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THE EFFECTS OF EXOGENOUS SHOCKS ON A PRODUCTION FRONTIER AND TECHNICAL EFFICIENCY IN KOREA

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This study investigates the effects of exogenous shocks from the HCI (Heavy Machinery and Chemical Industries) Drive Policies and the 1997 Asian financial crisis on a production frontier and technical efficiency level of the Non-HCI, HCI, and IT manufacturing in Korea from 1978 to 2001. The HCI Promotion Policy represents a strong market intervention under the GM (Governed Market) in the pre-1980 period, and the Asian financial crisis triggered another exogenous market intervention under the SM (Simulated Free Market) in the post-1980 period in Korea. Through a Full Frontier Production Function (FFPF) with a Gamma Distribution using maximum likelihood estimation method, it can be concluded that there have been significant reverberating effects of the HCI Drive Policy and the Asian financial crisis of 1997 with respect to the production frontier and level of technical efficiency of the rapidly growing core industries in the last few decades. Moreover, the technical efficiency level of the rapidly growing core industries targeted by the government at each economic developmental stage of Korea was higher than that of the industries not targeted, which proved that the winners of the government industrial policy gained static efficiency as well as dynamic efficiency in the last three decades.

In conclusion, the targeted industries led economic growth for each economic developmental stage of Korea, and efficient industry proved it to be highly competitive in the world market.

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Ⅰ. INTRODUCTION

This paper investigates the effects of exogenous shocks on the decision-making

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behavior of an individual production unit in the Korean manufacturing from 1978 to 2001. This study also delineates the extent that the exogenous shocks of HCI (Heavy Machinery and Chemical Industries) Drive Policies and the 1997 Asian financial crisis affected the production frontier and *technical efficiency* level of each establishment in the manufacturing sector.

The industrial policies to be reviewed are the pre-1980 "GM (Governed Market)" and the post-1980 "SM" (Simulated Free Market) on the basis of the role of the government. The overwhelmingly direct role of the government in the "Big-Push HCI policy" from 1973 to late 1979 was intended to foster the HCI for export promotion, which is characterized as a GM policy. The big business groups joined the HCI Projects due to a broad range of incentive schemes, including fiscal, monetary and trade-related advantages[1]. As a result, size distribution became substantially skewed towards LEs (Large Establishments) -- a ramification which eventually drew concern.

In contrast, in 1980 the government began implementing economy-wide structural adjustments by converting its role to a fine-tuning neutral supporter of the free market mechanism through SM policies. In essence the HCI Promotion Policy can be considered a major external economic disturbance in Korea's market-oriented economy.

Concerning the 1990's, the 1997 Asian financial crisis overwhelmingly pounded the Korean economy, causing another gigantic shock. The financial crisis occurred mainly due to indiscrete investment, triggering IMF supervision along with pervasive measures intended to adjust the structure of Korea's industries -- another strong exogenous market-disturbance shock. Although the strength and direction of the impact of the unanticipated financial crisis of 1997 were different from the anticipated HCI Drive Policy on production units, both the Asian financial crisis and the HCI Drive Policy were major disturbances to the essentially free-market economy. Therefore, the effects of the exogenous shocks on the *technical efficiency* of the industry groups are discussed based on the hypothesis that exogenous shocks to the economy affect the technical efficiency of individual establishment.

Caves and Barton (1990) focused on the interdependence between technical efficiency and productivity growth as well as comparative advantage in world markets. If an industry falls into a vicious cycle, its low efficiency engenders low productivity growth and further deterioration of the industry's international competitiveness and size. Nowadays, a nation's competitiveness gets more attention for its economy, and the analysis of estimated results by industry and also by industry groups becomes a core factor in determining national economic capability. Another contribution of this study is the use of micro-level

[1] The most powerful element in the new incentive regime was surely its financial policy, including credit rationing. According to J. Lee (1986), "credit rationing is an important form of market distortion and a probable determinant of technical efficiency in the Korean economy" (J. Lee(1986), p.86).

establishment data to analyze the production frontier and technical efficiency of the Non-HCI, the HCI, and the IT manufacturing of Korea inter-temporally from 1978 to 2001.

