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Voluntary agreements to encourage proactive firm action against climate change: an empirical study of industry associations' voluntary action plans in Japan

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ABSTRACT

From 1997 to 2012, 114 Japanese industry associations implemented voluntary action plans, which are not enforced by laws or regulations, to reduce carbon emissions. This paper investigates whether the establishment of these voluntary action plans by industry associations contributed to the adoption of a carbon emissions target at the firm level within the associations. Using a survey of approximately 1000 firms in Japan, this paper finds that small and medium-sized firms in sectors with voluntary action plans were 2–4 times more likely to establish their own carbon emissions targets than were firms belonging to industry associations without voluntary action plans. In contrast, the paper finds that voluntary action plans did not affect the establishment of emissions targets among firms with more than 3000 employees. This result is consistent with the survey responses, which found that periodic follow-ups under a voluntary action plan helped small firms to obtain important pieces of information and that industry associations played an important role in this process. In general, small firms have relatively large potential for energy saving, but the lack of information prevents its realization. The results confirm the importance of voluntary action plans in removing the information barriers of relatively small firms and encouraging them to implement carbon emissions targets.

1. Introduction

Facing the first Kyoto commitment period, Japanese industry associations established their own voluntary environmental action plans that entailed concrete CO_2 emissions targets (Keidanren, 1997). In this paper, the author uses voluntary action plans (VAPs, hereafter) to refer to these industry-wide plans in Japan. A VAP consists of various actions to mitigate climate change at the industry level. For example, the Japan Iron and Steel Federation listed possible technical improvements to estimate energy consumption reduction and set its own energy consumption target, which was a 10 percent reduction over 5 years from 2008 to 2012 compared to the 1990 level (Japan Iron and Steel Federation, 2012). Similarly, the Federation of Electric Power Companies set its emissions intensity target to 0.34 kg CO_2 per kWh and listed its strategies to achieve that target (Federation of Electric Power Companies of Japan, 2013).

It is not clear, however, whether these association-level VAPs influenced the environmental behaviors of each firm. Some argue that VAPs have played a central role in the Japanese national mitigation plan over time (Global Warming Prevention Headquarters, 2008), whereas other stakeholders are skeptical about their effectiveness (Kiko Network, 2007). The environmental effectiveness of VAPs has yet to be examined.

Ideally, the impacts of VAPs on CO_2 emissions should be analyzed to clarify their effectiveness. Firms' CO_2 emissions, however, are influenced by various factors, such as the firm's investment in production capacity, development of leaner production processes, and the prices of various fuels. The Japanese economy was affected by the Global Financial Crisis in 2008 as well as by the Great East Japan Earthquake (March 11, 2011) during the targeted period. Thus, it is difficult to identify the direct impact of VAPs on CO_2 emissions.

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Consequently, this paper follows an alternative approach suggested by Young (1999). Specifically, the author focuses on behavioral changes from which environmentally sound outcomes are expected by examining whether VAPs promote the establishment of CO_2 emissions targets by each firm. Japanese firms do not face mandatory emissions targets. Thus, the establishment of a voluntary emissions target is an essential first step for private firms to seriously engage in emission reduction activities.

The major contribution of this study is twofold. First, this study is the first quantitative ex post analysis of VAPs during the commitment period. Previous studies, such as Wakabayashi and Sugiyama (2007) or Sugino and Arimura (2011), examined VAP data before the commitment period from 2008 to 2012.

The second contribution is this study's examination of the impacts of VAPs on small and medium-sized enterprises (SMEs). Drawing upon a unique dataset available from the Ministry of Economy, Trade and Industry (METI), this study examines the effects of VAPs on the target setting of CO_2 emissions at the firm level. These data cover firms of various sizes, including SMEs. From a policy perspective, it is important to analyze SMEs because they are often exempt from environmental regulations.

This paper conducts a duration analysis that focuses on the timing of emissions target establishment. According to METI (2014), by 2012, industry associations that formulated VAPs covered approximately 80 percent of energy-origin CO_2 emissions from the industrial and energy conversion sectors. Unfortunately, this wide coverage makes it difficult to establish a comparison group; therefore, a duration approach is adopted.

The remainder of this paper is organized as follows. Section 2 provides a literature review of voluntary agreements (VAs) in general. Section 3 describes the history and features of Japanese VAPs. Section 4 presents the research methods. Section 5 presents the results. The author discusses the policy implications in Section 6 and the conclusions in Section 7.

