Policy learning and diffusion of Tokyo's metropolitan cap-and-trade: making a mandatory reduction of total CO_2 emissions work at local scales

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Abstract

The process of adopting policy ideas is extremely complex and requires a close examination of the political context in which the idea is learned, articulated, contested, adapted, and accepted by agents, both individual and collective. Why and how was the world's first urban scheme of mandatory reduction of total emissions adopted in Tokyo and not elsewhere? What might cause diffusion of this idea in other urban areas? One key explanation behind the idea adoption is a policy evolution of trial-and-error lessons about effective policy design, desirable policy goals and politically feasible judgments. This study finds that both agency effects and structural opportunities of policy adoption in the case of Tokyo's cap-and-trade are too specific to result in a more coherent diffusion of ideas, policies and practices in other urban areas. Although there is a sign of diffusion of Tokyo's cap-and-trade throughout Japan, it is more likely to derive from mimicking behaviors than from learning. The policy transfer of Tokyo's cap-and-trade requires the continuous learning of adaptive capacity to make it better fit to locally specific conditions.

Metropolitan regions generate the bulk of greenhouse gas (GHG) emissions as they are responsible for the consumption of the majority of the world's energy. Sub-national governments in these population centers are increasingly initiating action on climate change. In this article, the Tokyo Metropolitan cap-and-trade system will be used as a single case study. It is the world's first urban model of mandatory reduction of total CO_2 emissions, launched in April 2010 by the Tokyo Metropolitan Government (TMG). Experimentation at local scales presents a unique testing opportunity for both sub-national and national governments to achieve their climate policy goals.

Climate change mitigation, once provided, becomes a global public good. No country can be excluded from the consumption opportunities of mitigation benefits. But the effectiveness of mitigation depends on the aggregate effort of all countries, and equally important, it will inevitably need to adapt to local conditions for the implementation of mitigation measures. Specific policy tools can enhance the effectiveness of mitigation at local scales. Policy learning is one of the tools that are used to overcome impediments to policy-relevant decision-making. Learning, which may lead to policy diffusion, may be a key candidate for disentangling the mechanisms of local policy innovation. The process of adopting policy ideas raises the questions of why a specific policy idea is adopted in one place and not elsewhere and why some agents can be more responsive to the same idea than others.

This article will present a map of causal pathways and factors accounting for policy diffusion effects. It is a detailed case study that looks beneath the aggregate relationships of policy learning and diffusion to more qualitative evidence of governing bodies interacting at different phases of policy adoption within the urban scheme of mandatory reduction of total emissions. The causal mechanism of policy adoption will be described as sequences of events regarding the adoption of Tokyo's cap-and-trade. The focus of this study is on the whole causal process leading to a better process-oriented understanding of adopting policy ideas. Yet, to pinpoint complex diffusion patterns, it attempts to observe the process in a highly specific way by conceptualizing a diffusion mechanism of learning. It is the objective of this paper to disentangle the process of policy adoption by an agent, TMG, which constitutes the unit of analysis. The paper is structured to examine how the adoption of Tokyo's cap-and trade can be explained in terms of the lessons learned from their own past or from other places elsewhere.

Analytical frameworks of policy learning and diffusion

Learning in the policy literature can be analytically differentiated from mere copying or mimicking (DiMaggio and Powell 1991). Probably the most commonly assumed form of learning is 'lesson drawing' in reference to lessons drawn from previous experience (Rose 1991). Policy failure can thus lead to a reconsideration of the existing policy reasoning, subsequent to policy learning (May 1992; Lee and Strang 2006). The experience is taken into account as it provides useful lessons on the likely consequences of policy options. Rational or Bayesian learning assumes a linear relationship from information to decision making such that agents use new information to update their prior beliefs and adopt policy ideas with the highest expected utility (Meseguer 2003). Trial-and-error (Lindblom 1959; Wildavsky 1979) or bounded rationality (Strang and Meyer 1993; Weyland 2005) is an alternative basis of explanation for policy learning, while Covadona Meseguer (2006) argues that the two theories of bounded learning and rational learning are not necessarily incompatible or converging in their predictions of policy diffusion.

Others address an unwarranted tacit assumption that lesson drawing is a voluntary act by rational actors (Bulmer et al. 2007, 13). David Dolowitz and David Marsh (1996, 2000) suggest that lesson drawing is to encompass possible occurrences of both voluntary and coercive processes. Coercive forms do not always have to be non-rational. Lesson drawing may take place with negotiated or obligatory forms of "indirect coercion" lying in the middle of the voluntary-coercive continuum (Dolowitz and Marsh 1996, 347-9, Evans 2009, 245). Probably, lesson drawing cannot be entirely voluntary since it is also influenced by cultural values and social norms. It may occur when the policy culture facilitates a degree of

communication between policy elites. In other words, the role of learning is directed by the normative values of alternative choices embedded in the cultural structure within which the agent operates (Finnemore, 1996).

Karl Deutsch (1966) pioneered and emphasized the role of learning resulting from the flow of communications and feedback about policy impacts. The view of learning as a foundation for improving policy making was subsequently embraced and expanded by many others with the conceptualization of various forms of policy learning. The policy literature provides the foundation for different modalities of learning: (1) the broad level of learning about policy elites' beliefs, key policy objectives, or general policy direction, (2) the operational level of learning of regulatory/promotional instruments or implementation designs, and (3) the strategic level of learning to understand the political feasibility and its policy process.

