

Political Economy in Tradable Emissions Permits

Shinya Kawahara*

[Abstract]

This paper examines how a politically-motivated government can behave in a domestic emissions trading scheme within a simple political economy framework. By constructing a model in which the amount of emissions cap and the distribution of emissions permits (grandfathering system or auction system) are endogenously determined, we show that a corruptible government issues inefficient amounts of emissions cap to benefit its preferable group. In particular, a pro-industry government issues too large amount of emissions cap to reduce its price, which benefits an industry group. A pro-environment government issues too small amount of emissions cap to reduce pollution emissions, which benefits an environmental group. Then, we examine how an incumbent government decides the distribution of initial permits if it will be replaced in the future by a government with a different objective. In particular, we show that a pro-welfare government

* Faculty of Economics, Rissho University, 4-2-16 Osaki, Shinagawa-ku, Tokyo 141-8602, Japan. Tel/Fax: +81-3-5487-3232. E-mail: kawahara@ris.ac.jp. I am grateful to session participants at the 90th Annual Conference of the Western Economic Associations International for their useful comments and suggestions. This research was supported by JSPS Grant-in-Aid for Scientific Research (C) (Grant Number 25380334). Any remaining errors are my own.

which will be replaced by a corruptible government in the future chooses grandfathering system to make the amount of emissions cap chosen in the future more efficient.

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1. Introduction

During the past decade or so, emissions trading systems have been introduced, primarily in various European countries, as policy for solving the issue of global warming. Emissions trading is a system for achieving target emissions volumes (and/or reducing emission) in a cost-effective manner, in which the total amount of an emissions cap is distributed, for free or at a cost, to sources of pollutant emissions such as firms, that each trade emissions caps on the market according to their own permits. Environmental tax is a policy comparable to emissions trading; however, while environmental tax is an instrument of regulation based on prices, emissions trading is an instrument of regulation based on quantities. In the field of environmental economics, price-regulating environmental tax and quantity-regulating emissions trading have been regarded as equivalent policy instruments in terms of efficiency. In fact, in the various European countries which have progressively introduced emissions trading, producer responsibility is taken into consideration and emissions caps are distributed free of charge. The discussion concerning the equivalence mentioned above, however, assumes policy decisions made by “good” governments that seek efficiency, and does not take into consideration policy decisions by “bad” governments that are influenced by political economic incentives that may have an effect on environmental policy.

The purpose of this paper is to examine emissions trading scheme using a simple political economy framework. Of particular importance in the system design of emissions trading are the total amount of emissions cap and the decision-making concerning the systems used for distributing this amount. This paper examines the amount of emissions cap and their system of distributions, both of which are determined by governments that are subject to political economic influences. First, we characterize the amount of emissions cap chosen by governments influenced by political economic incentives and compare how they differ from their socially optimal levels. Second, we examine what kind of effect political economic incentives have on the system of distributing emissions permits. That is, we investigate how a current government chooses the system of distributing emissions permits when there is a possibility that inefficient amount of emissions cap may be chosen in the future.

The following conclusion can be drawn from our analyses. First, we show that a government that cares about industry profit chooses too large amount of emissions cap, while a government that cares about environmental group's welfare chooses too small amount of emissions cap. In particular, when the demand for emissions permits is inelastic, the extent of distance from socially optimal levels is always smaller for the grandfathering system, in which emissions permits are allocated free of charge, in comparison to the auction system, which involves charges. That is, when a government is politically influenced by industry lobbying, the amount of emissions cap always exceeds socially optimal levels, and the extent of this excess (the extent of inefficiency) is greater for the auction system; meanwhile, the extent to which total emissions permits, when selected by a government that is politically influenced by environmental lobbying, are smaller than socially optimal levels, is also greater for the auction system.

