An International Comparison of Korean Industries' Productivity and Competitiveness and New Directions for Industrial Policies

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1. Background and Purpose of Research

Internationalization has a significant bearing on the Korean economy, which, thus far, has achieved fast growth and development through export-driven strategies. The world's industries have seen a rapid expansion of the global value chain driven by the internationalization of technology and production as well as networking and ties between businesses, industries, and countries. Thus, the internationalization of trade has evolved beyond goods to encompass a diverse range of spheres. As evidenced by past examples, internationalization not only reveals powerful and efficient measures for the Korean economy to increase productivity levels and welfare benefits, but has yielded real-life results. Despite changes in the methods and channels through which internationalization takes place, the significance of internationalization and its implications on the Korean economy are growing.

If Korean industries are to continue succeeding in international

trade, it is necessary to identify and understand changes in the international environment and take aggressive countermeasures. Given rapid changes in the domestic and international economy and the evolution of the concepts and application of internationalization, Korean industries and businesses should develop industry-wide and company-specific strategies based on an understanding of the changing impact of globalization on productivity and competitiveness. In particular, Korea urgently needs to make Korean industries and businesses more productive and competitive. To do so, it is imperative for Korea to take full advantage of internationalization from an industrial policy perspective and respond to changes in the economic environments in both Korea and overseas.

Despite the importance of the relationship between internationalization and productivity and related changes, there is a relative lack of understanding in the following two aspects: a gap between internationalization and non-internationalization related to productivity distribution; and the causal relation between internationalization and productivity. The productivity gap suggests that the marginal effect of internationalization and non-internationalization varies according to productivity levels, and policy responses should be adjusted accordingly. The causal relation between internationalization and productivity implies certain endogenous errors of verifiable analysis. A few studies have looked into either one of the two issues using statistics available on Korean businesses, but little research has analyzed both factors simultaneously.

Utilizing micro-level data on Korean businesses, this study estimated productivity distribution by quartile to measure the impact of a company's internationalization. Based on the analyses' find-

ings, this study examined the industrial implications of export-oriented policies from and proposed measures for improvement.

The primary question that this study addresses is, "How is the marginal effect of internationalization on corporate productivity distributed after endogenous factors are controlled?" If the effects of internationalization differ by the quartile of productivity, then they present significant policy implications in regard to internationalization and productivity, and offer the opportunity to present policy-related solutions. In addition, from the perspective of company and industry dynamics, the productivity gap first appears between companies in a cohort, but less productive companies are left behind over time while more productive companies increase in productivity, leading to improved productivity in the overall economy. The role of internationalization of companies is seen to play a key role in this process. Accordingly, this study aims to examine the effects of internationalization from a dynamic perspective as well as its policy implications.

In the policy section, the study seeks to derive policy implications and gain insight for future policy directions by interpreting the results of policy analyses regarding the internationalization strategies of Korean companies, the exports of small to midsize entrepreneurs, and export-oriented policies. Exports have thus far comprised the base of internationalization strategies for Korean firms and have served as the foundational step toward internationalization. In addition, SMEs still have a critical role, as their presence in the export market remains marginal. For this purpose, this study examined the exports of SMEs and related policies to infer necessary policy shifts and identify ways to improve support

systems for increasing their exports.

2. Precedent Studies

The relationship between internationalization and productivity can be characterized by the impact of productivity on internationalization (the effect of self-selection) and the impact of internationalization on productivity (the learning effect of internationalization). The former reveals that companies with high productivity pursue internationalization on their own, while the latter reveals that companies achieve greater productivity through internationalization. Few theoretical and empirical analyses have been conducted regarding the impact of productivity on internationalization, both in Korea and overseas. Most of these analyses recognize the positive and significant effects of self-selection. In contrast, there are relatively few analyses on the impact of internationalization on productivity, and claims supporting the learning effects of internationalization have received limited recognition.

