
The Expansion of Global Value Chains and Industrial Policy Implications in Korea

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Chapter 1. Research Background and Aims

1. Necessity of Research

The recent trend in global industry has been a shift toward globalization of technology and production networks, and in particular the rapid expansion of global value chains (GVCs). Changes in the global economic environment as a result of GVC expansion and intensification have resulted in an increased tendency for company and industry performance and competitiveness to be determined by a company's position and role within that chain, rather than through trade between states as in the past. South Korea in particular is a case in which export-driven development strategies resulted in rapid economic and industry growth, and the role and importance of the external sector has grown over time. What position a company or industry occupies within a GVC may thus

be expected to become a crucial determinant of future economic and industry growth and development. It is therefore essential to increase understanding of the current status, characteristics, developments, and prospects of GVCs as a chief factor in changes to the global economic environment, and to establish measures for continued economic industry growth and development through industry policies linked to various sectors, including internal and external trade, investment, interindustry linkages, market structure, competition structure, entrepreneurship, and local economies.

GVC development has resulted in not only technology and production but also the policy environment becoming too complex for simple, uniform policy responses. The growing tendency for economic performance to be determined not solely by the individual efforts of stakeholders but by collective efforts throughout the domestic and overseas production process has resulted in increasing uncertainty over policy tools and targets and an inability to predict their effectiveness. Moreover, specialization of production factors and value chains in the production process has compounded the importance of interlinkages between these factors and among chains. As a result, the role of industry policy in reflecting structural changes in the production process and establishing and supporting efficient linkages between these areas is more important than ever before. The situation calls for an analysis of the various policy issues resulting from GVC expansion in terms of several industry policy aspects, as well as the proposal of effective policy alternatives.

2. Previous Research

The existing literature on GVCs consists broadly of 1) theoretically focused studies aimed at explaining GVC phenomena and 2) studies that use empirical analysis of industries with pronounced GVCs in order to identify various policy ideas.

Representative examples of the former include Gereffi et al. (2005), Costinot et al. (2011), Agostino et al. (2011), and OECD (2013), while examples of the latter include De Backer and Miroudot (2013), Miroudot et al. (2013), UNC-TAD (2013), OECD, WTO, and World Bank (2014), Farole and Winkler (2014), Baldwin and Yan (2014), and Kummritz (2015, 2016).

The above studies have reached the common conclusion that GVC phenomena have become widespread globally, and that countries, industries, and companies that participate in GVCs enjoy higher productivity and value-added than those that do not.

3. Research Scope and Methods

The focus of this report is on identifying changes in the global economic environment from a GVC perspective and establishing directions for an industry policy response. In particular, its goal is to examine GVC changes as a new opportunity for the South Korean economy and suggest avenues for industry policy in related areas.

As a reflection of the importance of and interest in GVCs, the number of studies on GVCs and understanding of their policy significance have grown significantly in the past few years. Relatively

few studies, however, have linked GVCs to industry policy. Despite its great importance, empirical studies of the results of company participation in GVCs—one of the most basic sources of data for policy determinations—have been almost entirely absent due to data constraints.

This study uses corporate data to compare companies that participate in GVCs and those that do not in terms of productivity (specifically labor productivity and total factor productivity). First, productivity is analyzed for both groups, and a comparative analysis is attempted for net effects of GVC participation on company performance. Next, productivity disparities between groups are measured over time, and a counterfactual empirical methodology is used to analyze the effect of changes in the distribution of companies participating in GVCs on the productivity distribution for all groups. GVC participation and its results are also measured according to company scale. Finally, the results of this analysis are used to identify industry policy implications. The discussion focuses in particular on the significance of GVCs for smaller businesses and possible policy approaches to increase these businesses' GVC participation and the resulting effects.

Chapter 2. Global Value Chains

1. Global Value Chains and Industry Policy

GVCs may be characterized as settings for division of labor in the modern sense, where production units share tasks according to their function and position within a complex vertical and horizon-

tal network of countries, industries, and companies.