Section Ⅱ presents a brief literature survey, while Sections Ⅲ and Ⅳ describe the methodology and the data applied. The interpretations of the empirical results are presented in Section Ⅴ, and the concluding remarks are in Section Ⅵ.

Ⅱ. BRIEF LITERATURE SURVEY

As a part of the interpretation of rapid economic growth and outcomes of the industrial policies of Korea, several studies have dealt with the rate of productivity growth. Pilat (1995) measured and analyzed productivity levels in the Korean manufacturing at industry level and compared them with those in the US. He estimated productivity levels of the Korean manufacturing and those of the US manufacturing in 13 manufacturing sectors in 1967 and found that the *value added per person and value added per hour worked* in Korea were only 6 percent and 4.5 percent of the US level respectively; however, in 1987, *those two values* had risen to 26 percent and 18 percent of the US level respectively. He found that especially the leather, metals and machinery industries had reached high productivity levels, some even approaching the levels of the European manufacturing. He also emphasized that Korea's export-oriented trade policies had increased the size of the market, thereby allowing industries to achieve economies of scale, which reduced cost and improved productivity.

Apart from the discussions concerning productivity growth as a primary factor for economic growth, increased factor accumulation and efficiency are also the major determinants of economic growth (Pilat (1995)). Unfortunately, little effort has been invested in investigating the efficiency in utilization of factor inputs (*i.e.*, technical efficiency) as a determinant of economic growth in Korea.

Recently, Kim and Han (2001) concluded that productivity growth from 1980 to 1994 was driven mainly by technical progress and that changes in technical efficiency had a significant positive effect while allocated efficiency had a negative effect. On the other hand, Yoo (1991) discovered that the variations of technical efficiency from the SFPF (Stochastic Frontier Production Function) are highly sensitive to both the specification of the production function and the selection of the dependent variable in his study using "*1978 Manufacturing Census*" of Korea. Furthermore, he failed to show the validity and robustness of technical efficiency estimates in the SFPF with a composed error model.

Yoo (1991) also tested the stability of the technical efficiency of Korean manufacturing industries from 1978 to 1988 and concluded that the estimates of efficiency are not stable over time, because the estimates of efficiency depend partly upon the shape of the empirical distribution of regression residuals, and is therefore unable to reflect any movement of the production frontier over time. He concluded that efficiency measures that take into account both the distributional changes and the shifts of the production frontier over time increase the extent of stability of technical efficiency and thus are more applicable for use in a dynamic context.

Pai (1995) found that the extent of *economies of scale* in the HCI declined similarly to that of technical efficiency by a Full Frontier Production Function model with one sided gamma distribution using *1978 Census of Manufacturing Establishments of Korea and the 1989 Survey of Manufacturing Establishments* in Korea. The *economies of scale* and technical efficiency in most of the HCI have concurrently declined within a decade, from 1978 to 1989, which implies a positive relationship between the two. Moreover, the *economies of scale* in the HCI have declined slightly between 1978 and 1989, when the earlier trend in the size distribution of Korean manufacturing establishments toward LEs (Large Establishments) began to be reversed since 1976.[2]

Pai (2002) also found that the noticeable effects of strong government intervention of the HCI Drive Policy on the technical efficiency and production frontier of the "favored" in 1978 were higher than in 1989, and most of the HCI became less technically efficient in 1989 than in 1978, except two industries, *Industrial Chemicals* and *Steel and Iron*, which showed the opposite trend.

Pai (2003) showed that the LEs were more efficient than the SMEs (Small and Medium-sized Establishments) in the growing key industries within the last three decades in Korea, though the variation of technical efficiency for LEs was greater than that of SMEs by exogenous shocks. Furthermore, the LEs of the *Textiles & Wearing Apparel* industry in the 1960s and the 1970s, the LEs of the *Manufacture of Basic Chemicals* industry in the 1980s, the LEs of the *Motor Vehicles & Trailers Manufacturing* and the LEs of the *Ship-Building of Ships* industries until the latter half of the 1990s, and the LEs of the *Semiconductor and Other Components* industry until 2000 and 2001 maintained the highest technical efficiency levels.