Of note, the impact of internationalization on productivity is potentially not unilateral but bilateral, and separating (controlling) the causal relation between the two is critical to analytical verification and extracting policy implications. Depending on the direction and scale of the causal relationship between internationalization and productivity, industrial policies should either alter their course completely to prioritize productivity over internationalization, or vice versa. If policy implications can be empirically demonstrated, they are expected to provide meaningful guidance for the Korean government in its wide-ranging implementation of policies to sup-

port internationalization (exports).

Meanwhile, most precedent studies tend to draw conclusions and policy implications by conducting an empirical analysis of internationalization and productivity at the "mean" level. This is a convenient and useful method of analysis. However, these studies overlooked the heterogeneity among individual companies in the dataset as well as significant differences among companies regarding their extent of internationalization and productivity levels. Consequently, companies that deviate from the mean are excluded from the analysis. More importantly, the effectiveness of policy support for internationalization is likely to differ according individual companies' productivity levels. Accordingly, it is necessary not to confine the scope of analysis to the mean but to analyze the whole of productivity distribution.

3. Analytical data and basic statistics

This study used the Survey of Business Activities published by Statistics Korea to analyze the impact of internationalization on productivity. The Corporate Activity Survey has been conducted since 2006 to understand changes in Korea's corporate management strategies and industrial framework. The study encompasses all Korean companies with 50 or more employees and all companies with a shareholders' equity of KRW 300 million or more. Given the scope of the data encompasses business operations, internationalization, diversification, and systematization, the survey provides suitable data for the study, which analyzes the relation between internationalization and productivity in each individual

company. The analysis covered the period of 2006-2012 and included all industries and the manufacturing sector.

An internationalized firm is defined as a company with an export value of greater than zero. Productivity is measured by three methods: labor productivity, which is the company's added value divided by the total number of employees; total factor productivity calculated by growth accounting; and 3) total factor productivity estimated by the Levinsohn and Petrin method (2003).

A comparison of internationalized companies and non-internationalized companies across industries shows that internationalized companies recorded higher figures than non-internationalized counterparts in 2012 in terms of sales revenue, intangible assets, tangible assets, shareholders' equity, and the debt-to-equity ratio. In contrast, non-internationalized companies recorded higher figures than internationalized counterparts in terms of the number of employees, labor costs per employee, and net profit. In the manufacturing sector, internationalized companies recorded higher figures than non-internationalized companies in terms of sales revenue, the number of employees, intangible assets, tangible assets, shareholders' equity, net margin, and labor costs per employee.

During the period of 2006-2012, the absolute number and relative market share of companies by firm size and industry declined among small companies with 50-99 employees but increased among midsize companies with 100-299 employees and large companies with 300 employees or more. In particular, the decline in the absolute number and relative market share of companies in the small-size segment was attributable to the contraction of companies specialized in the domestic market. In contrast, the expansion of

midsize to large companies was due to an increase in the number of internationalized companies. Compared to all other industries, the manufacturing sector saw a relatively fewer number of new entrants and internationalized firms in the small-size company segment, which reflects the weak representation of small companies employing 50 persons or fewer in Korean industries. When looking into the transition into or out of the export market by firm size, the transition into the export market by companies specialized in the domestic market started to slow in 2010 and remains sluggish.

A comparison of internationalized and non-internationalized companies in terms of productivity levels and productivity growth shows that companies specialized in the domestic market are more productive than internationalized companies in all industries, but the opposite is true for the manufacturing sector. In terms of productivity growth rate, internationalized companies outperformed non-internationalized companies both in all industries and the manufacturing sector.

The distribution of productivity, a focal point of this study, shows a concentration of companies on the right side of the mean, which is a right-skewed distribution with a long tail to the right of the mean. This right-skewed distribution is observable both for all industries and the manufacturing sector in terms of labor productivity and total factor productivity. Despite such similarities, the Kolmogorov-Smirnov test (KS-test) shows a statistically significant difference between productivity distributions of internationalized companies and those of non-internationalized companies. Accordingly, it can be conferred that the effect of internationalization and the effect of internationalization policies can appear in different

quartiles when it comes to productivity distribution.

4. Analytical Model and Analysis Results

(1) Analytical model

As highlighted earlier, this study focused on controlling endogenous factors between internationalization and productivity and estimating productivity distribution to analyze the effect of internationalization on productivity.