Concerning the system of distributing emissions permits, we show that

when there is a possibility that a government politically influenced by lobby groups may select inefficient amount of emissions cap in the future, for a current government uninfluenced by such political factors, the systems used for allocating emissions permits are not indifferent. In particular, it is shown that, when a government politically influenced by industry lobbying will select excessive emissions cap at some point in the future, a current government unaffected by such political influence and concerned only for social welfare will select the grandfathering system, whereby the degree of distance from socially optimal levels is small. On the other hand, it is shown that even when a government politically influenced by environmental lobbying will select smaller emissions cap in the future, the current government unaffected by political influence will seek to dampen the degree of the smaller emissions cap decided by the future government and push them closer to efficient levels by selecting the grandfathering system.

Montgomery (1972), Hahn (1984), and Stavins (1995) are seminal works that conducted research using theoretical frameworks for emissions trading. Gersbach and Requate (2004), Bernard et al. (2007), Fischer (2010), Hepburn (2013), and Schmidt and Heitzig (2014) may be given as research that indicated the superiority of the grandfathering systems. As for research that has analyzed emissions trading using political economy frameworks, Sterner and Isaksson (2006) examined the political superiority of the grandfathering system, while Harstad and Eskeland (2010) examined the incomplete information in the emissions trading system.

The research perhaps most relevant to this paper would be Lai (2007, 2008). As in this paper, Lai (2007, 2008) also examines emissions trading based on the political economy model developed by Grossman and Helpman (1994), which focuses on cases formed by industrial and environmental lobbying and shows that the grandfathering system is chosen in order to control the issuance of emissions permits that exceed efficient levels. Vari-

ous factors exert influence in the determination of emissions cap and allocation systems; besides producing the results above, Lai (2007, 2008) does not clearly indicate which factors are decisive, nor, due to the complexity of the model, are their conditions made clear. This paper focuses on the political factors that affect emissions trading; the study thus simplifies the model insofar as possible, and clarifies the factors that lead to excessive emissions cap and the factors that lead to deficient emissions volumes. As a result, the study shows that the factors that lead to deficient emissions volumes—not indicated in Lai (2007, 2008)—lie in environmental lobbying, and that the grandfathering system is selected in order to control not only excessive emissions volumes, but also deficient emissions volumes.

The organization of this paper is as follows. The next section sets up a political economy model of emissions trading that will be used in the following analysis. Section 3 examines the determination of total amount of emissions cap. Section 4 examines the determination of the system of distributing emissions permits when political economy incentives are present. The final section concludes the paper.

2. Model

The economy has N industries and a representative citizen (an environmentalist). The number of firms in each industry is normalized as 1. A firm obtains profits from using environment (or generating emissions). The profits obtained from using environment by firm i ($= 1, \dots, N$) is expressed as $B_i(e_i)$, where $B'_i > 0$ and $B''_i < 0$. e_i denotes the amount of emissions by firm i . For each unit of emissions, firms have to purchase emissions permits at a price τ . If the permits initially allocated to firm i is l_i , the

amount of emissions permits purchased by firm i becomes $e_i - l_i$.¹ Firm i chooses the amount of emissions e_i in order to maximize its net benefit

$$\Pi_i = B_i(e_i) - \tau(e_i - l_i).$$

The first-order condition for the firm's optimization problem is given by

$$B'_i(e_i) = \tau. \quad (1)$$

This represents the demand for the emissions permits for firm i . Totally differentiate (1) to obtain

$$\frac{\partial e_i}{\partial \tau} = \frac{1}{B''_i} < 0. \quad (2)$$

That is, an increase in the price of emissions permits τ decreases the demand for the permits (or the amount of emissions generated by the firm).

An environmentalist suffers environmental damage from emissions by firms. We denote total amount of emissions as $E = \sum_i e_i$ and the environmental damage as $D(E)$, where $D' > 0$ and $D'' > 0$. The welfare of the environmentalist is represented by

$$V_g = y_g - D(E), \quad (3)$$

where y_g denotes exogenous income obtained by the environmentalist.