Peter Hall (1993) defines what he calls 'social learning' as a conscious attempt to adjust both the macro objectives/beliefs and the micro instruments of policy in the light of policy experience and new information. Social learning is determined not merely by drawing on past experience but also heavily influenced by new ideas and broader societal conflicts and debates. Paul Sabatier's 'policy-oriented learning', however, is primarily concerned with the attainment or revision of a coalition's belief system (Sabatier 1987). In his view, learning can alter part of such a belief system but changes in policy elites' beliefs are often the result of non-conscious factors external to the make-up of a polity (Sabatier 1988, 134). In contrast, at the operational level of policy learning, cognitive/conscious factors that are internal to learning agents can be one of the key determinants of how policy is implemented. In a conventional sense, the study of policy learning assumes that agents are utility maximizers who are able to choose the optimal option to achieve their policy objectives while drawing on fully rational learning (Rose 1991). Kurt Weyland (2005), however, gives special importance to bounded rationality and cognitive factors in learning. Anne Schneider and Helen Ingram (1990), while emphasizing the use of 'learning tools' (formal evaluation, hearings, and institutional arrangements) to draw lessons from experience, acknowledge that agents may lack information and rely on cognitive heuristics in learning. Another important level of learning is about strategies for advocating policy ideas to increase the political feasibility of policy proposals. David Robertson (1991) finds that lesson drawing is a political learning in which agents manipulate the policy process. The advocacy coalition framework can be applied to explain agent behavior and policy outcomes in political conflicts over a long period of time (Sabatier 1988; Sabatier and Jenkins-Smith 1993). Embracing Sabatier's framework, Peter May (1992, 339) argues that learning agents can advance problems and ideas by learning how to enhance the political feasibility from lesson drawing. As an

analytical tool, the strategic level of learning is not concerned with a change in internalized policy beliefs, but rather strategic behavior to achieve policy goals.

Policy diffusion, which is facilitated by learning as a leading diffusion mechanism,[1] can be divided into two types: policy diffusion in a narrow sense and policy transfer. Policy transfer focuses on a limited, specific form of policy diffusion, which refers only to those cases caused by cognitive/conscious factors of learning agents. If it is the case that prior knowledge and its utilization are not independently responsible for policy adoption, then it cannot be said that policy transfer occurs (Bennett 1997, 215). Policy diffusion in a narrow sense includes cases where policy adoption is more the consequence of structural factors, such as similar modernizing and globalizing forces, without agents (Dolowitz and Marsh 1996, 334-335), while the involvement of agents increases the likelihood of diffusion (e.g., Mintrom 1997; Lee and Strang 2006). In a broader perspective, this subcategory of diffusion without agents, who are aware of prior knowledge, is seen as a way of explaining 'policy convergence' (Bennett 1991, Holzinger and Knill 2005), alongside the structural forces of globalization (Evans 2009, Stone 2004, 2010). All in all, from the viewpoint of structure-agency relationships, the diffusion literature emphasizes the importance of structural account for adopting policy ideas, while the transfer literature identifies the significance of agency-centered account for policy adaptation (Marsh and Sharman 2009).

The diffusion literature identifies a number of agent-involved patterns of adopting policy ideas. First, one of the key diffusion determinants is communication between policy elites who interact with each other in their networks (Savage 1985; Rogers 1995). They tend to adopt a policy idea when they interact with their counterparts who have already adopted the policy idea (Mintrom and Vergari 1998). Second, geographical proximity of neighboring polities is likely to encourage the diffusion of policy ideas. Policy diffusion tends to be clustered geographically as policy elites emulate their neighbors when faced with problems (Walker 1969; Berry and Berry 1999). Third, policy innovation 'front-runners' serve as point of reference for other policy elites, who do not wish to be among the latecomers, to catch up, favoring the diffusion of policy ideas (Berry and Berry 1999; Kern, Jörgens and Jänicke 2001). Dolowitz and Marsh (1996, 349) call it 'perceptual transfer' as agents have feelings of being left behind. Fourth, similarity in systems sharing much of the same cultural, economic and institutional features is another potential contribution to policy diffusion. Policy elites are likely to direct more attention to policy ideas that are adopted under cultural, economic and institutional conditions similar to their own.

When involved in policy diffusion, agents have different objects to be transferred. The primary focus of research interests was initially on material, utility-based objectives, such as

policy goals, structure and instruments between governments (Dolowitz 2003). Mark Evens and Jonathan Davies (1999) then distinguish between the 'soft' transfer of ideas, principles, symbols and attitudes and the 'hard' transfer of those material objectives. One might expect soft transfer to come before hard transfer as the latter requires an investigation of the founding role played by the soft transfer of discourse. In this context, Diane Stone (2004, 2010, 2012) seeks to address the role of ideational-based policy diffusion played by non-governmental actors in transnational networks – as complement to the government-centric hard transfer. Networks of experts (epistemic communities) are seen as knowledge-transfer agents who have control over knowledge production and thus guide policy learning (Dunlop 2009, Stone 2012, 488).

Yet, given such opportunities for policy ideas to spread, not all policy makers are equally sensitive to the same information (Berry and Berry 1999; Gilardi 2010). Some are more willing or capable to adopt policy ideas than others. Policy diffusion is thus not an inevitable process. Factors that are internal to agency, such as fiscal capacity, resourcing, prior beliefs, attentiveness to policy ideas, public demand, political leadership, and electoral/party politics, can be a more influential determinant of adopting policy ideas than the external opportunity structures (Walker 1969; Gray 1973; Savage 1985; Rogers 1995). The public policy literature produces a better understanding of how domestic factors affect the process of policy adoption from abroad while the diffusion literature in structuralists' international relations tends to ignore domestic circumstances (Marsh and Sharman 2009, 279). Global strategies and national mandates, which are internationally agreed by states concerned, need to lead climate mitigation. However, climate change impacts are manifested locally and the capacity of policy operation is largely determined by local conditions. It is therefore expected that the relationship of structural factors and agency effects is strongly interactive in the sense that global strategies and national mandates promote or constrain Tokyo' action yet Tokyo interprets these structures and adapts to local conditions.

