A Theory of Endogenous Yardstick Political Competition

By Zhihao Yu*

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This paper develops a theory of endogenous yardstick political competition to examine the effects of government anti-smoking campaigns. It is shown that government anti-smoking campaigns reduce the tobacco industry's alternative welfare and hence help the government in political bargaining with the tobacco lobby. Anti-smoking campaigns not only raise the equilibrium taxation on tobacco, but they also force the tobacco lobby to increase its political contributions because its bargaining position becomes weaker. The paper also finds that when the effectiveness of campaign spending on the expected vote share increases, the incumbent government will increase its effort in anti-smoking campaigns, and as a result, extract more political contributions from the tobacco lobby.

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Key Words: Endogenous Yardstick Political Competition, Political Contributions, Bargaining Position

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"Who will decide if these efforts [government anti-smoking campaigns] support positive causes or take on the trapping of propaganda and social programming?"

– K. McCormack (*Adweek Eastern Edition*, 10/27/1997, pp.12)[1]

1 Introduction

The tobacco industry in the U.S. donates millions of dollars each year to politicians, and some of its firms have been the major donors in the entire agribusiness sector.[2] During the last few decades, however, governments at all levels have significantly increased regulations on the tobacco industry (e.g. increases in sales taxes, restrictions on tobacco advertising, and lawsuits against tobacco companies, etc.). A simple explanation for this is that since government policies are chosen to balance the needs of various special interests, the increases in tobacco regulations could be a result of the growing political pressure from the anti-tobacco interests. Yet, why do governments also spend millions of dollars each year to launch mass media anti-smoking campaigns to raise public awareness of the health hazards of smoking?[3] Some might suggest that it is also because of the lobby of the anti-tobacco interests that governments have to launch anti-smoking campaigns.[4] However, this paper suggests an alternative explanation by developing a theory of *endogenous yardstick political competition* rather than attributing everything to the political pressure from the anti-tobacco lobby.

The focus of the paper is on the political incentives of an incumbent government/ politicians in anti-smoking campaigns, and their effect on the political interaction between the incumbent

[1]See similar views in "The myth of anti-smoking" by Kevin Dowd (1991).

[2]For instance, Philip Morris gave more than $3.4 million in the 1999-2000 election cycle, making it the largest contributor in the agribusiness sector and the 14th largest contributor overall. Source: www.opensecrets.org (date visited: 20 May 2003).

[3]For instance, after the 1964 surgeon general's report associated cigarette smoking with heart disease, lung cancer, and many other diseases, several government initiatives were implemented to publicize the harmful effects of smoking. In 1967, for example, the Federal Communications Commission ruled that the fairness doctrine applied to cigarette advertising, and as a result, stations broadcasting cigarette commercials had to donate airtime for anti-smoking messages (Jacobson and Wasserman, 1997). Many governments at the state levels have also initiated their own mass media anti-smoking campaigns.

[4]It could be the case, of course, that governments are simply trying to reduce the negative externalities of smoking, although such normative arguments are not shared by all, especially when the efficacy of these programs is not always clear. Normative arguments are beyond the scope of the present model of political economy. For more reading on these issues, see Chaloupka and Warner (2000) for a survey of the economics of smoking, Cnossen and Smart (2004) for a recent review on tobacco taxation, and Bulow and Klemperer (1998) on the recent issues on the tobacco settlement. Also, see Gruber and Köszegi (2001) for a recent empirical study on smoking.

government and the tobacco lobby. In particular, we address the following questions: Why would governments want to change public preference if their best strategy is just to keep their policy in line with it (e.g., the media-voter's preference)? Apart from the political pressure from the anti-tobacco lobby, would it be in the government's own political interests to launch anti-smoking campaigns? What is the impact of anti-smoking campaigns on the political interaction between the government and the tobacco lobby? Finally, how is it that political contributions from the tobacco industry continue to increase while governments at all levels seem to take on the tobacco industry?[5]

1.1 Overview

During the last two decades the political economy methodology has made significant progress,[6] and two distinctive approaches have evolved to become prominent in the literature.[7] The first approach emphasizes *political competition* (or electoral competition) between candidates, and explicitly models an election. Recent developments of this approach can be found in the probabilistic-voting models (e.g. Austen-Smith, 1987; Coughlin, et al. 1990),[8] and the citizen-candidates models (Osborne and Slivinski, 1996; Besley and Coate, 1997). In the probabilistic-voting models, political candidates seek to maximize the expected number of votes, or their probability of winning. In the citizen-candidates models, policy decisions are delegated to a representative who is selected in an election, with citizens who wish to represent the community presenting themselves as candidates for office. The *political competition* approach is most important when it comes to understanding broader policy issues that often define the platforms

