Is carbon neutrality feasible for Korean manufacturing firms?
- The CO_2 emissions performance of the Metafrontier Malmquist-Luenburger Index -

이형석(인하대학교 동아시아환경연구소)

1. 서론

Research background

For a feasible paradigm shift toward a carbon neutral economy, the participation and cooperation of private firms are highly important, such that balancing industrial competitiveness and environmental issues have become a significantly more difficult, but unavoidable challenge.

Motivation

Measuring and monitoring environmentally friendly performance in terms of “CO2 emissions productivity” is essential for the sustainable future of the Korean economy.

Research question

“How can the Korean manufacturing industry improve its CO_2 emissions performance?”

2. 본론

Methodology

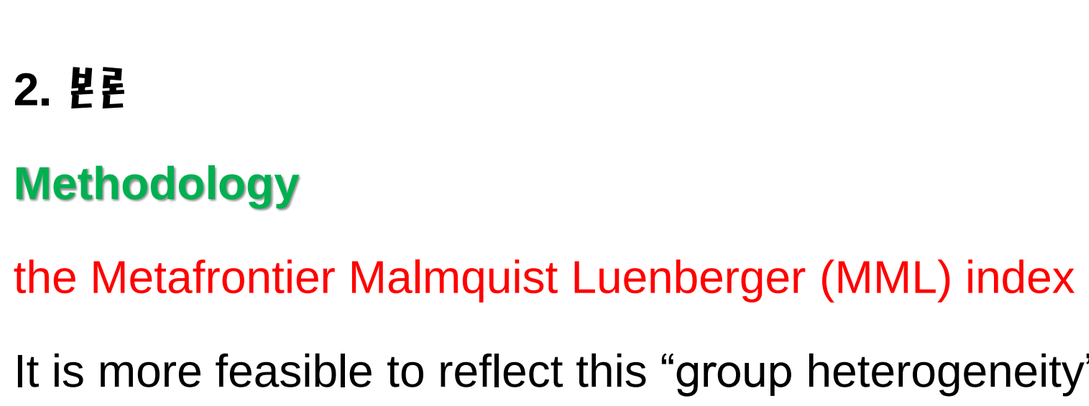
the Metafrontier Malmquist Luenberger (MML) index

It is more feasible to reflect this “group heterogeneity”.

Decomposition of MML =EC*BPC*TG

EC= Efficiency Change
BPC= Best Practice gap
TGC= Technological gap change

Data & Framework



Source: KOSIS (국가통계포털)

Empirical result

<Overall average MML trend : 2012 ~2017>

0.966→ 0.968→ 0.994→ 1.001→ 1.030

<Group Difference>

- The high technology: **1.020 (+2%).**

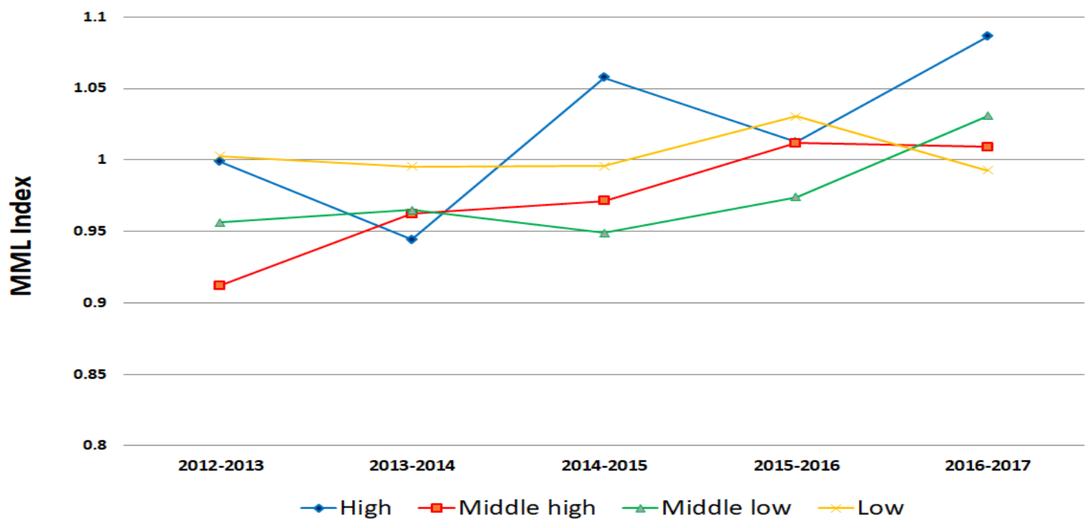
→“beneficiary industry” under the ETS

- The middle-high technology: **0.973 (−2.7%)**
- The middle-low technology: **0.975 (−2.5%)**

→heavy burden for CO_2 reduction.