The learning and diffusion of Tokyo's metropolitan cap-and-trade deserves a closer examination. First, because of cross-sectoral impacts of cost sharing, environmental problem solving normally involves multiple agencies and multi-level policy networks or the multiplicity of learning and diffusion processes associated with policy adoption (Evans and Davies 1999, Common 2001, Evans 2004). This allows us to map the spread of policy ideas that agents wish to promote or prevent through interaction in policy networks, conferences, and negotiations. Second, more than other policy areas, environmental policy is guided by scientific knowledge and technology. The transmission of policy ideas from networks of experts can be very intensive. The operational level of learning may reveal how experts' control over scientific knowledge guides policy makers' learning. Third, the politicization of

science and policy objectivity is inevitable since the core beliefs of environmental issues are deeply divided and even irreconcilable. It is well worth finding out how scientific knowledge is biased or compromised by the core beliefs of clashing coalitions, as well as examining how the core beliefs are constrained by the political feasibility.

I also engage with some of the issues that are addressed in the special issue on policy transfer of *Policy Studies*, Vol. 33, No. 6, November 2012. The paper presented here responds to Eugene McCann and Kevin Ward's critiques on the study of policy transfer: too much emphasis on the national scale and the rationality of policy adoption (McCann and Ward 2012). It argues that climate mitigation needs to be led by both global strategies and national mandates in an integrated way but policy adoption at local scales is manifested locally and adaptive capacity is determined by local conditions. Equally important, it suggests that the process of adopting policy ideas is learned, articulated, contested, adapted, and accepted by agents, both individual and collective, in an ongoing process, rather than involving a linear, rational progress.

From where are lessons drawn?

The Agency for Natural Resources and Energy, which is a branch of Japan's Ministry of Economy, Trade and Industry (METI, formerly Ministry of International Trade and Industry), has been instrumental in managing energy demand/supply. Not surprisingly, METI takes on the issue of climate change as a matter of industrial policy. Climate change presents a challenge for energy demand/supply policy to take GHG emissions constraints into consideration. The national Energy Efficiency Law, which is the basis of energy policy implementation for the national agency, was revised in 1998 to require business operators, with overall annual energy consumption of 3,000kl in crude oil equivalent or more, to periodically report their energy unit consumption, energy conservation measures and three-to-five year conservation plans (METI 2012, 44). According to this revision, when energy conservation activities were inadequate, measures, such as public disclosures and fines, would be applied to the underperforming business operator. Energy policy had thus been an exclusive jurisdiction at the national level. Yet the Bureau of Environment of TMG (BOE) directed attention to the mandatory national reporting scheme as a policy tool lesson, which triggered the 2000 introduction of the Enterprise Planning System for Mitigation Measures (a voluntary emissions reduction scheme with a mandatory reporting system) by TMG (2000). This program targeted business facilities with emissions of 1,500kl in crude oil equivalent or more, which were required to report a target, based on the average from the past consecutive three years' emissions, and plan to implement the required basic reduction measures set by

TMG. Under this scheme, it was also required for the targeted facilities to make their reports on reduction plans and the results available to the public. TMG publicly named the facilities that had failed to comply with disclosure obligations. In the operational process of this program, the targeted facilities were identified by utilizing existing surveys for the implementation of the national Energy Efficiency Law and conducting TMG's independent surveys (Toshiko Chiba 2010, pers.comm., 20 May).[2]

In essence, the process of adopting the TMG's mandatory reporting scheme is a redesign of the national policy instrument and constitutes evidence of instrumental learning. This is a case of the spillover of instrumental ideas from one policy domain, energy policy, to another, environmental policy. At the operation level of learning, conscious factors that are internal to TMG appear to be the key determinant of adopting the instrumental idea. BOE used learning tools, such as independent surveys and formal evaluation, to draw lessons from the national instrumental design. However, such lesson-drawing can be inadequate as instrumental ideas may be adopted without acknowledging the initial policy-making environment of a specific policy domain at a different level of government (May 1992, 333).

The latest addition to the Tokyo's climate policy package is a cap-and-trade scheme. The idea of a market-based cap-and-trade was originated in the 1980s in the United States to address acid rain caused by sulfur dioxide emissions. As the policy idea diffused from the US clean air scheme to global climate policy, the multi-national European Union Emissions Trading System was launched in 2005. In Tokyo, from 2001 and 2002, think tanks and academics acted as a transfer agent, shuttling knowledge about cap-and trade, and they were invited to work with BOE officials (Yuko Nishida 2011, pers.comm., 23 June).[3] BOE accepted the fundamental ideas of cap-and-trade, but as the transferred policy instruments had to be adapted to the urban scale there was little practical experience from around the world for BOE officials to draw on. As described below, the 'hard' transfer of policy instruments from overseas was limited, and domestic processes were soon shaping the detailed programs of Tokyo's cap-and-trade. In the following sections, I will trace the different phases of adopting policy ideas within the urban scheme of Tokyo's cap-and-trade, including an analysis of whether BOE was able to have an improved understanding of the instrumental redesign.

Why engage in policy transfer?

This section will explore the spread of Tokyo's mandatory reporting system to others and inquire into why and how instances of learning or copying occurred. Besides Tokyo's mandatory reporting system that was introduced in 2000, there are two other potential lessons

for learning to others: the 2005 revision of Tokyo's mandatory reporting system (TMG 2006) and the 2005 national mandatory GHG Accounting and Reporting system (which was part of the 2005 Act on the Promotion of Global Warming Countermeasures) (Japan e-Gov 2011). As described later, TMG failed to introduce a mandatory reduction of total CO_2 emissions in 2004. Instead, in March 2005, TMG strengthened the enforcement mechanism of Tokyo's mandatory reporting system; in the revised reporting system, the targeted business facilities were now advised by TMG guidelines, required to submit and announce a five-year GHG reduction plan, and this plan was evaluated, rated by TMG and announced on TMG website. The instrumental role of Tokyo's mandatory reporting system shifted from information management to regulatory measures. This experience provided a basis for the introduction of a mandatory reduction of total CO_2 emissions in Tokyo. On the other hand, in June 2005, the national government finally adopted a national mandatory reporting system for emissions reduction; however, in this system, the individual reports on business operators were disclosed only upon request and enforcement mechanisms, such as government advice, rating, evaluation, and public announcement, were not put in place. While it is worth examining if the adoption of this national mandatory reporting scheme was the outcome of policy convergence (since a number of OECD countries, including Australia, Britain, Canada, France, Israel, New Zealand, and the United States, had already put such reporting schemes in place or were considering introducing them), it is observed that TMG led the adoption of a mandatory reporting of emissions reduction and the national government eventually followed suit. But the policy instrument was not directly transferable to a national level of governance since national strategies occurred in the learning process of wider socio-political landscapes and technical practices.