In sum, the aforementioned studies proved that the winners of the government industrial policy gained *static efficiency* as well as even *dynamic efficiency* within the last three decades. Therefore, It can be concluded that the LEs of core industries led economic growth for each economic development stage of Korea and efficient industry proved it to be highly competitive in the world market as Caves and Barton(1990) noted.

Ⅲ. ESTIMATION OF PRODUCTION FRONTIER FUNCTION

Measuring technical efficiency has been one of the major objectives in the estimation of a frontier production function. The theoretical production function defines a functional relationship, which enables one to calculate the maximum

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[2] See Nugent(1996).

possible output from a given set of inputs. The "frontier" of the production function represents the uppermost limit to the range of possible production points of all observations in the sample. Hence, by definition, no point can exist above the production frontier; all production points must lie on or below the frontier of production.

Since Farrell (1957) formulated a measurement of production frontier and technical efficiency by introducing definitions of technical efficiency and price efficiency, numerous studies have been undertaken on the subject of specification and estimation of a frontier production function in relation to technical efficiency.

Aigner and Chu (1968), as a Parametric Full Frontier Production Function, specified a homogenous Cobb-Douglas production frontier while constraining residuals to be negative, *i.e.*, all observations lie on or beneath the frontier as suggested by Farrell's second approach,[3] but no distributional assumption is imposed on a disturbance term.

However, the more critical defect in these full frontier maximum likelihood estimators is that they have no identifiable statistical properties due to the lack of assumptions on the regresses or the disturbance; therefore neither standard errors nor statistical inferences has been derived based on them, even though the programming estimators are of maximum likelihood.

3.1 Stochastic Frontier Production Function (SFPF)

The stochastic frontier model has a composed error term, which can be characterized in two parts. A symmetric component, v, allows random variations of the frontier across firms and captures the effects of measurement error, misspecification of econometric model, usual white noise, and random exogenous shocks beyond the firm's control. The one-sided component, u, captures the overall effects of inefficiency.

$$
\begin{aligned}
y &= f(x)exp(v-u) \\
&= f(x)\,exp(\varepsilon), \qquad \varepsilon=(v-u)\,;u>0. \qquad (3.1)
\end{aligned}
$$

In the above econometric model, $f(x)exp(v)$ denotes the stochastic production frontier where v is some symmetric distribution to capture white noise, measurement error, and uncontrollable exogenous shocks which cause the placement of the deterministic kernel $f(x)$ to vary across firms. Thus, technical inefficiency relative to the stochastic production frontier is then caught by the one-sided error component, $exp(-u)$, $u \geq 0$. Although the stochastic frontier

[3] Farrell suggested a parametric convex hull of the observed input-output ratios with the Cobb-Douglas functional form in his second approach, but restricted to constant returns to scale.

model seems to be quite attractive, it has a few intrinsic defects.

First of all, the choice of assumptions on the distribution of u and v are imposed without a theoretical basis, *i.e.*, in quite an arbitrary way.

Second, it is not feasible to decompose the error term into u and v separately after estimating the deterministic kernel $f(x)$. Hence, it is not easy to extract technical inefficiency on a single firm basis. Jondrow et al. (1982) suggest a solution to decomposing an entire $(v-u)$ to v and u separately by the expected value of u conditional on $(v-u)$. He generates statistical formulas for the half-normal and exponential cases, which enable the technical efficiency of individual plants to be calculated.

Third, the technical inefficiency being estimated in this model includes input price inefficiency as well. However, as Caves and Barton (1990) noted, the lack of appropriate data on factor input prices and accruing input demand makes it difficult to extract the sole technical inefficiency from the total.

Fourth, in the SFPF approach, troublesome statistical errors are detected, such as "type I failure" or "type II failure."[4]

Caves and Barton (1990) also pointed out the sensitivity of SSPF to outliers.