- Low technology: **0.999 (-0.01%)**

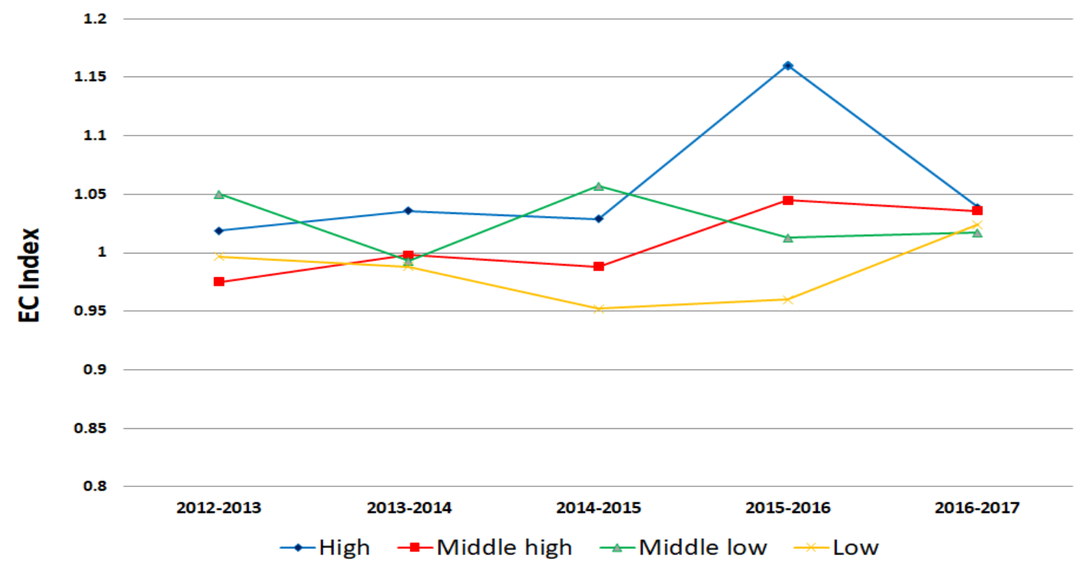
→ less motivation for CO_2 reduction.



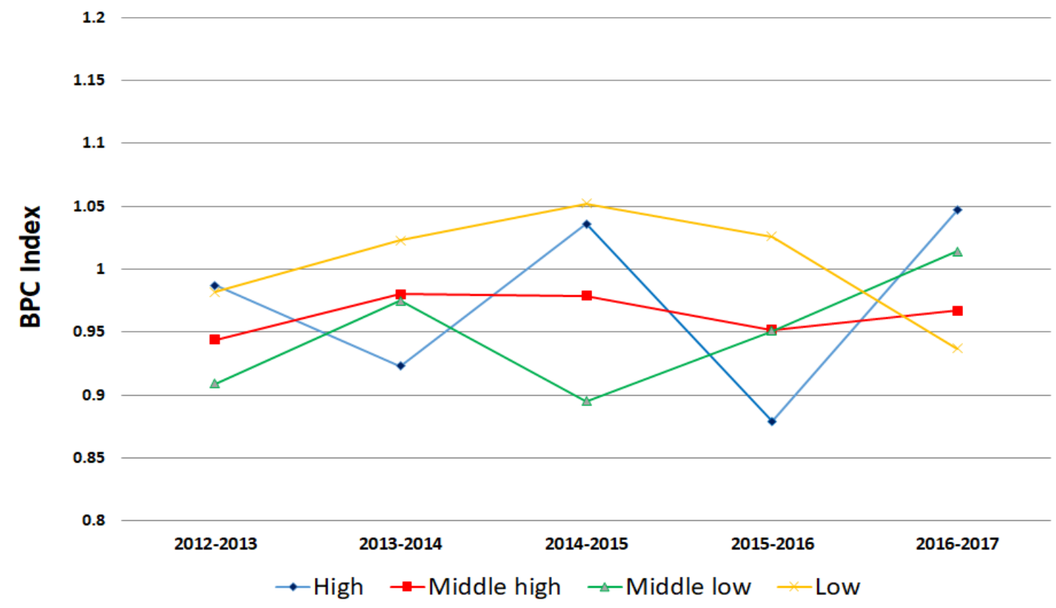
EC (1.9%) TGC (0.04 %) >>BPC (–2.7 %) >

“catching-up effect of the EC.” is the main driver

The government should encourage firms to enhance their efficiency by actively benchmarking against others or by making an effort to improve their own operations.



Negative average BPC index implies that all industries may have suffered from weak innovation due to the loose implementation of CO2 emissions regulations.



3. 결론

Research Contribution

First, aggregated industrial data were used to cover all firms in Korea.

Second, included a wide range of data across industrial sectors, resulting in the heterogeneity issue.

Limitations and Suggestion

First, owing to data scarcity, the study period was limited to only six years (2012–2017).

Second, non-parametric DEA approach does not offer statistical reliability, bootstrapping is recommended.

Third, comparison between covered and non-covered firms performance.