As of October 2012, 30 out of 47 prefectures and 7 out of 20 designated municipalities (with populations of greater than a half million) were implementing some form of mandatory systems of emissions reporting. What was transferred? Learning implies an improved understanding, as reflected by a decision to produce more efficient and effective policy outcomes than the previous ones (Rose 1991). Along this line, I have used the existence of convincing enforcement mechanisms as an indicator for learning outcomes of Tokyo's mandatory reporting system at the same level of government. Aggregate patterns of diffusion over time (2000-2012) showed that a majority of those local governments copied rather than learned the experience of Tokyo's 2000 mandatory reporting system while introducing their mandatory reporting systems without adequate mechanisms to enforce them. There were only three localities (the city of Sapporo, the city of Nagoya, and Kagawa prefecture) that imposed obligations on targeted facilities to disclose both their emission reduction plans and the results. In 2005 as the national mandatory GHG Accounting and Reporting system introduced the national government's duty of disclosure, several local governments, such as Saitama,

Hyogo, Kyoto, Osaka, Nagano, Shizuoka prefectures, rather than business operators themselves, also began to disclose the plans and results of individual business facilities. However, no local governments adopted the instrumental ideas of formal evaluation, rating, and announcement as prescribed in Tokyo's 2005 mandatory reporting system. It is safe to say that most local authorities essentially wished to implement voluntary emissions reduction schemes with the mimicking behavior of mandatory reporting.[4]

The way of learning agents involved in adopting mitigation policy instruments seems to be heavily influenced by industrial structures and previous growth patterns on emissions in each locality. In 2006 the industrial sector in Tokyo was responsible for only 9 per cent of all CO_2 emissions (cf. Japan's average of 36 per cent), but the large-scale office buildings in the commercial sector, which represented only one per cent of all businesses in Tokyo, accounted for about 40 per cent of all CO_2 emissions (TMG 2010_a). These office buildings were targeted for Tokyo's mandatory reporting. In the same year, Chiba prefecture, whose industrial sector represented 65 per cent of all CO_2 emissions, had failed to introduce a mandatory reporting system, and Aichi prefecture, whose industrial sector accounted for 53 per cent of all CO_2 emissions, in 2003 adopted a mandatory reporting system but with no mechanism to enforce the targeted facilities to submit their reports (MOE 2012_a). In contrast, a few localities (the cities of Kyoto and Sapporo and the prefectures of Kyoto, Osaka and Saitama) that approximated the institutionalization of Tokyo's mandatory reporting enforcement tended to show a much lower share of industrial CO_2 emissions by sector (MOE 2012_a and MOE 2012_b). In 2006, 6 per cent of Sapporo city's CO_2 emissions and 18 per cent of Kyoto city's came from the industrial sector. The reasoning thus hypothesizes that the higher the share of the industrial sector to all CO_2 emissions, the less likely it is that learning agents adopt effective mitigation policy tools. Previous growth patterns on emissions also seem to be associated with the effectiveness of policy instruments. The front-runners of effective mandatory reporting can be found in the low growth environment of GHG emissions. GHG emissions in Tokyo increased by approximately 3 per cent from 1990 to 2006, those in Osaka prefecture showed negative 4 per cent and those in Saitama prefecture indicated positive 1.5 per cent during the same period. On the other hand, Fukushima prefecture, whose GHG emissions increased by 28 per cent form 1990 to 2006, had been unable to adopt its mandatory reporting system. Akita prefecture, which was equally a fast growing emitter with 13 per cent increase during the same period, eventually introduced its mandatory reporting system in 2011 but with only its right to counsel the targeted facilities that failed to submit their reports (MOE 2012_a). It is similarly hypothesized that the faster GHG emissions increase in previous years, the less likely it is that learning agents adopt effective mitigation policy tools.

How can learning alter policy elites' beliefs and objectives?

As the COP7 – Marrakesh Climate ended with an agreement on implementation details of the Kyoto accord in November 2001, a policy network of communication among BOE officials, local NGOs and academic researchers emerged through informal debates and study sessions. To take part in the new commitment which Japan internationally agreed to in Marrakesh, the 2002 Tokyo Metropolitan Environmental Master Plan made a clear target of Tokyo's 6 per cent GHG reduction by 2010 from the 1990 level, although the national reduction goals did not specify the statutory responsibility of local governments (Sugiyama and Takeuchi 2008). Those policy network experts shared the recognition that Tokyo's voluntary emissions reduction scheme with the mandatory reporting system alone could not achieve the goal in emission reduction. In February 2002, Governor Shintaro Ishihara launched 'Tokyo's Climate Change Strategy' at the opening speech of the first plenary session of the Metropolitan Assembly (TMA), prioritizing a mandatory reduction of CO_2 emissions from large-scale buildings in the industrial and commercial sectors and beginning deliberations on the possible establishment of Tokyo's ETS (TMA 2002). Tokyo's policy success to introduce a mandatory reduction scheme of diesel vehicle emissions in 1999 provided a convincing basis for learning by allowing BOE officials to trace the course of the events for success. BOE officials saw this specific lesson as a reference point. In this scheme, BOE worked with the metropolitan department of small-to-medium enterprises to create demand for particulate-matter removal devices (DPF) and promote a market-driven reduction mechanism with TMG's subsidies for the purchase of those devices (TMA 2002).