From a GVC perspective, a company's function(s) and position, rather than its products, have assumed far greater importance than before as a factor determining its performance. At the same time, the emergence of GVCs is also changing perspectives on industry policy. Production processes have been continually fragmenting, and as globalized production linkages rapidly expand beyond national and industry borders, the targets and effectiveness of industry policy are likely to become less clear, and past methods of industry policy may lose effectiveness in terms of their targets and the means and approaches of their application.

If function and position within a GVC have a greater influence now on performance for companies and national economies, what avenues does this entail for industry policy, and what specific changes in policy approach are recommended? Answering these questions requires a new perspective from the one currently adopted in industry policy. If the spread and intensification of GVCs is steering changes in the global economic environment, the situation requests corporate strategies for GVC participation and industry policy alternatives to leverage GVCs for economic growth and industry development.

2. GVC Development

GVCs underwent steady expansion nearly everywhere in the world over the period from 1995 to 2011, with the exception of the global financial crisis years 2008 and 2009. From 2011 to recently, the trend has been one of slowdown or decline. As with the rest

of the world, South Korea's overall GVC participation showed a rapid trend of increase through 2011. The increase in the GVC participation index for the years 1995–2011 averaged 12.4% annually, which was lower than the 13.1% average for developing countries but relatively fast compared to the 8.0% for advanced economies. As of 2011, South Korea's total GVC participation rate was 62.1%, with forward and backward engagement rates of 20.5% and 41.6%, respectively. The reason for South Korea's high rate of GVC participation has to do with its far higher percentage of backward engagement (the percentage of overseas value-added contributing to domestic exports) than in other countries.

Even when the constraint of South Korea's need to import large amounts of raw materials is taken into account, the fact that its GVC backward engagement rate, or the percentage of overseas value-added in its imports, is so much higher than in other countries means that the contribution of value-added to exports by the intermediate goods sector handled by South Korean businesses in the overall GVC is relatively low. This in turn implies that the role of smaller businesses, which chiefly supply parts at the lower end of the GVC, is relatively minimal, a fact that holds great industry policy significance in terms of usage of GVCs and small businesses. In other words, it underscores the need for industry policy to increase the role of small businesses within GVCs.

Chapter 3. Analysis Data and Basic Conditions

As a basic measure to analyze the effects of GVC participation on company productivity (or lack thereof), analysis data were ex-

amined, along with data on the basic conditions in terms of major variables and the general conditions of domestic companies and companies participating in GVCs. Data used for the analysis came chiefly from Statistics Korea's Survey of Business Activities. This survey, which is performed for all business with 50 or more employees and capital of 300 billion won or more, serves as a leading example of micro statistics. The same survey also investigates general company conditions and various forms of economic activity by companies, including diversification, globalization, and systematization of corporate activities. Analysis focuses on all industries and manufacturing over the period from 2010 to 2014. GVC companies were defined in accordance with Baldwin and Yan (2014) as those with export and import values both greater than zero.

No major change was observed in the percentage of domestic businesses and businesses participating in GVCs out of all industry and manufacturing businesses between 2010 and 2014. Analysis for all industries according to company scale showed the highest percentage of companies to be domestic, while analysis for manufacturing according to company scale showed the highest percentage to be participating in GVCs. GVC participation was also found to be higher for large businesses than for small businesses both for all industries and for manufacturing.

For all industries and manufacturing alike, the percentage of companies with affiliates and a parent company increased for both GVC and domestic companies. At the same time, the number of overseas affiliates and the rate of increase in overseas affiliates for GVC companies were found to be greater than the number of domestic affiliates and the rate of increase in domestic affiliates for

domestic companies, indicating areas of difference between GVC and domestic companies.

Analysis of the number of affiliates and the rate of increase in affiliates for GVC and domestic companies according to company scale did not show any quantitative difference in findings from the analysis that did not distinguish company scale. At the same time, the number of affiliates and the rate of increase in affiliates were found to differ according to company scale. More specifically, large companies had more affiliates than small companies, and the difference in number of affiliates between GVC and domestic companies was found to be greater. A trend of continued increase in the percentage of companies contracting out duties was observed for both GVC and domestic companies, but the percentage of GVC companies contracting out work was found to be greater than the corresponding percentage of domestic companies. The chief duties contracted out included such relatively low value-added areas as production, transportation, security, and cleaning, while relatively higher value-added production processes such as design and research and development were contracted out less often.

