

Incentives and Barriers for Energy Efficient Investment: Evidence from Japanese Firms*

○Naonari Yajima**, Toshi H. Arimura†† and Emiko Inoue‡‡

1. Introduction

The Paris Agreement claims that at least 40% of greenhouse gases (GHG) reduction with respect to base GHG of 2010 is necessary to reduce the risks of climate change. One of the important options to realize this goal is to incentivize private firms to invest in energy efficiency and initiate divestment of carbon-intensive production.

Despite the higher returns on energy efficient investment, such initiatives by the firms are limited, due to the problem of a market failure. Some literatures report that this market failure is due to the lack of information or mis-understandings of true benefits from the investment, known as “*Energy Efficiency Gap*” (Allcott and Greenstone 2012, DeCanio et al., 1998; 2000).

Under such circumstances, economic theories predict that a cost-effective way to solve the problem is to remove the cause of this market failure, i.e. providing information on the benefit from energy efficiency investment (Allcott and Greenstone 2012). Therefore, understanding the firm’s incentives and barriers to investment in the climate mitigation is important to achieve the global goal of GHG reduction.

In this paper, we try to investigate the role of the following two elements in the firm’s decision to adopt the climate mitigation strategy. The first element that we focus on is organizational structures of firms followed by Martin et al. (2012). Particularly, we focus on the existence of environmental department, and the relationships between environmental managers and top-level executives. The second one is the *Act on Rational Use of Energy*, which is a unique regulation to promote the energy management and conservation in Japan.

2. Econometric Strategy

We performed a regression analysis using a unique data set of Japanese firms from all sectors. We conducted the survey to collect information on environmental practices at 2010 and connected economic data from Teikoku Data Bank data. Moreover, we collected the information on the organizational structures from Toyo Keizai CSR data and environmental report published by each firm.

3. Results

Main estimation results are summarized in Table 1. Our findings are as follows. First, our results suggest that establishing an environmental department and implementing the *Act* promotes large

** Graduate School of Economics, Waseda University, Japan

†† Faculty of Political Science and Economics, Waseda University, Japan

‡‡ Faculty of Economics, Kyoto University, Japan

firms adopting the environmental practices. However, we find that these factors only influence relatively less costly decision such as energy efficiency investment. Second, we also investigated the impact of these factors on divestment in addition to the investment, and we find the executives can proceed such relatively more costly decision. Thirdly, we investigate the industrial heterogeneity of the impacts of both elements.

4. Conclusion

These results provide us some implications on how to proceed de-carbonization. First, an establishment of an environmental department and the *Act* can be effective for bridging the “*Energy Efficiency Gap*”. Some requirements under the *Act* such as making a plan and appointing an “energy management control officer”, and the department may solve a lack of information and miss-understanding of benefits of environmental practices. However, the department and the *Act* may not be enough to proceed divestment. Because they do not have sufficient power on promoting divestment. A reason may be a lack of authority. Second, joining a higher-ranking person into managerial team in charge of environmental policy is effective to solve such lack. On the other hand, the second result also indicates that the higher-ranking person does not always adopt less-costly decision. Hence, the environmental department and the *Act*, and executives have a complementary relationship.

Table 1 Main Results using the all sectors

	<i>Energy Saving Practices</i>				<i>Divestment</i>		
	<i>Investment on Energy Efficiency Improvement</i>	<i>Investment on the new facilities</i>	<i>Investment on the existing facilities</i>	<i>Development of new products</i>	<i>Design of products</i>	<i>Withdrawal from intensive business</i>	<i>Cancellation of new carbon intensive business</i>
<i>Department</i>	0.28 (0.25)	0.39** (0.20)	0.15 (0.20)	0.53*** (0.19)	0.54*** (0.19)	-0.31 (0.32)	-0.49 (0.36)
<i>Executives</i>	-0.56 (0.45)	0.44 (0.35)	-0.31 (0.38)	0.40 (0.36)	-0.17 (0.35)	1.42*** (0.49)	1.37*** (0.52)
<i>The_Act</i>	0.12 (0.21)	0.82*** (0.18)	1.06*** (0.17)	0.09 (0.17)	-0.18 (0.17)	-0.47* (0.27)	-0.33 (0.30)
N	536	516	531	530	524	478	433
LR test	0.00***	0.00***	0.00***	0.00***	0.00***	0.02**	0.15

Notes: Standard errors in parenthesis. Variables not shown includes natural-log of turnovers, sub-sector dummies, stakeholder dummies. * p< 0.10, ** p<0.05, *** p<0.01