The market for emissions permits can be described as follows. First, total supply of emissions permits is represented by L . The fraction of those permits distributed free of charge (under the grandfathering system) is given by α ($\in [0, 1]$), and the fraction of those obtained by firm i is denoted by β_i ($\in [0, 1]$, $\sum_i \beta_i = 1$); firm i thus obtains $\beta_i \alpha L$ emissions

¹ If the amount of emissions by firm i is less than the amount initially allocated, then firm i can sell emissions permits in the market for the price τ .

permits.² The amount of emissions permits distributed via auction system can be expressed as $(1 - \alpha)L$. Revenue from the auction $R = \tau(1 - \alpha)L$ is assumed to be uniformly distributed to the environmentalist.

Total demand for the emissions permits is the sum of each firm's amount of emissions $E = \sum_i e_i$. Equilibrium condition for the market can be written as

$$\sum_i e_i = L. \tag{4}$$

Totally differentiate (4) and use (2) to obtain

$$\frac{d\tau}{dL} = \frac{1}{\sum_i \partial e_i / \partial \tau} < 0. \tag{5}$$

That is, an increase in total supply of the emissions permits (or the amount of emissions cap) decreases the price of permits.

3. Determination of total amount of emissions

There are two types of agents in the economy: firms and the environmentalist. A firm in industry i (firm i) forms the industry lobby i . The benefit for firm i from forming the lobby, gross of political contributions, is represented by

$$\Pi_i = B_i(e_i) - \tau(e_i - l_i) = B_i(e_i) - \tau(\gamma_i - \beta_i\alpha)L, \tag{6}$$

where $\gamma_i = e_i/L$. On the other hand, the environmentalist forms the environmental lobby. The benefit for the environmentalist from forming the lobby, gross of political contributions, can be expressed as

$$V_g = y_g + R - D(E) = y_g + \tau(1 - \alpha)L - D(L), \tag{7}$$

² We assume β_i as being fixed as it is determined in accordance with firm i 's past amount of emissions.

where we use the equilibrium condition for the emissions permit market $E = L$ to derive the second equality.³

The timing of the decisions is as follows. In period 1, the government at the time determines the fraction of emissions caps to be distributed free of charge under the grandfathering system α ($\in [0, 1]$). Period 2 supposes a Grossman and Helpman (1994) type common agency model among the government and lobby groups. Firms and the environmentalist form lobbies and make political contributions (C_i, C_g) to the government, where C_i ($i = 1, \dots, N$) denotes political contributions by industry lobby i and C_g represents those by environmental lobby. Based on the political contributions, the government in period 2 determines the total amount of emissions cap L .

The model can be solved by backward induction as in Grossman and Helpman (1994). The objective function of the period 2 government can be expressed as

$$G = \sum_i C_i + C_g + aW, \quad (8)$$

where W denotes aggregate social welfare

$$W = \sum_i \Pi_i + V_g. \quad (9)$$

and a represents the extent to which the government cares about aggregate social welfare relative to the political contributions. As in Grossman and Helpman (1994), it is assumed that the contribution schedule chosen by any organized lobby reflects its true preferences. That is, the organized lobby always chooses a truthful contribution schedule. We focus on the equilibrium in which the organized lobbies always make positive contributions. Thus, under any truthful Nash equilibria (Nash equilibria in which

³ Note also that the environmentalist's income consists of the revenue from auction R as well as exogenous income y_g .

the organized lobbies choose truthful contribution schedules), we have

$$\frac{\partial C_i}{\partial L} = \frac{\partial \Pi_i}{\partial L}, \quad \frac{\partial C_g}{\partial L} = \frac{\partial V_g}{\partial L}. \quad (10)$$

The equilibrium amount of emissions cap can be characterized using those relationships.