Theoretically, the occurrence of endogeneity between the two variables is attributable to various factors. In the case of internationalization and productivity, the key reason is a reverse causal relation in which the latter affects the former. Given this, this study applied a control function and the two-stage ordinary least-squares method, which are suitable for controlling the reverse causality. As aforementioned, the distribution of productivity (labor productivity, total factor productivity) is skewed to the right side. Accordingly, the linear regression estimate, which is based on mean values, may risk distorting the effect of internationalization on productivity, as estimates based on mean values are unlikely to represent the distribution of effects of internationalization on productivity. Given this, this study used a more suitable model, the quartile regression model, to estimate productivity distribution. The quartile regression model is an empirical method that divides firms into different quartiles of productivity distribution and estimates the impact of internationalization on productivity by quartile. Particularly, when the distribution of productivity, an object of the analysis, is asym-

metrical, the quartile regression model is useful to estimate the quartile marginal effect.

Aside from the quartile regression analysis, which reflected asymmetrical distribution, a mean regression analysis was conducted for comparative purposes. The impact of internationalization on productivity was analyzed through various analytical methods that control endogenous factors, such as panel analysis, propensity score matching, and dynamic panel analysis.

(2) Results of analysis

The analysis of all industries with a control function model and the two-stage ordinary least-squares method, which controlled endogenous factors between internationalization and productivity, found that a coefficient of an internationalization variable has a positive and statistically significant value, and that the a higher the productivity quartile results in a lower coefficient of the internationalization variable.

In the case of the control function model, the gap in total factor productivity between internationalized companies and non-internationalized companies is widest at 44 percent in the 20th quartile, followed by 37 percent in the 50th quartile and 18 percent in the 90th quartile. In the case of the two-stage ordinary least-squares method, the gap in total factor productivity between internationalized companies and non-internationalized companies is widest at 48 percent in the 20th quartile, followed by 37 percent in 50th quartile, and 12 percent in the 90th quartile. In other words, when endogeneity has been controlled, internationalized companies

yield higher productivity than non-internationalized companies in all quartiles, with the gap narrowing in the higher quartiles. That is, the positive effect of internationalization on productivity is not identical for all companies that seek to transition from the domestic market to the export market, but is greater for companies with a lower level of productivity. However, the result is only applicable to companies that have successfully achieved internationalization, and thus should not be used as grounds to gear public policy to prioritize companies with companies with low productivity levels (mostly small companies). Due to a self-selection process that was excluded by controlling endogeneity, companies with low productivity levels upon entering the export market are unlikely to achieve successful internationalization. As a result, internationalization policies are faced with a choice between two conflicting options: a high probability of success and productivity growth accompanied by successful internationalization.

The quartile regression analysis of the impact of internationalization on productivity by year shows similar results: the effect of internationalization was smaller in companies in the higher productivity quartile compared with those in the lower quartile. The gap in the effects of internationalization by quartile remains almost unchanged in terms of cross-sectional data. However, in terms of time-series data, internationalization effects in the same quartile vary by year. This indicates the existence of year-specific effects that simultaneously influence the effect of internationalization on productivity in all quartiles. Accordingly, internationalization support policies should be designed in a way that generates the most favorable effects to all internationalized companies, regardless of

productivity quartiles, taking into consideration year-specific effects.

In addition, the impact of internationalization on productivity was analyzed by the mean regression models as follows. According to the panel analysis, the propensity score matching method, and dynamic panel analysis, internationalized companies experienced a 2-9 percent greater impact of internationalization on productivity compared with non-internationalized companies. In contrast, according to the control function and two-stage ordinary least-squares method, internationalized companies experienced a 35 percent greater impact of internationalization on productivity compared with non-internationalized companies. The results of the analysis did not exhibit any qualitative change, even when the object of analysis changes from all industries to the manufacturing sector.

