A Study of Policy Impacts on International Competitiveness for Renewable Energy Technologies

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Overview

With both greenhouse gas emission from fossil fuels and the exhaustion of natural resources, there are growing concerns about the renewable technologies in energy sector. Since renewable technologies are not only able to supply pollution-free energy but become a new growth engine for sustainable economic development, many countries are rushing to develop the renewable technologies. Despite of many countries' interests in renewable energy, there is still a relatively low percentage of generation form renewable energy in total electric generation. Under the circumstance, each countries have been attempting to develop renewable energy technologies and increase the renewable energy market. Therefore, governments come up with different kinds of policies to provoke the development in the renewable energy industry.

Energy and environmental policies have definitely direct and indirect influence on an international competitiveness for renewable technologies. For example, Feed-in-Tariff (FiT) policy and Renewable Portfolio Standard (RPS) policy focus on diffusion of renewable technology but they also influence on both cost reduction innovation and R&D investment. As a result, it could have indirect effect on competitiveness. In other aspect, those policies could form a new market for renewable technologies and it could directly help and improve competitiveness. Mads Greaker (2006) showed that emission quota have direct and indirect effect to the competitiveness and Valeria Costantini (2008) analysed the relation between environmental regulation and export of energy technologies. A great part of previous studies, however, have researched the policy effect on the competitiveness with few policies or regulations. Moreover, it is limited to show the effect of energy and environmental policies directly and indirectly to the international competitiveness for renewable energy industry.

Methods

The competitiveness of renewable technologies was modeled by gravity equation in which it interacts with innovations and environmental policies based on Valeria Costantini (2008). We assessed the influence of four renewable energy-related policies, i.e. FiT policy, RPS policy, equipment investment policy and environmental policy on each innovation stage. Furthermore, we identified the impact of combinations of policies on competitiveness because they make a different influence according to the property and the aim of policy.

For the empirical analysis, we measured export data for renewable energy technologies from UN Comtade(online database), R&D activity and knowledge stock using the patents from European Patent Office (EPO). The photovoltaic and wind power cost and was measured by both photovoltaic module price and system balance price and wind turbine module price. We analyzed interactions between policies and competitiveness and how to influence the competitiveness through Ordinary Least Square and Generalized Least Square method. Empirical analysis was performed with ten countries including Australia, Austria, Switzerland, Germany, United Kingdom, Italy, Japan, Korea, Netherlands and United States.

Results

From estimation result, we find that the different policies have different influences to the competitiveness. Moreoever, the result shows that there are direct and indirect effects of energy and environmental policies to the competitiveness.

Policies such as Feed-in-Tariff and Renewable Portfolio Standard have shown that it has more indirect impact. This is caused by those policies have affected R&D investment and innovation which are helpful for firms to export technologies. On the contrary, carbon tax have influenced the direct effect to the competitiveness. It is caused that tax gives cost effect directly.

Conclusions

In our research, we are able to verify interaction among energy and environmental policies to the competitiveness and identify the direct and indirect impact of the four renewable energy-related policy. It is significant that we are able to find more accurate and valid results making difference in impact of the policies on exports of renewable energy technologies. In photovoltaic industry, the appropriate technology-specific policies are better for its innovation. This tells us that both the suitable policies and their stringency must be differentiated according to the kind of renewable technology.

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References

Mads Greaker(2006), “Spillovers in the development of new pollution abatement technology: A new look at the Porter-hypothesis”, Journal of environmental Economics and Management, Vol. 52, pp. 411-420.

Valeria Costantini and Francesco Crespi(2006), “ Environmental regulation and the export dynamics of technologies” , Ecological Economoics, Vol. 66, pp. 447-460.