3.1 Both groups are organized

Suppose that both groups are organized in period 2. Then, the government chooses the total amount of emissions cap L so as to maximize its objective function:

$$\max_L G = \sum_i C_i + C_g + aW.$$

The optimality condition for this problem is

$$\frac{\partial G}{\partial L} = \sum_i \frac{\partial C_i}{\partial L} + \frac{\partial C_g}{\partial L} + a \frac{\partial W}{\partial L} = 0. \quad (11)$$

Using (10), this can be written as

$$\sum_i \frac{\partial \Pi_i}{\partial L} + \frac{\partial V_g}{\partial L} + a \frac{\partial W}{\partial L} = 0. \quad (12)$$

The first term on the left-hand side of (12) represents the sum of the effects of L on each firm's profit. Differentiating (6) with respect to L , this term can be written as

$$\frac{\partial \Pi_i}{\partial L} = \tau \beta_i \alpha (1 - \epsilon) + \tau \gamma_i \epsilon, \quad (13)$$

where $\epsilon = -\frac{d\tau}{dL} \frac{L}{\tau} > 0$. The first term on the right-hand side of (13) expresses the effect of L on the value of initial amount of emission permits τl_i by firm i . The sign of this term depends on ϵ , which represents the reciprocal of the elasticity of L with respect to τ . Lai (2007) interprets that if the demand for the emissions permits becomes inelastic, then it is likely

to have $\epsilon > 1$. In this case, the sign of the first term becomes negative. The second term represents the effect of L on the price of permits. An increase in total amount of emissions cap decreases the price of permits, which increases the firm's profit. Thus, the sign of this term will be positive.

Next, the second term on the left-hand side of (12) represents the effect of L on the environmentalist's welfare. Differentiating (7) with respect to L , this term can be written as

$$\frac{\partial V_g}{\partial L} = \tau(1 - \alpha)(1 - \epsilon) - D'(L). \quad (14)$$

The first term on the right-hand side of (14) represents the effect of L on the value of transferred income from the government $\tau(1 - \alpha)L$. If the demand for the emissions permits is inelastic ($\epsilon > 1$), then an increase in total amount of emissions cap causes a significant decrease in the price of permits and, therefore, causes a decrease in the value of transferred income. This exerts a negative effect on the environmentalist's welfare.⁴ The second term represents negative effect that an increase in L has on environmental damage.

Finally, the third term on the left-hand side of (12) represents the effect of L on the aggregate social welfare. Using (13) and (14), this term can be represented as

$$\frac{\partial W}{\partial L} = \tau - D'(L). \quad (15)$$

The above equation reveals that a government which aims to maximize the aggregate social welfare chooses L such that $D'(L) = \tau = B'_i(e_i)$. That is, the government chooses the total amount of emissions L^* so that the marginal damage and the marginal benefit from emissions become equal.

⁴ If the demand for the emissions permits is elastic, the sign of this term will become positive. That is, an increase in L has a positive impact on the environmentalist's welfare. This result is abstracted from Lai (2007) for the sake of simplification.

Substituting (13)-(15) into (12) gives the optimal conditions regarding the total amount of emissions cap chosen by the period 2 government

$$(1 + a) [\tau - D'(L)] = 0. \tag{16}$$

That is, the government in period 2 chooses the total amount of emissions cap such that $\tau = D'(L)$. Thus, if both groups are organized, then a government will choose socially optimal level of emissions cap L^* .

3.2 Only the industry lobby is formed

Next, suppose that only the industry lobby is organized in period 2. Then, the government chooses the total amount of emissions cap L so as to maximize its objective function, which gives the optimality condition as

$$\frac{\partial G}{\partial L} = \sum_i \frac{\partial C_i}{\partial L} + a \frac{\partial W}{\partial L} = 0. \tag{17}$$

Using (10), this can be written as

$$\sum_i \frac{\partial \Pi_i}{\partial L} + a \frac{\partial W}{\partial L} = 0. \tag{18}$$

Substituting (13) and (15) into (18) gives the optimality conditions regarding the total amount of emissions cap chosen by the period 2 government

$$\sum_i [\tau \beta_i \alpha (1 - \epsilon) + \tau \gamma_i \epsilon] + a [\tau - D'(L)] = 0. \tag{19}$$

From (19), the price of emissions permits in period 2 when only the industry lobby is formed can be derived as

$$\tau^b = \frac{a}{\alpha + (1 - \alpha)\epsilon + a} D'. \tag{20}$$

From the equation above, we have $\tau^b < D'$; therefore, $L^b > L^*$.⁵ That is, when only the industry lobby is formed in period 2, the government that

⁵ Note that $\tau^b < D'$ follows from $\alpha + (1 - \alpha)\epsilon > 0$, and $L^b > L^*$ follows from $D' > 0$ and $D'' > 0$.

cares about the industry lobby chooses too large amount of total emissions cap. With too large amount of total emissions cap, its price decreases, which increases industry profits.