5. Direction for Export-Oriented Policies and Industrial Policies

(1) Internationalization of SMEs and export-oriented policies

In the past, Korea's policy measures to promote internationalization primarily included export-oriented policies, which provided direct and indirect support for companies to advance to the export market. From the early stages of its economic development, Korea recognized the importance of international trade and achieved great success by pursuing an externally oriented development strategy. Given its past experiences, it is very natural for the Kore-

an government to continue providing various forms of support to promote international trade. Regardless of the size of companies, the universal and general benefits brought by exports (benefits of trade) are valid even today, despite increased complexity in international trade environments. Thus, it is reasonable that the Korean government has maintained and expanded policies in a way that encourages more companies to enter the export market and generate greater profits. In particular, as the corporate structures of large corporations and SMEs have remained immobile since the 1997 Asian Currency Crisis, the Korean government has shifted its policy focus by increasing export support for SMEs at the expense of large corporations. As a result, governments at the central and local levels and various related organizations have expanded and diversified their export support systems for SMEs. The question is whether such support systems have achieved their original policy goals and how to efficiently develop policies in response to rapid changes in the economic and trade environments in Korea and overseas.

This study looked at Korea's export trends with a focus on SMEs. SME exporters account for a meager 2.6 percent of SMEs in Korea, trailing far behind advanced economies. In Germany, for instance, the figure stands at 11.3 percent. Large companies, which account for 0.8 percent of the total number of exporters in Korea, contribute to about 68 percent of Korea's total exports. In contrast, SMEs, which account for 75.8 percent of the total number of exporters, contribute to about 19 percent of Korea's exports, a percentage that has been declining since the 2008 global financial crisis. Furthermore, it does not help that 83.2 percent of SME ex-

porters are small companies with a respective export value of USD one million. In the export market, SMEs account for 31 percent and 26 percent of entries and exits from the export market, respectively, figures that reflect a high level of volatility. In addition, new businesses three years old or younger accounted for 45 percent of the total number of exporters but only 11 percent of total export value, making marginal contributions to the overall export industry. The first-year survival rate for new entrants stood at 50 percent, while the five-year survival rate declined to 35 percent. That is, about 50 percent of new SME exporters are forced out of the export market within a year, and 65 percent faced the same fate within the three years. However, once companies survive for more than three years, they can take root in the export market and have a high probability of becoming successfully internationalized companies.

Taking the conditions SME exporters into consideration, the Korean government and related organizations have pursued adjusted export-oriented policies and provided various forms of assistance to encourage as many domestic-oriented companies as possible to enter the export market. In 2013, the number of export promotion projects undertaken by the central and local governments and related organizations stood at 408, with a total budget of KRW 500 billion or more. Korea surpasses major economies in terms of export support per USD 1,000 GDP. However, despite governmental efforts, Korean SME exporters have low levels of global capacity and competitiveness. An empirical analysis of the impact of financial assistance under current export-oriented policies shows that government efforts contributed to expanding the scale of exports by SME exporters over the short term, but have marginal impact

on export growth and financial performance over the mid- to long-term. There are several problems with current export policies. For instance, financial support is centered on short-term performance, and the support system is loosely organized in a redundant and overlapping way without national, comprehensive, systematic strategies. In addition, the system does not assess the capabilities of potential exporters, conduct ex-post evaluations of policy support, or provide feedback afterwards. The current export-oriented policy system is criticized for inefficiency and a lack of improvement. As a result, export-oriented policies incur increasing social costs and fail to serve the purpose of realizing internationalization potential among SMEs.

(2) Policy implications

According to the analysis, if non-internationalized companies in the low productivity quartile seek internationalization, the success rate is low. Nevertheless, once these companies have made a successful transition to internationalization, they are likely to achieve relatively stronger productivity. When new entrants to the export market overcome the low survival rate and operate over a long term, they can record high export values, making significant contributions to the export market and delivering productivity increases. This indicates the need to tighten the policy process through which companies are evaluated and selected for their chance of survival in the export market based on growth potential, capability and productivity. In addition, once export support is granted through the assessment and selection process, it is desirable to pro-

vide support not over a short term but for more than a certain period to ensure the survival of exporters over a longer period. Given the effects of internationalization on productivity, policy support is needed to encourage as many SMEs as possible to look beyond the domestic market and become exporters. However, if they can survive only for a short term, it results in an increase in social expenses. Accordingly, it is imperative to place a greater focus on policies that help new entrants take root in the export market and achieve long-term growth.