Examination of basic conditions for productivity and major variables between GVC and domestic companies similarly showed the former to have higher labor and total factor productivity than the latter.

Disparities in labor productivity and total factor productivity between GVC and domestic companies were observed to decline steadily after 2010, which appeared to be attributable to a combination of a slowing in the increase in GVC company productivity from 2012 onward and a steady increase in domestic company

productivity. Analysis of productivity for GVC and domestic companies by company scale showed no qualitative difference in findings from analysis that did not distinguish scale. The productivity gap between large GVC and domestic companies, however, was found to be greater than that between small GVC and domestic companies.

Comparative analysis of the corporate performance of GVC and domestic companies according to major variables showed the performance of GVC companies to be stronger than that of domestic companies.

Chapter 4. Analysis of Productivity Effects for GVC Companies

To analyze productivity differences between GVC and domestic companies and reasons for the continued decrease in the productivity gap for the two groups between 2010 and 2013 in terms of overall industry, manufacturing, and company scale, a counterfactual productivity distribution model was used as per DiNardo et al. (1996).

First, propensity score matching (PSM) was used to analyze differences in productivity between GVC and domestic companies. The reason for this was the possibility of sampling bias due to the large probability of individual companies' GVC participation not being decided randomly, but determined by the respective company's capacities and productivity. The PSM approach is a quantitative analytic method that is capable of controlling for sample bias issues.

Findings from the analysis of labor and total factor productivity disparities between GVC and domestic companies for all industry and manufacturing may be summarized as follows. GVC companies had higher labor and total factor productivity than domestic companies, with respective levels ranging from 7.0% to 11.5% higher according to the model. Labor and total factor productivity were also found to be higher for GVC companies than for domestic companies for large and small businesses alike when analyzed according to company scale. The productivity gap between GVC and domestic companies was also found to be greater for large businesses than for small businesses. Examination of labor and total factor productivity trends for each group by year showed labor and total factor productivity disparities between GVC and domestic companies decreasing steadily through 2013 for all industries and manufacturing alike, before increasing once again in 2014.

Findings were not qualitatively different from the aforementioned analysis when the GVC and domestic company productivity gap was analyzed in terms of company scale. The productivity gap between GVC and domestic companies was also found to be more marked among large companies than among small ones.

Next, a counterfactual distribution model was used to analyze the reasons for the decreasing productivity gap between GVC and domestic companies. The findings showed the total factor productivity distribution increasing as the percentage of GVC companies among all industries and manufacturing declined. This is believed to be the result of a decline between 2010 and 2013 in the number of GVC companies with relatively low productivity, together with the rate of productivity increase for highly productive GVC compa-

nies being faster than for those with low productivity. To test the robustness of the counterfactual distribution model analysis findings, a variance decomposition sensitivity analysis was performed, and statistical significance was tested with replacement sampling. The sensitivity analysis showed that variance between GVC and domestic companies was decreasing, a situation that applied both between and within groups. The phenomenon was attributable to a slowdown in the productivity increase for GVC companies and a steep rise in productivity for domestic companies.

Next, statistical significance testing showed a marginal effect greater than zero for GVC companies in over 90% of cases. This indicates that the effect of changes in the percentage of GVC businesses had a statistically significant effect on the total factor productivity distribution.

Chapter 5. GVCs and Implications for Industry Policy

1. Chief Findings and Implications

This report used company data to analyze the productivity (labor and total factor) gap between GVC and non-GVC companies through the PSM approach, while classifying companies by scale in terms of GVC participation and its outcomes. To empirically infer dynamic benefits from GVC participation, the counterfactual distribution method was used to analyze effects of changes in GVC company distribution on the productivity distribution for all companies.

Industry policy implications of these findings are as follows.

First, GVC participation is associated with significantly higher company productivity. While the GVC approach has been expanding to become the dominant form across all stages of the production process, the other side of this is a strategic determination on companies' part to reap maximum positive effects from this participation in their own performance. In view of GVC-based network formation and ripple effects, this suggests a societal incentive to increase GVC participation in industry policy terms.