Next, we consider how the system of distributing initial permits (grandfathering system or auction system) affects the total amount of emissions cap. First, in the grandfathering system ($\alpha = 1$), (20) can be written as

$$\tau_{GF}^b = \frac{a}{1+a} D'. \quad (21)$$

On the other hand, in the auction system ($\alpha = 0$), (20) can be written as

$$\tau_{AUC}^b = \frac{a}{\epsilon + a} D'. \quad (22)$$

Comparing (21) and (22), one can find that $\tau_{AUC}^b < \tau_{GF}^b$ when $\epsilon > 1$. That is, when the demand for the emissions permits is inelastic, its price in the auction system will be lower than that in the grandfathering system. Thus, the total amount of emissions cap chosen by the government in period 2 will be larger in the auction system relative to the grandfathering system. If the demand for the emissions permits is inelastic ($\epsilon > 1$), the decrease in its price in response to an increase in the total amount of emissions cap will be larger. Under the auction system, a decrease in the price of emissions permits benefits firms by reducing its costs. Thus, a government caring about the industry lobby has an incentive to choose larger amount of emissions cap under the auction system. On the contrary, under the grandfathering system, a decrease in the price of emissions permits hurts firms by reducing the value of initial permits. Thus, a government caring about the industry lobby chooses smaller amount of emissions cap under the grandfathering system.

In cases where the demand for the emissions permits is elastic ($\epsilon < 1$), the above leads to an opposite result. That is, a government that cares about

the industry lobby has an incentive to choose larger amount of emissions cap under the grandfathering system relative to the auction system.

3.3 Only the environmental lobby is formed

Finally, suppose that only the environmental lobby is organized in period 2. Then, the government chooses the total amount of emissions cap L so as to maximize its objective function, which gives the optimality condition as

$$\frac{\partial G}{\partial L} = \frac{\partial C_g}{\partial L} + a \frac{\partial W}{\partial L}. \quad (23)$$

Using (10), this can be written as

$$\frac{\partial V_g}{\partial L} + a \frac{\partial W}{\partial L} = 0. \quad (24)$$

Substituting (14) and (15) into (24) gives the optimality conditions regarding the total amount of emissions cap chosen by the period 2 government

$$\tau(1 - \alpha)(1 - \epsilon) - D'(L) + a[\tau - D'(L)] = 0. \quad (25)$$

From (25), the price of emissions permits in period 2 when only the environmental lobby is formed can be derived as

$$\tau^g = \frac{1 + a}{(1 - \alpha)(1 - \epsilon) + a} D'. \quad (26)$$

From the equation above, we have $\tau^g > D'$; therefore, $L^g < L^*$.⁶ That is, when only the environmental lobby is formed in period 2, the government that cares about the environmental lobby chooses too small amount of total emissions cap. With too small amount of total emissions cap, its price increases, which benefits the environmentalist.

⁶ Assuming positive price of emissions permits, we have $\tau^g > D'$ since $(1 - \alpha)(1 - \epsilon) < 1$.

Next, we consider how the system of distributing initial permits affects the total amount of emissions cap. First, in the grandfathering system ($\alpha = 1$), (26) can be written as

$$\tau_{GF}^g = \frac{1+a}{a} D'. \quad (27)$$

On the other hand, in the auction system ($\alpha = 0$), (26) can be written as

$$\tau_{AUC}^g = \frac{1+a}{(1-\epsilon)+a} D'. \quad (28)$$

Comparing (27) and (28), one can find that $\tau_{AUC}^g > \tau_{GF}^g$ when $\epsilon > 1$.⁷ That is, when the demand for the emissions permits is inelastic, its price in the auction system will be higher than that in the grandfathering system. Thus, the total amount of emissions cap chosen by the government in period 2 will be smaller in the auction system relative to the grandfathering system. In cases where the demand for the emissions permits is inelastic ($\epsilon > 1$), the increase in its price in response to a decrease in the total amount of emissions cap will be larger. Again, under the auction system, an increase in the price of emissions permits benefits environmentalists by increasing the value of transferred income. Thus, a government caring about the environmental lobby has an incentive to choose smaller amount of emissions cap under the auction system. On the contrary, under the grandfathering system, the environmentalist does not receive transferred income. Thus, a government caring about the environmental lobby chooses larger amount of emissions cap under the grandfathering system.