3.2 Full Frontier Production Function (FFPF) with a Gamma Distribution

Forsund *et al.* (1980) noted that deterministic frontiers are consistent with economic theory and are the absolute frontier, which represents current technology, though they are often argued to be sensitive to outliers. In contrast with a half normal or an exponential distribution, gamma distribution has several strengths in its application to the estimation of the full frontier production model.[5]

Greene (1980) pointed out that OLS estimators are unbiased and consistent but generally not efficient when residuals are asymmetric. MLE (Maximum Likelihood Estimation) generally provides asymptotically efficient estimators since it utilizes all the information on the residuals. He also noted several theoretical strengths of gamma distribution in MLE.

First, the functional relationship between mean and variance, *i. e.*, μ and σ^2, assumed in a half normal and an exponential distribution seems to be unwarranted; however, the two free parameters, P and λ in the gamma distribution would eliminate the rigid functional relationship between μ and σ^2. Thus, it allows high flexibility in the shape of error distribution.

Second, the gamma distribution is originally asymmetric. Therefore, MLE of the parameters in the gamma distribution is more efficient than the least squares estimation and verifies that MLE for the full frontier using gamma density is distinguishably different from the parameter estimates obtained from OLS, MLE

[4] See Caves and Barton (1990), Yoo (1990), and Pai(1995).

[5] See Greene (1980) for more details.

for the stochastic frontier.

The concept of *absolute frontier* is constructed from the FFPF, since the estimation methods draw a maximum possible output frontier from the full set of observations[6] under the current technology with an assumption of a one-sided error distribution.[7]

Greene (1980) proves that the desirable asymptotic properties of maximum likelihood estimators such as *consistency, asymptotic efficiency*, and *asymptotic normal distribution* are to be recovered under some conditions for the density of ε, $f(\varepsilon)$ in (3.2).[8]

Let the production function be specified as

$$y_t = \alpha + \beta' x_t + \varepsilon_t, \quad t = 1, \ldots, T. \tag{3.2}$$

where y_t is output, x_t is vector of exogenous variables, ε_t is a random disturbance such as managerial inexperience, weather, inefficiencies, α and β are unknown parameters, and T is the size of sample.

In the above equation, ε denotes a random disturbance term which has a two-parameter gamma distribution such as

$$F(\varepsilon) = G(\lambda, P) = \frac{\lambda^P}{\Gamma(P)} \varepsilon^{P-1} exp(-\lambda\varepsilon), \ \varepsilon \geq 0, \lambda > 0, P > 2, \tag{3.3}$$

where the *mean* and *variance* of ε are $\mu = \frac{P}{\lambda}$ and $\mu^2 = \frac{P}{\lambda^2}$, respectively. The log likelihood function for the gamma density model is represented as:

$$\log L = TP \log \lambda - T \log \Gamma(P) + (P-1) \sum_t \log (\alpha + \beta' x_t - y_t) \\ - \lambda \sum_t (\alpha + \beta' x_t - y_t). \tag{3.4}$$

3.3 Measuring Technical Efficiency

The primary reason in estimating the production frontier function is to derive technical efficiency.

Let the production model formulated as

$$y = F(x) u, \qquad \text{where} \qquad 0 < u \leq 1, \tag{3.5}$$

[6] This means all possible observations collected after deleting improper data.

[7] See Forsund *et al.* (1979).

[8] See more details in Greene(1980).

where y is gross output, and x is an input bundle.

By log transformation of the above equation, we have $\log y = \log F(x) + \log u = \log F(x) - \varepsilon$, $\varepsilon \geq 0$. And the *technical efficiency* of each establishment (u) is converted from the corresponding *residual* (ε) as follows:

$$\log u = -\varepsilon \text{ and } \quad u = e^{-\varepsilon}. \tag{3.6}$$

As a result, the most efficient establishment must be $u = 1$ with the technical inefficiency term $\varepsilon = 0$.