Learning, as part of the process of adopting the idea of mandatory reduction policy, entailed new understandings of general policy direction, involving a rethinking among the policy elites about the dominant view of voluntary reduction about fundamental aspect of mitigation policy. The change in their beliefs from voluntary to mandatory reduction appeared to be the direct result of non-conscious factors, especially those of internationally agreed commitments and national policies, external to the make-up of the Tokyo metropolitan polity. But these structural factors are not sufficient to account for the alteration of general policy direction. Cognitive/conscious factors that were internal to the learning agents are necessary to consider the result. The policy networks of BOE officials and other like-minded experts were characterized by consensual knowledge. Members of the networks used the formal evaluation of Tokyo's mitigation policy as a learning tool, and the necessity of mandatory reduction was communicated through the channels of informal debates and study sessions (Naomi Okamoto 2011 pers.comm., 23 June).[5] Equally important, Tokyo's initiative to control diesel vehicle emissions can be identified as the most influential lesson learned by BOE officials. This innovation convinced them to pursue a policy model of mandatory reduction (Keiji Endo

2011, pers.comm., 29 June).[6]

How is the process of learning related to policy success or failure?

Combating climate change is a political problem. In Japan, there is little evidence that the divide between the environmental and industrial advocacy coalitions at the national level will be resolved over climate change policy. In contrast, it appears that the Tokyo's cap-and-trade program has successfully gained the goodwill for cooperation from both citizens groups and business establishments. Tokyo's success in implementing the cap-and-trade program can be attributed largely to political learning about maneuvering and manipulating policy processes in order to advance the policy idea of mandatory reduction. In February 2002, as mentioned above, Governor Ishihara got a mandatory emissions reduction on the policymaking agenda. A handful of BOE officials informally worked with an environmental non-profit organization and came up with the idea of mandatory reduction of 'total' CO_2 emissions (Yuko Nishida 2011, pers.comm., 23 June). To this end, they proposed an absolute, aggregate cap on large-scale facilities that would be induced to trade excess reduction among themselves to achieve the overall reduction target (cap-and-trade). In November 2002, TMG officially announced its policy shift toward a mandatory reduction of total CO_2 emissions (TMG 2002).

In May 2003, the policy idea of cap-and-trade was referred to a sub-committee of the Tokyo Metropolitan Environmental Council, which consisted of 15 members – including only four members from the business sector (Tokyo Electric Power, Tokyo Gas, Toyota Motor, Association of Building Engineering and Equipment) (TMG 2003_a). Not surprisingly, BOE officials could not avoid a bitter split between the environmental coalition (academics, scientists, and citizens' groups) and the industrial advocacy coalition. The core beliefs of the environmental coalition, which was calling for mandatory emissions reduction, were based on Japan's moral responsibility as a big emitter, while those of the industrial advocacy coalition, which emphasized the economic rationale of voluntary measures, were concerned about economic welfare over environmental objectives. Both Toyota and Tokyo Electric Power strongly opposed to the proposals of mandatory reduction of total CO_2 emissions and the necessary provisions of penalties (TMG 2003_b). As TMG anticipated, neither of the coalitions was led to alter their core beliefs. Yet the Council Secretariat had initially maneuvered the sub-committee membership so that pro-cap-and-trade members occupied the majority of the seats at the sub-committee. It appeared that the expected sub-committee's report would be in favor of BOE's proposals for cap-and-trade. By the 6^{th} session of the sub-committee in November 2003, this momentum abruptly changed as business operators lobbied Headquarters of the Governor intensively to ensure they could retain their voluntary

measures (Yoshihiro Kageyama, pers.comm., 23 June; Masami Hasegawa 2011, pers.comm., 27 June).[7] In May 2004, the Council Secretariat submitted the final report, from which the phrases of mandatory reduction and penalties were uniformly missing, to Governor Ishihara. TMG subsequently dropped the institutionalization of cap-and-trade from its policymaking agenda list. Instead, as describe previously, it was moving toward regulatory measures by strengthening its mandatory reporting system in 2005.

In 2006 Tokyo's bid to become the host city for the summer Olympic Game in 2016 bought back the policy idea of cap-and-trade on its policymaking agenda (Aoki and Motoki 2007, 156-157). To win the rights to host the games, Governor Ishihara gave a top priority on the environment, with the formulation of strategy, 'Carbon-minus Olympics' (TMG 2010_b, 389-390). Tokyo's bid for the games brought different TMG departments together and led to the formation of interdepartmental consensus over stringent mitigation measures. In the following year, Governor Ishihara displayed his political commitment to addressing climate change issues, allocating US$ 600 million to 'Global Warming Countermeasures Fund' for the next ten years. Unlike other local authorities, TMG had a great deal of freedom for budgetary choice, which allowed it to create such a fund. The governor had sufficient financial resources and political opportunities of Tokyo's bid for the games to be exploited by political leadership. The metropolitan administration was ready to commit itself to progressive policymaking since there was no likelihood of changing to a new governor in near future.

In June 2007, TMG officially created a cap-and-trade policy agenda again (TMG 2007_b). By this time, BOE officials had attempted to advance the idea of adopting a cap-and–trade scheme by learning the political feasibility from lesson drawing. They were not so much concerned with a change in the policy beliefs of business operators, but rather promoting strategic behavior to achieve the policy goals of mandatory reduction of total CO_2 missions. From 2007 to 2008, MTG held three administration-led 'stakeholders' meetings and 28 public meetings with business establishments. TMG and Japan Business Federation failed to reach a mutually satisfying resolution but Tokyo Chamber of Commerce came to fully support a cap-and-trade scheme at the end of the consultation process (TMG 2012). In June 2008, members of the Metropolitan Assembly who relied heavily on support from small-medium businesses (representing over 99 per cent of business enterprise in Tokyo) for their electoral success unanimously passed a cap-and-trade program by revising the existing Environmental Conservation Ordinance.