Second, categorization by company scale showed GVC participation to be associated with higher productivity for large and small businesses alike. In particular, GVC participation may be seen as a promising strategy for productivity improvement for smaller businesses whose actual productivity is lower than potential productivity due to visible and invisible cost constraints on international market involvement. An overall increase in small business productivity through GVC participation can be expected to contribute greatly to improving productivity not only for those companies, but for the South Korean economy and industry as a whole. This suggests a serious need to focus industry policy on enabling GVC participation by primary, secondary, tertiary, and lower businesses, which account for an overwhelming portion of the value chain. This in turn suggests a need for industry policy consideration of linkages between small businesses and GVCs.

Third, GVC participation has a significant influence on the productivity distribution for industry in general. Counterfactual productivity distribution analysis showed average total factor productivity to decrease and the distribution to increase for all businesses when the percentage of GVC companies went down. This holds

great significance not only in terms of firm dynamics but in industry policy terms, as it implies that an expansion in the competitive environment represented by GVCs confers different benefits to the economy in general from GVC participation by individual companies. This indicates that policy ideas for promoting GVCs domestically and internationally should be considered alongside support plans for GVC participation by individual businesses.

Fourth, the fact that productivity effects were found to be higher than calculated for all industries than when calculated for manufacturing alone suggests potential productivity improvements from GVC participation are greater for non-manufacturing businesses (services in particular). The nature of GVCs is such that low productivity in the service businesses that provide intermediate goods for manufacturing results in decreased export value-added creation for manufacturing. This raises the need to extend policy consideration to GVC participation by the service industry.

From the above analysis, the primary question that must be answered in industry policy, assuming GVC participation, is how companies should participate in GVCs. This raises the need to extend primary policy attention to whether and how companies participate. In terms of company scale, this indicates the importance of devising industry policy measures for GVC entry, and resulting productivity improvement, by less globalized small businesses than for large businesses that are comparatively more globalized. Moreover, because GVC participation encompasses both indirect exports and imports, this suggests a need to consider policy measures for small businesses, which are inherently less capable of clear and direct GVC participation.

2. Industry Policy Approaches in a GVC Environment

The GVC environment has resulted in a growing tendency for a sector-based (state or industry) international division of labor to be replaced with a task-based one. As GVCs develop, the ability to specialize in certain tasks and expand by exploiting that comparative advantage across a broad range of areas becomes an important factor determining company performance. Yet while 90% of South Korean materials and parts companies rely on domestic large corporations, small businesses in South Korea today severely lack the high value-added conversion capacities that they need to enter value chains directed by global businesses. This strongly implies that corporate strategies and policy support for GVC participation should be oriented chiefly toward improving the company capacities needed to enter GVCs. As value chains expand and intensify domestically and internationally, this greatly increases the opportunity for small businesses to take part in globalization—through indirect if not direct exporting—and increases the need for policies aimed at taking full advantage of this. While opportunities for indirect export participation and contribution may be increased indirectly through value chain linkages with existing exporting businesses, small businesses must individually pay comparatively larger fixed costs when they enter global markets and are more vulnerable to uncertainties related to market entry, suggesting that participation in established value chains may be a strategically safer choice. Consideration should therefore be extended to measures aimed at increasing exports for the economy and industry as a whole by including indirect value chain-based exports as a target

for small business support.

At the same time, industry policy measures should also be devised for the establishment of an overall environment conducive to GVC participation by small businesses. GVC competitiveness requires increased inputs of factors of production that are rigid and relatively confined to national borders, including human capital, technology, high-quality infrastructure, strong industry-academia linkages, implicit knowledge, and government capacities. Whether or not an unhindered supply of these factors exists becomes an important determinant of GVC expansion and company participation, and ultimately of productivity improvements for industry and the economy as a whole. A great number of factors—including the establishment of linkages between GVC leaders and small businesses, companies' financial soundness, production capabilities, standards and certifications, site availability, increased ICT application, improved innovation capabilities, improved business environments, improvement information infrastructure, availability of industry-based specialization factors, access to related knowledge and technology, and more general policy elements such as trade promotion, service liberalization, competition policy, investment openness, intellectual property right protections, dispute arbitration, and qualitative improvements in instructions—contribute to improving the GVC environment and should be the focus of deliberate industry policy efforts to promote the performance of companies linked together through the GVC framework.