Therefore, the ex-post observed production point of individual establishment should lie beneath the production frontier $F(x)$ where only *the best practice firm* exists.

The value of u for each establishment is converted in percentage term in the following Emprical Results section.

For the purpose of maintaining consistency and validating the resulting differences in the comparisons of estimated parameter values, the most common and flexible functional form is employed.

$$\begin{aligned} \ln(GO/N) = {} & \ln a + \beta_L \ln(N) + \beta_K \ln(K/N) + \beta_M \ln(M/N) \\ & + \beta_{LL} (\ln N)^2 + \beta_{KK} (\ln K/N)^2 + \beta_{MM} (\ln M/N)^2 \\ & + \beta_{LK} (\ln N)(\ln(K/N)) + \beta_{KM} (\ln K/N)(\ln(M/N)) \\ & + \beta_{ML} (\ln(K/N))(\ln N) - \varepsilon, \quad \varepsilon \geq 0, \end{aligned} \tag{3.7}$$

where GO = value of gross output in million won,
N = number of employees,
K = value of tangible fixed assets in million won,
M = value of production costs including the cost of raw materials, fuel, electricity and water, contract work and repair and maintenance costs in million won.

For an utmost "frontier" of the production function in terms of current technology, all residuals must be positive as assumed in the FFPF model, *i.e.*, the intercept should be shifted upward far enough until the minimum value of the residual is zero. Since the two free parameters in the gamma distribution, P and λ, are related to the residual term, ε, such that $E(\varepsilon) = P/\lambda$ and $V(\varepsilon) = P/\lambda^2$, P and λ will be obviously positive and P is greater than 2 in almost all applications. The *skewness coefficient*, represented by $2/\sqrt{P}$, is clearly positive in all FFPF models using the gamma distribution.

IV. DATA DESCRIPTION

The *1978 Census of Manufacturing Establishments of Korea* was used as the reference for the pre-1980 period, while the *1983* and *1988 Census of Manufacturing Establishments of Korea* and the *1992, 1996, 1999, 2000, and 2001 Survey of Manufacturing Establishments* were used as the reference for the post-1980 period to estimate the technical efficiency of establishments during each event.

In particular, the years 1992 and 1996 were selected for the pre-IMF supervision era and 1999, 2000 and 2001 were selected for the post-IMF supervision era as the reference points to detect trends in the technical efficiency of establishments by industry caused by industrial structural adjustments under the IMF supervision.

The main contribution of this study is the use of annual micro-level establishment data to analyze the technical efficiency of the Non-HCI, the HCI, and IT manufacturing industries inter-temporally.

V. EMPIRICAL RESULTS

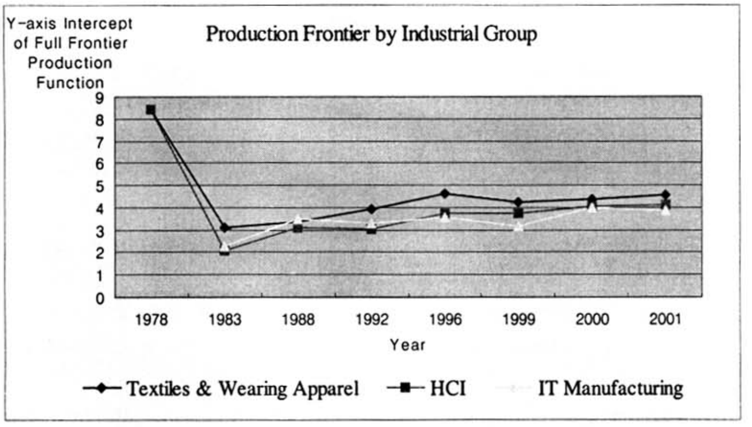
Figures 1 and 2 show the production frontier and technical efficiency trends of the three industrial groups of Textiles & Wearing Apparel (Non-HCI), HCI, and IT manufacturing in percentage terms. The production frontier and technical efficiency are estimated from the FFPF with a gamma distribution by individual industry and by year and then categorized into three industry groups: Textiles & Wearing Apparel (Non-HCI), HCI, and IT manufacturing.