BOE officials judged the probability of successful cap-and-trade enactment and assessed opportunity costs associated with advancing this proposal. The cap did not apply to small and medium-sized business facilities, yet through their offset-credit approach these facilities were

allowed to create credits, known as offsets, through energy-saving measures, and then the large-scale facilities under the cap were allowed to purchase such credits to meet their obligations. Governor Ishihara introduced the Environmental Collateralized Bond Obligation (CBO) Program, in order to provide smaller businesses with a means of raising funds to achieve CO_2 reductions (TMG 2007_a, 8). TMG was thus able to convince Tokyo Chamber of Commerce of the viability of the implementation designs. In other words, political learning led to instrumental learning. Another political strategy significantly undermined policy objectives, in order to increase the political feasibility of cap-and-trade proposals. No facilities owned by the steel and petroleum industries, which fell under the category of the targeted facilities under the cap, happened to be located in Tokyo. Equally important, electric power plants (energy supply-side regulations), while being required to submit their plans and results of emissions reduction and renewable energy development, were exempted from the cap-and-trade system. TMG was able to limit instances of direct confrontation with those most powerful lobbying groups. Although their policy rationale was well documented and prepared with convincing data, BOE officials were obviously unwilling to challenge the core beliefs of the industrial coalition. These policy elites were aware of relationship between their past failed strategy and its impact on the prospect of cap-and-trade (Toshiko Chiba 2010, pers.comm., 20 May).

Evidence indicates that resource and leadership similarities might facilitate the learning of similar cap-and-trade at local scales elsewhere but they were not sufficient preconditions to facilitate political learning. The structural factors - especially those relating to geographic location – seemed to have provided TMG with another political opportunity to push its mandatory reduction of total CO_2 emissions through the policy processes. The unique location of Tokyo persuaded many big business operators to reluctantly concede the mandatory reduction (Keiji Okamoto 2011, pers.comm., 17 June; Takeshi Imada 2011, pers.comm., 4 July).[8] Tokyo is the city with the highest concentration rate of corporate headquarters (more 50 per cent of enterprises having more than 3000 employees) and hosts the national government's functions. This does not necessarily make the city significantly different from the counterparts in other countries, but the structure of national bureaucracy does make a significant difference. Japan's regulatory agencies distinctively practice informal/administrative regulations rather than market-based regulations, although pushing it toward a market-driven regulatory system since the early 1990s. Proximity to the national bureaucracy becomes crucial in running their business operations. The business value of information obtained through face-to-face contact with the national bureaucracy encourages the concentration of headquarters in Tokyo to overcome bureaucratic hurdles. The comparative advantages of business operation in Tokyo are likely to outweigh the costs associated with mandatory emissions reduction. It is thus less likely that the introduction of

Tokyo's cap-and-trade system would induce large-scale business operators to move out of Tokyo to situate their headquarters elsewhere within the nation. The concentration of corporate headquarters then allows Tokyo's cap-and-trade system to prioritize CO_2 emissions reduction from large-scale buildings that account for 40 per cent of all CO_2 emissions in Tokyo.

Findings

GHG emissions are the consequence of human actions or organizational processes that take place in a given space. Climate mitigation may be led by national mandates, but the causes of this global issue are locally specific in character and its implementation needs to be locally specific to meet local conditions. In the absence of national policy, for example, this necessity has led to the creation of some pioneering programs of sub-national ETSs, such as Regional Greenhouse Gas Initiative (RGGI) in Northeastern United States, Greenhouse Gas Reduction Scheme (GGRS) in Australia's New South Wales, Regional Clean Air Initiatives Market (RECLAIM) in Los Angeles, and Emissions Reduction Market System (ERMS) in Chicago that are all functioning at a sub-national level. These cases have increased the potential ability of local authorities to learn lessons drawn from previous experience about mitigation at sub-national scales (Cash and Moser 2000). Metropolitan areas are responsible not only for the bulk of national economic output but also the costs of high carbon-intensities. They are particularly vulnerable to the urban-specific impacts of climate change and thus need to take these impacts into consideration for climate change mitigation (Corburn 2009; Hallegatte et al. 2008). Such consideration is yet to be given to mitigation experiments at city-scales, such as Tokyo's cap-and-trade program.

Vertical diffusion

It took many years to establish Tokyo's cap-and-trade grogam. TMG began to curtail Tokyo's CO_2 emissions in 2000 by seeking to innovate its own voluntary emissions reduction scheme with a mandatory reporting system. Once Governor Ishihara got the issue of mandatory reduction on the TMG policy-making agenda in 2002, the 'soft' transfer of a market-based cap-and-trade solution had been the initial driver of Tokyo's climate policy at an early stage. The adoption of this basic idea from overseas bypassed the exclusive jurisdiction of the national government without, however, directly challenging the existing inter-governmental relations. The detailed instruments of Tokyo's climate policy package involved multiple policy cycles in interactive domestic-level processes while diffusing upwards or downwards between national and sub-national governments.