In cases where the demand for the emissions permits is elastic ($\epsilon < 1$), the above leads to an opposite result. That is, a government that cares about the environmental lobby has an incentive to choose smaller amount

⁷ Again, we are assuming positive price of emissions permits so that $(1-\epsilon)+a > 0$.

of emissions cap under the grandfathering system relative to the auction system.

The following proposition summarizes the results obtained in this section.

Proposition 1 : Suppose that the economy consists of industrialists and environmentalists. Suppose also that the government issues tradable emissions permits and its decision is subject to political pressure. Then, we have the following:

- (a) If both lobbies are formed, the government issues socially optimal amount of emissions permits.
- (b) If only the industry lobby is formed, the government issues too large amount of emissions permits. The amount of emissions permits will be larger under the auction system (the grandfathering system) if the demand for the emissions permits is inelastic (elastic).
- (c) If only the environmental lobby is formed, the government issues too small amount of emissions permits. The amount of emissions permits will be smaller under the auction system (the grandfathering system) if the demand for the emissions permits is inelastic (elastic).

4. Determination of the system of distributing emissions permits

The preceding section examined the determination of the total amount of emissions cap under specific system of distributing initial permits (the grandfathering system or the auction system) by governments that are politically influenced by lobby groups in period 2. This section returns to period 1 and considers the determination of the system of distributing initial permits. For simplification, we assume that the government in period 1 is not politically influenced by lobby groups and cares only about the aggre-

gate social welfare.⁸ In particular, the government in period 1 determines the fraction of emissions permits distributed under the grandfathering system α so as to maximize the aggregate social welfare (9). Differentiating W with respect to α and using (13)-(15) give⁹

$$\frac{dW}{d\alpha} = \frac{\partial W}{\partial \alpha} + \frac{\partial W}{\partial L} \frac{dL}{d\alpha} = [\tau - D'(L)] \frac{dL}{d\alpha}. \quad (29)$$

4.1 Both groups are organized

First, when both groups are organized in period 2, we have $\tau = D'(L)$ from (16). Substituting this into (29) gives

$$\frac{dW}{d\alpha} = 0.$$

That is, if both lobbies are formed in period 2 and socially optimal amount of emissions cap is chosen, then the system of distributing initial permit (whether it is grandfathered or auctioned) is indifferent for the government that cares only about the aggregate social welfare.

4.2 Only the industry lobby is formed

Next, when only the industry lobby is formed in period 2, (29) can be written as

$$\frac{dW}{d\alpha} = [\tau^b - D'(L^b)] \frac{dL^b}{d\alpha}. \quad (30)$$

From (20), the sign of the first term on the right-hand side of the above is negative. To determine the sign of the second term, totally differentiating (20) gives

$$\frac{dL^b}{d\alpha} = \frac{(1 - \epsilon)D'}{[\alpha + (1 - \alpha)\epsilon + a]D''}.$$

We know $D' > 0$, $D'' > 0$, and $\alpha + (1 - \alpha)\epsilon + a > 0$. Thus, if $\epsilon > (<)$ 1, then $dL^b/d\alpha < (>) 0$. This, in turn, implies that $dW/d\alpha > 0$ from

⁸ Note that this specification is not significant in deriving our results.

⁹ As W does not depend on α , we have $\partial W/\partial \alpha = 0$.