2. Literature review

VAPs are a type of VA. According to Rezessy and Bertoldi (2011), VAs are “tailor-made negotiated covenants between the public authorities and individual firms or groups of firms, which include targets and timetables for action aimed at improving energy efficiency for reducing GHG emissions”.

VAs have been adopted in various countries in very different ways (Chittock and Hughey, 2010). Pinske and Kolk (2009) classify VAs into two categories: negotiated agreements and public voluntary programs. Negotiated agreements were widely applied in Europe as a part of broader policy mix during the 1990s (Krarup and Ramesohl, 2002). They were contracts between a group of firms and the government and were introduced to complement regulations, such as environmental taxes. The EU ETS was implemented and became mainstream EU climate policy after 2005, and VA programs lost importance in most western European countries. Nevertheless, some countries, such as the Netherlands, Belgium, and Sweden, continue to operate VA programs (see Abeelen et al. (2013) for the Dutch case, Cornelis (2014) for the Belgian case, and Stenqvist and Nilsson (2011) for the Swedish case). The main target of these programs shifted to encouraging energy efficient management in small firms and non-energy intensive industries, which are not covered by the EU ETS.

Public voluntary programs, in contrast, are implemented in countries such as the U.S. and Australia (see Mazurek (1999) and Miller et al. (2008) for the U.S. case and Gunningham (2004) for the Australian case). These are essentially fully voluntary programs, and each firm decides whether to participate. Therefore, many studies analyze the drivers of firm participation in this second group of VAs. For example, Arora and Cason (1995) indicate that large firms are more likely to enroll in these programs. In addition to similar results, DeCanio and Watkins (1998) show that financial performance influences firms' decisions. Henriques and Sadorsky (1996) find that customer or shareholder pressure, regulatory threats, and peer pressure all promote environmentally responsible corporate behavior. Nakamura et al. (2001) explore Japanese manufacturers' decisions to obtain ISO 14001 certification and find the same tendencies.

Previous studies have found mixed results regarding the environmental effectiveness of VAs. On the one hand, some researchers have found positive effects. For example, Khanna and Damon (1999) report that the 33/50 Program in the U.S. has a substantial impact by reducing toxic releases. Bjorner and Jansen (2002) find that voluntary agreements contribute significantly to reduced energy demand in Danish industries. Rietbergen et al. (2002) argue that long-term agreements on industrial energy efficiency in the Netherlands alter investment behavior and improve energy efficiency. Anton et al. (2004) report that the voluntary adoption of environmental management systems by U.S. firms results in reductions in toxic releases per unit sales. Similarly, Arimura et al. (2008) find that Japanese firms are able to reduce their environmental impact if they adopt ISO 14001.

On the other hand, other studies have found negative results. For example, Bohringer and Frondel (2007) report that actual environmental performance did not differ from business as usual in the German cement industry. Martin et al. (2011) argue that negotiated targets under the Climate Change Agreement in the UK were too generous to induce any energy efficiency improvement.

Broadly speaking, two types of econometric methods can be applied to evaluate the impact of VAs.[1] One type involves conducting difference in difference estimations at the micro level. Khanna and Damon (1999), Bjorner and Jansen (2002) and Anton et al. (2004) follow this approach. They evaluate public voluntary programs, where comparison between the treatment (VA program participants) and control (non-participants) groups is possible because participation in the programs is fully voluntary and is limited to part of the population.

Another type of method involves comparing observed and hypothetical outcomes in the absence of VA programs (see Horowitz, 2014). This approach is used to evaluate negotiated agreements, in which most major firms are involved and direct comparison with non-participants is difficult. Bohringer and Frondel (2007) follow this approach.

Some empirical studies suggest the importance of industry associations' involvement in environmental VAs. For example, Henriques and Sadorsky (2007) indicate that organizations that consider their voluntary agreement within an industry to be important are more likely to intensify their environmentally friendly activities. Similarly, Gusmerotti et al. (2012) show the importance of the sector associations' influence on facilities' environmental practice.

The number of studies examining VA involvement by SMEs has been small because of limited data availability. This scarcity is even more evident in Japanese VAP studies. Consequently, few studies have analyzed the link between the importance of an industry association and firm size. This study is the first to examine this link in the context of VAPs in Japan.

[1] There are other approaches to evaluating the impact of policies and programs, including VAs, in addition to these econometric methods. A bottom-up evaluation (an engineering approach) could be an alternative.