The institutional approach to national-local coordination on climate change policy that is

commonly used in most countries is a top-down model (or a hierarchically ordered system of direct/indirect coercion) where national governments require sub-national authorities to work within nationally defined frameworks as well as assist sub-national authorities to develop their capacity to take action on their own. But not all national governments have made such a strong commitment to climate action. In the absence of strong national policy, as seen in the case of Tokyo's cap-and-trade initiative, some sub-national authorities are capable enough to independently act to address climate change by lesson drawing. If local action one-sidedly enhances policy diffusion to higher levels of government, this can be seen as a bottom-up model (a decentralized form of learning or copying). The case in point is that Japanese local governments initially led the adoption of policy innovations against industrial pollution and the policy laggard, national government, followed suit. The case study of Tokyo's cap-and-trade, however, has found that a third model, that of interactive/mutual learning processes among levels of government, is revealed in the process of adopting policy ideas. It is safe to say that the analytical importance of organizational learning through interaction between levels of government can tap into the abundant information of policy diffusion (Bulkeley and Moser 2007). In general, mitigation policy instruments are less likely to be directly transferable to a different level of government while there is a growing need for coordinated decision-making processes between different levels of government. Learning agents are faced in a different structural context at each level of government. They interpret that structural context and make a conscious effort to have an improved understanding of what factors constrain a direct policy transfer. In this study, the learning of mandatory reporting in national energy policy triggered the introduction of mandatory reporting in a different policy domain at the local level, that is, local environmental policy, to meet local conditions. The national government eventually made policy development better fit in the national structural context of the same environmental policy domain and then introduced a national mandatory reporting scheme in a less stringent way to reduce GHG emissions.

Horizontal diffusion

Policy diffusion can also occur through national networks of communication among local governments to keep up with their policy innovation 'front-runners' or to emulate their neighbors. It is based on interactions among governmental units that legally or socio-economically have the same status at the same level. The expected competition among local governments performs the diffusion of horizontal dimension of policy innovation among locales. The horizontal competition at the sub-national level assumes that the policy process need not follow the administrative chart of the centralized structure but reveals the actual learning behavior of local policy elites rather than the formal rules in the hierarchical structure. In the policy area of environmental policy, some studies provide evidence that communication networks of sub-national authorities did result in inefficient regulatory

competition or ‘a race to the bottom’ that would lower environmental quality to compete for capital (Fredriksson and Millimet 2002; Levinson 2003). Others report evidence of ‘free riding’ by sub-national authorities that chose lower environmental standards to export the environmental costs to their neighbors (Helland and Whitford 2003; Sigman 2005). These two behavioral tendencies have been considered to be key constraints on the diffusion of progressive environmental policy; they are driven by structural factors, such as fiscal or capital demand for a common low base.

In this study, there is no clear evidence for the case of the mandatory reporting system to support the claim of horizontal competition to catch up with front-runners. This can be partly explained by the nature of cost-benefit of mitigation measures. In Japan, the focus of environmental protection has shifted from identifiable sources of industrial pollution to diffuse, no-point sources of climate change. Since the costs and benefits of industrial pollution are relatively concentrated on a narrow range of industrial interests and affected residents in industrial cities, these groups intensified their political conflict in a direct way. A dichotomy of polluters-versus-victims interest representation effectively influenced the adoption of policy ideas regarding pollution control and compensation. In contrast, climate change policy tends to impose both diffused and uncertain adaptation costs on a sectoral basis while offering diffused benefits to a wide range of social groups. Laggard government agencies are thus less willing to learn about mitigation instruments and emulate their neighbors. This study has found that the process of horizontal diffusion of the mandatory reporting is characterized by copying in terms of symbolic terms, rather than rational concern with an improved understanding of policy ideas. A majority of local governments that had engaged in policy instrument transfer emulated Tokyo’s mandatory reporting system without adequate mechanisms to enforce their own systems.

There is also no clear evidence of an association between mitigation tools and ‘a race to the bottom.’ The previous findings of this constraint on progressive or costly policy diffusion are based primarily on the American experience in a federal system. In theory, elected local officials in Japan’s unitary system do not have to be accountable to their voters to the extent that national regulations set limits on the financial discretion of local governments and extend fiscal equalization to reduce the inequality of fiscal capacity among localities. Japanese local governments tend to compete less with each other than those in federal systems, such as the United States, in the pursuit of revenue policy. According to a perceived ‘race to the bottom,’ local governments are expected to choose economic advantages over potentially costly environmental tools. The findings suggest that national networks of communication among local governments did not necessarily operate under a ‘lowest common denominator’ mechanism in which local governments, while adhering to sub-optimal choices, failed to

achieve more efficient and effective policy outcomes than previous outcomes. The assumption of 'a race to bottom' does not fully account for why 37 (55 per cent) of 67 large local authorities have adopted the idea of mandatory reporting and the rest have not, and why at least 7 (15 per cent) of those authorities are implementing their mandatory reporting with convincing enforcement mechanisms (MOE 2012_a and 2012_b). It is also important to note that local governments, which adopted this policy idea after the introduction of the 2005 national mandatory GHG Accounting and Reporting system, tended to emulate this national practice rather than Tokyo's one in a horizontally competitive way.

Learning agents as diffusion determinants

In this case study, opportunity structures that influenced the choice of policymaking and helped to bring about the adoption of Tokyo's cap-and-trade are unique in the sense that others are unlikely to have such structures. First, Tokyo has the largest concentration of corporate headquarters in the world, which flock to seek national government offices in the Kasumigaseki section of Tokyo for informal communication and lobbying. The business value of the office location probably outweighs any other location in Japan. This allowed TMG to adopt a specific yet efficient coverage of a mandatory reduction of total CO_2 emissions, which targeted only large-scale buildings but accounted for nearly a half of Tokyo's CO_2 emissions. The total CO_2 emissions in Tokyo were characterized by a high rate in the commercial sector but a low rate in the industrial sector. So far there is no evidence of a Tokyo's cap-and-trade-induced pattern of business migration to move out of the business and political center of the metropolitan area. Second, TMG has a great deal of freedom for budgetary choice, which allows it to offer a more comprehensive incentive program for mitigation measures. The concentration of business activities in Tokyo ensures the revenue-raising capacity to implement a package of mitigation measures, with its per capita local tax revenue amounting to roughly twice the level of the prefectural average. TMG was able to offer subsidies, funding and tax incentives as a mechanism of spurring the demand of emission credits and started its own tax system to promote energy saving for small-and-medium-sized companies. This study also suggests that there are two structural conditions to which almost all of the 47 prefectures and the 20 designated cities seem to have adapted for mitigation policy instruments: industrial structures and previous growth patterns on emissions in each locality. The higher the share of the industrial sector to all CO_2 emissions, the less likely it is that learning agents adopt effective mitigation policy tools. The faster GHG emissions increase in previous years, the less likely it is that learning agents adopt effective mitigation policy tools.