[5]According to Weissman (2000), "Both parties get rich. Despite the overall tilt to the Republicans, every major industrial sector contributes large sums to the Democrats as well. Agribusiness and energy/natural resources, two of the most pro-Republican industries, gave the Democrats $69 million and $64 million, respectively, in the election cycles from 1990 to 2000." Similar pictures are observed at the state-level (e.g., Common Cause Education Fund).

[6]Persson and Tabellini (2000) and Mueller (2003) are two excellent textbooks on political economy and public choice. For political economy approaches in international trade, economic reform, etc. see Hillman (1989), Magee, Brock and Young (1989), Rodrik (1995),Jain and Mukand (2003), Majumdar and Mukand (2004), and Mukand and Rodrik (forthcoming). Also, see a recent study on campaign finance reform by Coate (2004).

[7]Other important lines of research include the literature on party coalition (e.g. Roemer, 2001; Levy, 2004) and political institution and economic policy (e.g. Persson and Tabellini, 2004; Aghion, Alesina and Trebbi, 2004).

[8]Also, see Hinich and Munger (1994) and Schofeild (2003), among others. Börgers (2004) is a recent study on costly voting with small electorates.

of political candidates.

The second approach focuses on policy decisions by an incumbent government aiming to maximize its political support, keeping the political competition of the next election in the background. A recent development of this is the *political contribution* approach in Grossman and Helpman (1994), and Dixit, Grossman and Helpman (1996).[9] As in Grossman and Helpman, for example, the political support that the incumbent government aims to maximize is the weighted sum of social welfare and political contributions, where the former captures the well-being of the society (and hence the public support of the government's policy) and the latter is used as campaign spending to generate additional political support. The political contribution approach is instrumental in understanding the formation of a particular government policy that attracts no immediate political competition (or electoral challenge) from an opposing political rival. It has contributed a great deal to our understanding of the political optimization underlying the endogenous determination of government policy.

The current paper focuses on the political interaction between a particular industry and an incumbent government. There is one unique aspect of the analysis, however, that prevents it from using the political contribution approach. This is because both the government and the industry are heavily engaged in information/misinformation campaigns to affect public perception about the negative health effects of smoking. In the political contribution approach, the political support of the incumbent government increases (*resp.* decreases) if there is a change of an underlying parameter that raises (*resp.* lowers) the level of social welfare, which may have nothing to do with the government policy in question. Although sometimes it is true that voters credit the well-being of the society (e.g. the good economy) to the incumbent government, many times they don't – they may consider the incumbent politicians just simply lucky to be in office at the right time. To deal with this particular issue or problem (which is actually much broader than the particular topic of this analysis), this paper develops an *endogenous yardstick competition* approach.

In the endogenous yardstick competition approach, the level of social welfare is no longer

[9]The recent development of the political contribution approach is based on the menu-auction (or common agency) model of Bernheim and Whinston (1986). The earlier literature focusing on policy decisions by an incumbent government is the political-support function approach (e.g., Stigler, 1971; Hillman, 1989). Also, Coate and Morris (1995) is a recent study focusing on decision making by incumbent politicians.

an important indicator of the public support of the incumbent government. Instead, in giving their political support, voters compare the policy of the incumbent government to the policy of a "benchmark candidate" – a yardstick. Since there is no immediate electoral challenge from an opposing political rival (i.e. the main political challenger is not yet established), one yardstick that voters will use for comparison will naturally be the policy that maximizes social welfare, although it could be something else (e.g. the median voter's preference). In this case, a change in an underlying parameter that raises social welfare under the policy of the incumbent government, also raises social welfare under the policy of the benchmark candidate. Hence, it is no longer obvious whether the political support of the incumbent government will actually increase or decrease.

This paper considers the following two-stage game. In the first stage, the level of government anti-smoking campaigns, which affects the public's knowledge/belief about the adverse effects of smoking, is determined either non-cooperatively or cooperatively between the incumbent government and the tobacco industry. In the second stage, the equilibrium level of the direct regulation on tobacco, a consumption tax, is determined in a bargaining setting between the incumbent government and the industry. Using the endogenous yardstick competition approach, our analysis yields some new insights for the political interaction between the tobacco lobby (or a special interest group, in general) and the incumbent government.

