SOEs, productivity is not affected by market share or R&D. For large private firms, productivity is affected by the level of exports, as measured by the share of exports in total revenue.

Vu Thi Thu Thu and Nguyen Thi Van Ha (2017) also analyzed groups of factors affecting the productivity of Vietnamese private enterprises. The first group of factors is a group of business characteristics, including factors such as geographical location, firm size, business field, technology level, business activities such as import and export activities, research and development activities (R&D). The second group of factors on human capital. These factors are divided into two groups: the group of characteristics of the enterprise's head (qualification, age) and the group of characteristics of the employees (qualification, education level, gender, etc). The author used the Ordinary Least Squares (OLS) method with the enterprise survey data set in 2011 to evaluate the above groups of factors affecting productivity of Vietnamese private enterprises. The results of estimation indicate that increase in labor size and labor quality positively affect labor productivity. Private enterprises can also improve labor productivity by engaging in import-export activities, research and development activities. In addition, factors such as business manager, geographical location and business line also have a significant impact on labor productivity differences between enterprises.

3. CONCLUSION

Within a firm, an increase in TFP generates a higher level of output based on a given level of input. Therefore, it allows a firm to achieve better economic performance by reducing unit costs. As a consequence, the firm becomes more competitive. This means that increased productivity leads to better firm performance. This paper has reviewed firm-level productivity studies which consider the effect of multiple determinants on TFP growth as well as focusing on only one determinant or a few determinants. TFP is determined jointly by a combination of factors rather than just one so these factors are likely to generate a different effect on productivity than when they are considered individually. For this reason, these studies that consider the effect of multiple determinants on TFP provide better insight into the potential determinants of productivity at the firm level.

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