However, even if such hypotheses were generally applied to localities, not all learning agents would equally be sensitive to the same information. The key issue boils down to learning agents' willingness and capability of contributing to the locally specific policy-making

process.[9] There were two exceptions where, despite being one of the lowest growth environments of emissions, the localities had not adopted any form of mandatory reporting (MOE 2012_a). Why was the city of Fukuoka with a low growth rate in the industrial sector or the city of Shizuoka with a low growth rate in GHG emissions still unable to adopt the policy idea of mandatory reporting? These exceptional cases are yet to be examined to answer the question. Nonetheless, this case study demonstrates that TMG's practice of continuous learning successfully drove the implementation of a mandatory reduction of all CO_2 missions. A full explanation required the examination of factors that were internal to TMG or agency effects. The linear stages of policy process (i.e., agenda setting, policy formulation, and implementation) did not reflect the actual TMG's practice, and the policy evolution involved multiple interacting cycles (a voluntary reduction policy with mandatory reporting, regulatory measures, a mandatory reduction policy, an incentive mechanism, and a tax policy) rather than a single policy cycle. The process of BOE's learning did not necessarily show a linear relationship from information to decision-making or systematic policy evaluation, but rather an evolutional process of trial-and-error in pursuit of the political feasibility of policy adoption.

The process tracing of TMG's multiple interacting policy cycles has found a set of individual and collective agent effects on the adoption of Tokyo's cap-and-trade scheme. (1) Without Governor Ishihara's commitment, progressive proposals may have never got onto a policy agenda despite being initially presented by an informal policy network of those interested in low carbon issues. (2) TMG's mandatory emissions reporting scheme was a result of instrumental learning or a redesign of the national policy instrument of energy conservation reporting. (3) A key departure from prior policy ideas toward Tokyo's cap-and-trade was the change in their shared beliefs of the environmental coalition from voluntary reduction to mandatory reduction, which policy network members had learned from the policy experience of a voluntary emissions reduction plan with mandatory reporting. (4) Tokyo's regulatory measures to control diesel vehicle emissions whose reductions had previously created a market-driven reduction mechanism convinced BOE officials to pursue a policy model of mandatory reduction. (5) TMG's failure to adopt its mandatory reduction of all CO_2 emissions in 2004 entailed policy advocates learning about political strategies for increasing the feasibility of policy adoption. (6) BOE officials became more sophisticated in ensuring the successful cap-and-trade policy enactment, while learning about creating incentives to meet TMG's reduction goals. (7) The mandatory emissions reporting provided TMG with the accumulated data necessary for implementing the cap-and-trade scheme.

Conclusion

The development of Tokyo's cap-and-trade system presents a case study on policy learning and diffusion from multiple sources, by a variety of agents, and over an extended period of time. The preliminary analysis in this article suggests that there is evidence of both endogenous and exogenous sources of learning for Tokyo's climate change policy. All in all, domestic processes in conjunction with policy ideas from overseas are reflected in its policy package. The key finding is that the opportunity for transferring overseas ideas into Tokyo arose from its adaptive capacity, which is determined by local conditions.

The international recognition of Marrakech Accords and Japan's commitment to the agreements certainly created a legitimate setting for Tokyo's involvement in mandatory reduction. However, there was little evidence that the change in TMG officials' beliefs from voluntary to mandatory reduction was the direct result of non-conscious factors, especially those of internationally agreed commitments and national policies, external to the make-up of the Tokyo metropolitan polity. These structural factors are not sufficient to account for the alteration of general policy direction. Cognitive/conscious factors that were internal to the learning agency are necessary to consider the result. Think-tanks and academics were the key agents of the soft transfer from overseas of cap-and-trade concepts; these experts facilitated the emergence of BOE officials' policy learning. As the modes of mandatory reduction had been widely discussed, Governor Ishihara became a necessary agent in the sense that he used his official capacity to create a cap-and-trade policy agenda, enhancing the political feasibility. It was not surprising that neither of the environmental coalition and the industry advocacy coalition were led to change their core beliefs. But TMG was able to convince small-medium businesses (representing over 99 per cent of business enterprise in Tokyo) of the viability of the implementation designs by providing financial incentives for GHG emissions reduction. In other words, the strategic level of learning advanced the policy adoption by manipulating the policy process while being not concerned with a change in their internalized policy beliefs.

The evolution of Tokyo's climate change policy involved multiple interacting policy cycles, based on its practice of continuous learning over time. The policy development was largely a function of agency effects, rather than events outside the subsystem of TMG while reconstructing the policy ideas, exogenous to the Tokyo metropolitan polity, to ensure a better fit with prior local experience. It was based on the sequence of policy learning, rather than concentrating upon what lessons were drawn from a single policy blueprint. The process tracing in this case study described how multiple ideas and lessons were chosen and integrated into a climate policy package. TMG's trial-and-error both in the policy and political processes lies at the heart of the evolutionary learning of policy adoption, while complementing rationality as optimization. Tokyo's policy learning is not easily adopted elsewhere due to the interaction of structure and agency peculiar to the capital megacity.

Other local authorities require a capacity of lesson drawing to understand the applicability of Tokyo's experience in their context. Otherwise, if any diffusion, it is more likely to be mimicking for other localities to catch up as a diffusion mechanism or prompted by the national government in a semi-coercive fashion.

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