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RISK PREFERENCES REVEALED IN VOTE ON NUCLEAR POWER IN THE FINNISH PARLIAMENT – SOCIAL COSTS OF CARBON VS. RADIOACTIVE WASTE

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Overview

Risks related to high-profile environmental issues are lively debated, but the public has difficult time quantifying risks from sources such as global warming or nuclear power generation in part because a general consensus does not exist within scientific community. The Finnish parliament made an internationally recognized decision in July 2010 by voting in support of two new nuclear reactors proposed by the energy industry. The public debate preceding the vote focused on meeting the Finnish targets to cut greenhouse gas emissions, the possible employment effects of the new nuclear power plants and their influence on renewable energy investments, radioactive waste and safety issues. Yet, surprisingly little is known about risk perceptions related to energy production. Experience from the US shows that the social costs of nuclear-waste transport and storage plans may hinge on decision makers' or planners' ability to communicate these risks. The social costs of nuclear energy production - including management of spent fuel and waste disposal facilities - should be related to other social costs of energy production, e.g., the social costs of carbon emissions which are increasingly internalized in fuel prices, e.g., in form of energy taxes on or permit prices for carbon emissions.

Method

Public policy is impacted by public attitudes towards risks which in turn have an influence on the social costs of alternative technologies. We study how risk perceptions affect decision making under uncertainty, and what the implications are for measuring social welfare. For the analysis, a model on utility affected by two types of emissions - pollution in forms of carbon emissions and hazardous nuclear waste - is built up. The trade-offs in energy production regarding their environmental and social impacts can be identified, and the perceived social costs of nuclear energy production can be empirically estimated.

The members of the Finnish parliament were approached using a survey eliciting attitudes towards economic, environmental and safety risks of energy production. Survey items elicited explicitly the importance of subjective risks on preferences regarding radioactive waste and carbon emissions vis-à-vis their environmental and economic impacts. The impacts of risk preferences were evaluated to identify the most important factors affecting the social costs of nuclear energy production. Discrete choice random utility models were applied in the estimations. Finally, the preferences were taken into account in a model where trade-offs between two different types of emissions (nuclear waste and greenhouse gases) related to alternative energy production technologies in terms of environmental impacts and risks were considered.

Results

The social costs of alternative energy production technologies, social welfare and its measurement are affected by the heterogeneity in preferences, which explains the different views adopted in the political decision.

The survey elicited factors that the members of parliament (MEPs) regarded as the most important for their voting behavior. The self sufficiency in the energy production was chosen the most frequently followed by the other economic factors such as the competitiveness and employment issues. The climate change and greenhouse gases together with nuclear waste factors were chosen only by less than 20 % of respondents.

The respondents were also asked to evaluate different risk factors on a Likert scale running from low risk to high risk. Again the economic risks were evaluated as highly risky: over 70 % of respondents saw the weakening of competitiveness either quite high or high risk. Spent nuclear fuel divided the answers: a slightly higher share chose low or quite low risk, but there were also 40 % stating it to be quite high or high risk. Nuclear accident was clearly a low risk factor, about 75 % considering it low or quite low.

We also investigated the probability of MEPs to vote for the approval of new nuclear reactors. The economic risk factors, such as concerns about the competitiveness of the industry and/or an increase in the unemployment, increased the probability of voting for additional nuclear power. Regarding the spent nuclear fuel as a high risk factor decreased

the probability of voting in favor of the new reactors. Another, perhaps expected, result is that older members of the parliament vote for nuclear power more likely than the younger ones. Nuclear power seemed to be more attractive for men than for women, but the gender dummy variable did not support a statistically significant difference in voting behavior between men and women.

Based on the results of the statistical model on voting behavior, and using alternative estimates available on the social cost of carbon, we calculated an estimate on the social cost of nuclear waste.

Conclusions

The social cost of high-level radioactive waste can be related, on the one hand, to the private costs of management and final disposal of nuclear waste, and on the other, to the costs of other technologies than nuclear power that aim at abatement of carbon emissions. Policy makers should carefully compare these costs and encourage adoption of technologies that maximize the social welfare of citizens.

References

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