The findings of the analysis have the following policy implications. First, policy support for the internationalization of businesses is essential to overcome restrictions inherent in the Korean economy and identify new growth drivers. Therefore, continuous policy efforts should be made to enhance the internationalization of firms. The fact that only 2.6 percent of SMEs are exporters indicates the potential of internationalization to realize social benefits by expanding the number of SME exporters. To do so, it is desirable to place the policy focus on improving and complementing current export-oriented policies. In particular, identifying SMEs with strong potential and encouraging them to join the export market is a precondition for successful internationalization. Given this, it is necessary to enhance the capability assessment of exporting companies eligible for policy support. This applies to both new entrants and incumbents in the export market. SMEs that display high productivity and strong capability before and after their entry to the export market are likely to survive and make key contributions to boosting overall productivity at the industrial and company -level by way of exports.

Second, it is necessary to extend the support period for selected companies and enhance ex-post management of follow-up support. It is difficult to make companies specialized in the domestic market transition smoothly into the export market, and it is even more challenging to make exporters operate successfully beyond a certain time period. It takes time for new entrants to take root in the export market, survive as an exporter and show reliable results. Policy support over a fixed time period should help new entrants in the export market overcome uncertainties in their transition to internationalized companies. Accordingly, it is necessary to consider extending policy support beyond the entry stage to include the post-entry period. However, it is desirable to set a sunset clause or a cap on policy support, so that time-bound policy commitments clearly indicate a specific policy direction and time horizon, and thus reduce the risk of an unnecessary waste of resources.

Third, the export support system should be streamlined, simplified and more flexible to increase efficiency. It is imperative to formulate a diverse range of policy support as rapid changes in the forms and methods of internationalization often create insurmountable hurdles for many companies, especially SMEs. However, the current export support system has a high risk of redundancy and waste due to duplicated efforts by several related organizations operating under similar systems. These systems should be consolidated to simplify, streamline and flexibly operate the export support system, and an oversight organization should be designated to manage and evaluate the overall implementation process. However, it is desirable to following the economies of scope by ensuring diversity in the objects of export support.

This study found that industrial policy for internationalization is set to mitigate information asymmetry and entry expenses – key factors considered by companies in their decision to enter the export market. The likelihood of achieving industrial policy objectives increases when potential participants in the economy can make decisions in a socially desirable way. Assuming the same is true for internationalization, a socially desirable internationalization can be defined as a process which encourages the self-selection of companies with success potential into the export market while discouraging companies with weak potential from going international. That is, it is important to design industry policies in a way that reduces information asymmetry and entry costs by providing information on the international market, competition and internationalization while enabling businesses to decide on internalization based on their own potential.

Meanwhile, aside from providing direct support for SMEs to become exporters, it is necessary to apply the export support system to indirect exports, which takes place through the supply of intermediary goods. In this regard, the value chains in Korea and overseas has a critical role to play. Given that SMEs face relatively high uncertainties and heavier fixed-cost burdens in their expansion to the global market, SEMs can contribute to exports by aligning their value chain with those of existing exporters (large corporations, midsize companies and other SMEs) or taking part in the global value chain, rather than pursuing direct internationalization or participation in the direct export market. Accordingly, it is necessary to consider ways to increase the benefits of exportation by expanding the scope of export support systems to include indirect exports.

There is a great need to reinterpret the global value chain from the perspective of internationalization, productivity and industrial policy, as the global value chain is critical to redefining the methods and benefits of internationalization. Under the global value chain, a company's productivity is affected not just by individual performance but also by the collective performance of all participants in the value chain. In other words, a company's productivity depends on which partners it works with and which value chain it takes part in. Apart from a company's direct participation in the export market, the contribution of its value add to export throughout the global value chain is increasingly important. Even if the export value is the same, the value added by exports significantly varies, making a different impact on the productivity of firms. Accordingly, it is necessary to consider industry policies which induce participation in the value chain in Korea and abroad.