Because the estimates of technical efficiency depend partly upon the shape of the empirical distribution of regression residuals, they are unable to reflect any movements of the production frontier over time. Therefore, if an industry production frontier was lifted concurrently with the increase of the technical efficiency then we can say *productivity growth* is attained (Caves and Barton (1990)).

The figures created from the estimation results clearly show the following facts, which are significantly based on one-tailed hypotheses tests at the 95% significance level.

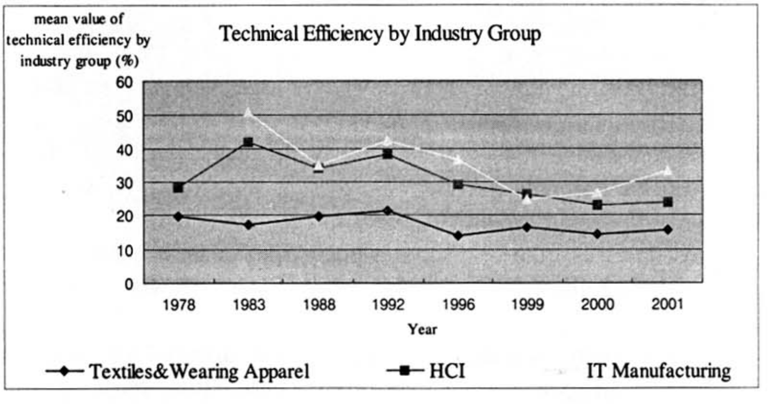
First, the production frontiers of *Textiles & Wearing Apparel* and HCI in 1978 under the GM policy were remarkably higher than those of *Textiles & Wearing Apparel* and HCI in 1983 under the SM policy. Concurrently, the HCI technical efficiency relatively improved due partly to a lower production frontier, whereas the *Textiles & Wearing Apparel* technical efficiency worsened. Together, this implies that the government's excessive market interventionist Big-Push HCI Promotion Policy along with the strong export-drive policy overextended the production frontiers of the HCI, but failed to improve the technical efficiency level.

[Figure 1]



Year	1978	1983	1988	1992	1996	1999	2000	2001
Textiles & Wearing Apparel	8.4296	3.1122	3.3787	3.9363	4.627	4.2655	4.3722	4.533
HCI	8.4492	2.0816.	3.0843	3.0187	3.7533	3.714	4.0307	4.1269
IT Manufacturing	-	2.2757	3.4796	3.3008	3.5477	3.1748	4.0183	3.8734

[Figure 2]



Year	1978	1983	1988	1992	1996	1999	2000	2001
Textiles & Wearing Apparel	19.78	17.215	19.61	21.205	14.11	16.355	14.41	15.76
HCI	28.45	41.975	34.158	38.346	29.343	26.213	22.858	23.923
IT Manufacturing	-	51.1	34.875	42.32	36.72	24.656	26.6	33.288

Interestingly, similar phenomena were captured in 1996 though to a lesser degree, just before the financial crisis of 1997, which displayed higher production frontiers with lower technical efficiency levels compared to those of 1992. In fact, there were huge investments in the HCI from the beginning of the 1990s until just before the financial crisis of 1997. Hence, another similarity between the two phenomena is that both epochs were the final stages of ongoing HCI capital accumulation. In other words, the best-practice firm, which maximizes production through optimal factor combination, can improve technical efficiency by lifting the production possibility curve. However, as Caves and Barton (1990) pointed out, over-investment of capital caused capital inefficiencies, so that when the additional production units failed to reach maximum production with given inputs, they dragged down the overall efficiency level of the industry. Therefore, the high growth rates of the HCI shall on the contrary give rise to low values of technical efficiency.[9]

Second, under the SM policy, *Textiles & Wearing Apparel* maintained the highest production frontier, except in 1988 when the IT manufacturing marked the highest. However, the IT manufacturing marked the greatest technical efficiency, the HCI second, and *Textiles & Wearing Apparel* the lowest among the three industrial categories in the all the eight separate years, except in 1999 when the HCI exceeded the IT manufacturing by a small margin.

