[FEED-IN-TARIFFS SCANDAL OF RENEWABLE GENERATION: MORAL HAZARD AND COST PADDING AUDIT]

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Overview

Climate change, calls for a worldwide trend to implement appropriate measures to reduce greenhouse gas (GHG) emissions, which has raised significant concerns among policymakers. Two commonly implemented policy instruments are cap-and-trade (C&T) schemes and policies promoting renewable energy (RE) technologies. While the former directly limits GHG emissions, the latter does so indirectly by providing financial incentives in the form of subsidies or guaranteed revenue for RE producers [1]. Example of financial incentive includes feed-in-tariffs (FITs), which are being enacted by numerous countries and states across the world.

Power market has typical regulated competitive characteristics with asymmetric information [2, 3]. One of the challenges what the countries face is to craft policies that are compatible with profit , and to encourage polluting industries to reduce emissions in a competitive market [4-6]. Since power is supplied by the public utilities [7], it is instructive to refer to corresponding regulations in power distribution [8]. Governments, grid, generation firms, and consumers constitute a power production chain, wherein the government acts as a regulator and grid and generation firms are regulated entities. Under this scheme, grid purchase power from generation firms and offer it to consumers. Regulator, the government, should make sure that price is reasonable. As an accounting convention, costs are reimbursed to firms by the regulator [8]. In addition, firms must be compensated through a net monetary transfer.

FITs scandal of renewable generation is a severe issue in many countries including China. Renewable generation firms are the agents who have the motivation of performing moral hazerd charging subsidies without generating any renewable power at all. That is, cost padding exists among agents. The regulator, government, is responsible for auditing it on behalf of the users and act as a principal in this incentive framework.

Methods

The custom consciousness holds that renewable generation cost depends totally on technology and effort, which is a polar case where accounting manipulations that transfer revenue to the firm or its managers are perfectly and costlessly monitored. However, there are many approaches to divert costs: subsidization of R&D with commercial purposes; advertising for corporate image charged to the project; transfer of funds among divisions with different cost-reimbursement rules, etc. Thus, the regulatory agencies' actions of cost padding are under surveillance, see Figure 1.

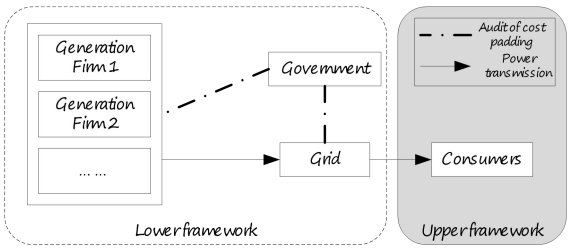

Figure 1: Model of regulated renewable generation feed-in-tariffs scandal

The model's lower level comprises two stakeholders, grid and generation firms, and its upper level contains customers. Mechanism design based on bi-level program is used for the approach of this research. In the lower framework, the regulator, who has a first-mover advantage, is assumed to be a Stackelberg leader and establishes a take-it-or-leave-it scheme. The firms characterized by individual rationality participate in the incentive scheme [9]. Besides, the regulator calibrates an incentive compatible constrain [10] for the agent to audit her cost padding. This is a moral hazard to overwhelm for the regulator under information asymmetries. In the upper framework, we persue the maximization of consumers surplus which is the difference between the consumers' willingness to pay and actual payment.

Results

Cases with moral hazard shows an apperent distortion on social welfare w.r.t. the benchmark. We verify that in the two-type case , the efficient type exerts the socially efficient level of cost-reducing effort (that which would result from a fixed-price contract) and the inefficient type exerts a suboptimal effort. Since the efficient type's marginal disutility of effort is equal to one, each dollar diverted through cost padding requires an extra effort, with monetary disutility equal to one; the efficient type thus does not engage in cost padding. In contrast, the inefficient type's marginal disutility of effort is lower than one, which may give it an incentive to engage in cost padding.

Conclusions

The ease of the behavior effect of moral hazard by means of cost padding audit is the purpose of this paper. Through theoretical analysis we get the following conclusions: first, moral hazard is exactly the cause of distortion of society commonwealth; second, more efficient firm types choose more powerful incentive schemes and engage in less cost padding at equilibrium and hence, feed-in-tariffs scandal of renewable generation is probably occurring on the lower efficiency firm types; third, a deterioration in the audit of cost padding makes it more difficult to extract rent and privileges incentives over rent extraction. Our findings are valuable for regulator to alleviate the impact of the moral hazard of cost padding and hence, improve supervision effect of feed-in-tariffs scandal of renewable generation.

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