(30). That is, the government that cares only about the aggregate social welfare chooses the grandfathering system ($\alpha = 1$). When $\epsilon > 1$, too large amount of emissions cap is implemented in the auction system relative to the grandfathering system in the presence of the industry lobby. Thus, the government caring only about the aggregate social welfare in period 1 will choose the grandfathering system in order to reduce the excessive amount of emissions permits. On the contrary, when $\epsilon < 1$, we have $dL^b/d\alpha > 0$ and hence $dW/d\alpha < 0$. That is, the government chooses the auction system ($\alpha = 0$).

4.3 Only the environmental lobby is formed

Finally, when only the environmental lobby is formed in period, (29) can be written as

$$\frac{dW}{d\alpha} = [\tau^g - D'(L^g)] \frac{dL^g}{d\alpha}. \tag{31}$$

From (26), the sign of the first term on the right-hand side of the above is positive. To examine the sign of the second term, totally differentiating (26) gives

$$\frac{dL^g}{d\alpha} = \frac{-(1 - \epsilon)D'}{[(1 - \alpha)(1 - \epsilon) + a]D''}.$$

We know $D' > 0$, $D'' > 0$, and $(1 - \alpha)(1 - \epsilon) + a > 0$. Thus, if $\epsilon > (<) 1$, then $dL^g/d\alpha > (<) 0$. This, in turn, implies that $dW/d\alpha > 0$ from (31). That is, the government that cares only about the aggregate social welfare chooses the grandfathering system ($\alpha = 1$). When $\epsilon > 1$, too small amount of emissions cap is implemented in the auction system relative to the grandfathering system in the presence of the environmental lobby. Thus, the government caring only about the aggregate social welfare in period 1 will choose the grandfathering system in order to raise the too small amount of emissions permits. On the contrary, when $\epsilon < 1$, we have $dL^g/d\alpha < 0$ and hence $dW/d\alpha < 0$. That is, the government chooses the

auction system ($\alpha = 0$).

The following proposition summarizes the results obtained in this section.

Proposition 2 : Suppose that the economy consists of industrialists and environmentalists. Suppose also that in the future period the politically-motivated government decides the amount of emission permits while the current government, which is not politically-influenced, decides the system of distributing initial emission permits. Then, we have the following:

- (a) If both lobbies are formed in the future period, the system of distributing initial permits is indifferent for the current government.
- (b) In the presence of the industry lobby in the future period, the current government chooses the grandfathering system (the auction system) to reduce excessive amount of emissions permits in the future period, if the demand for the emissions permits is inelastic (elastic).
- (c) In the presence of the environmental lobby in the future period, the current government chooses the grandfathering system (the auction system) to raise too small amount of emissions permits in the future period, if the demand for the emissions permits is inelastic (elastic).

5. Concluding Remarks

This paper examined how a politically-motivated government could behave in a domestic emissions trading scheme within a simple political economy framework. We constructed a model in which the total amount of emissions cap and its system of distribution were endogenously determined, and examined the amount of emissions cap chosen by the government. We also examined how an incumbent government could decide the system of distributing initial permits if it would be replaced in the future by a government with a different objective. The conclusions obtained from the

analyses can be summarized as follows.

First, we showed that a pro-industry government would choose too large amount of emissions cap, while a pro-environment government would choose too small amount of emissions cap. In particular, when the demand for the emissions permits is inelastic, the degree of distance from socially optimal levels lessens for the grandfathering system in comparison to the auction system. In particular, it was shown that the degree of greater emissions cap chosen by a government that was politically influenced by the industry lobby would be larger for the auction system; meanwhile, the degree of smaller emissions cap chosen by a government that was politically influenced by the environmental lobby would be larger for the auction system.

Second, it was shown that, in cases whereby an excessive total amount of emissions cap would be selected inefficiently at some point in the future, a current government that cared only about social welfare would choose the grandfathering system, which had a small degree of distance from socially optimal levels. Meanwhile, it was also shown that in cases whereby a smaller amount of emissions cap would be selected inefficiently at some point in the future, a government that, at present, was not politically influenced by lobby groups would still select the grandfathering system and seek to push the smaller amount of emissions volume chosen by a future government towards an efficient level.

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