Third, comparing the production frontiers of the HCI and that of the IT manufacturing, the production frontier of the IT manufacturing ranked higher in the years 1988 and 1992, but the opposite is true in the years 1996 and 1999. However, the production frontier of each industry group shifted up to converge to a common point in the year 2000.

Fourth, the HCI began to achieve Pack and Westphal (1986)'s *dynamic efficiency* from 1983, judging from the fact that the technical efficiency gap between the HCI and *Textiles & Wearing Apparel* has not closed and remains to this present day. However, the technical efficiency of the IT manufacturing has worsened since it was launched in 1983, partly due to being an unstable growing industry that is experiencing a continuous upward shift of its production frontier.[10]

Fifth, *Textiles & Wearing Apparel* accomplished Caves and Barton (1990)'s *productivity growth* in 1988 and 1992 by a simultaneous shift upward of both its production frontier and technical efficiency level.

The year 1999 may well be thought of as a harvest bearing some of the fruits from the industrial structural reforms triggered by the 1997 financial crisis. However, the downshifts of production frontiers accompanied by lower technical

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[9] Meeusen and Broeck (1977) noted that *the firms experience permanent shift of the frontier production function, at any moment have less opportunity to get to their frontier than stable firms.*

[10] See Meeusen and Broeck (1977) and Caves and Barton (1990).

efficiency in all the three industry categories imply that the industrial structural adjustments failed to improve technical efficiency.

Only in the year 2000 captured were two remarkable phenomena with shifts in the production frontier and technical efficiency The one was initiated with the lifting of the production frontier of all industry. groups that allowed them to converge to a certain point, which implies that the industrial structure adjustments accelerated M&A, eliminating those firms whose lack of competitiveness was holding back production frontiers. The other involved the worsening technical efficiency of *Textiles & Wearing Apparel* and the HCI. The performance of the IT manufacturing on the level of technical efficiency, however, improved.

Eventually, the IT manufacturing gained Caves and Barton (1990)'s *productivity growth* both in the years 2000 and 2001, and the technical efficiency of the Textiles & *Wearing Apparel* and the HCI began to improve in the year 2001.

Ⅵ. CONCLUSION

In sum, there have been significant reverberating effects of the HCI Drive Policy and the 1997 Asian financial crisis with respect to the production frontier and level of technical efficiency of the rapidly growing core industries in the last few decades. Moreover, the technical efficiency level of the rapidly growing core industries targeted by the government at each economic developmental stage of Korea was higher than that of the industries not targeted, which proved that the winners of the government industrial policy gained *static efficiency* as well as *dynamic efficiency* in the last three decades.

In conclusion, the targeted industries led economic growth for each economic developmental stage of Korea, and efficient industry proved it to be highly competitive on the world market.

APPENDIX

The industries selected are key industries that have driven the sustained economic growth of Korea, and were divided into three categories: HCI, Non-HCI, and IT Manufacturing.

Non-HCI (Heavy Machinery and Chemical industries)

KSIC 17 Textiles, Except Sewn Wearing Apparel
KSIC 181 Sewn Wearing Apparel, Except Fur Apparel

HCI (Heavy Machinery and Chemical industries)

KSIC 241 Manufacture of Basic Chemicals
KSIC 271 Manufacture of Basic Iron and Steel
KSIC 291 Manufacturing of General Purpose Machinery
KSIC 34 Motor Vehicles & Trailers Manufacturing
KSIC 343 Parts for Motor Vehicles and Engines Manufacturing
KSIC 3511 Building of Ships

IT (Information and Communication Technology) Manufacturing

KSIC 3001 Computers and Peripheral Equipment
KSIC 30013 I/O Units and Peripheral Equipment
KSIC 321 Semiconductor and Other Components
KSIC 32202 Communication Apparatuses
KSIC 323 Television and Radio Receivers

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