First, when the outcome of the first stage of the game is non-cooperative, it obtains the following main results: although a government anti-smoking campaign reduces the joint surplus between the government and the tobacco industry, it can benefit the government. The reason for this is that the anti-smoking campaign reduces the threat-point level of the industry's welfare, and as a result, it creates more surplus in the bargaining for the government to share. Furthermore, although a government anti-smoking campaign raises the public awareness of the harmful effects of smoking and hence raises the tax on tobacco, it will result in an increase in political contributions from the tobacco industry because the bargaining position of the industry becomes weaker. A key to understanding this result is realizing that although anti-smoking campaigns reduce the tobacco industry's welfare (due to a higher tax), its potential loss from not/less lobbying actually increases. It is also shown that a possible reason for the government to launch anti-smoking campaigns is the increase in the effectiveness of political campaign

spending on the expected vote share.

Second, when the outcome of the first stage of the game is cooperative, the tobacco industry is able to lobby the incumbent government/politician to reduce the level of government anti-smoking campaigns. If the effectiveness of political campaign spending on the expected vote share is small, the government anti-smoking campaigns will be eliminated in the equilibrium.

Finally, whether the non-cooperative outcome or the cooperative outcome is the equilibrium depends on the parameter of the effectiveness of political campaign spending on the expected vote share. If it is large, the non-cooperative outcome is the equilibrium; otherwise, the cooperative outcome is the equilibrium.

1.2 Other Related Literature

Recently there has been a growing research interest in the effects of mass media on public policies. For instance, Besley and Burgess (2002) examine the effects of mass media on the government responsiveness to the public needs in India. Strömberg (2003) also examines a similar issue on the New Deal relief program in the U.S. in the 1930s. Furthermore, Strömberg (2004) investigates the role of mass media on public policy with the media being a profit-maximizing agent in providing information to the public. While these studies show how the presence of mass media could affect government policy, the focus of the current paper is on how governments could engage in public persuasion (through mass media) to benefit themselves in the political interaction with special interest groups. Grossman and Helpman (2001) also investigate the issue of 'educating voters' in an electoral-competition model with active special interest groups.[10] Their focus, however, is on the effect of the timing of interest groups' communication with voters.

The current paper is more closely related to my earlier work (Yu 2005), which extends the work of Grossman and Helpman (1994) to study how opposing interest groups could engage in both 'direct' (lobbying the government) and 'indirect' (persuading the public) competition for political influence.[11] The focus of my earlier work is on the role of public persuasion by

[10]DeMarzo, Vayanos and Zwiebel (2003) recently provided a boundedly rational model of opinion formation in which individuals are subject to persuasion bias.

[11]Although the paper analyzes a government environmental policy, the model can also be applied to the government policy on tobacco with emphasis on the interaction between the tobacco industry and anti-tobacco lobby (since government anti-smoking campaigns could be a result of strong lobby from anti-tobacco interests.

special interest groups, and in particular, on the relationship between the direct and the indirect political competition. The focus of the current paper, however, is on the interaction between an incumbent government and a special interest lobby. The two papers are also different in the methodology. While the first paper uses a reduced-form function for the political cost/support of a government policy that deviates from the public preference, the current paper develops a more general framework, and does not rely on the reduced-form function for the political support of a government policy. In addition, Yu (2005) uses the common-agency framework (i.e., Bernheim and Whinston, 1986) but the current paper uses the Nash bargaining approach.

Among many different approaches in political-economy literature, the Nash bargaining approach has proven to be very useful in analyzing the political interaction between an incumbent government and a special interest group.[12] For example, Maggi and Rodriguez-Clare (1998) use this approach to study trade policy when the government is subject to lobbying from a domestic industry. They show that the government can improve its bargaining position *vis-à-vis* the lobby by committing to free trade. The key insight of their analysis is that without the commitment, the government may become worse off in the long run since the industry will grow stronger (from the misallocation of resources caused by the protective trade policy) in future bargaining. Also, using the Nash bargaining approach, Drazen and Limão (2003) have recently developed a bargaining theory of inefficient redistribution and show that a government may prefer using inefficient policies even when more efficient ones are available for a similar purpose. The reason is that using the efficient policies could actually worsen the bargaining position of the government. The results in both papers, however, are obtained under the assumption that the bargaining power of the government relative to the lobby has to be sufficiently small. In contrast, the current paper does not require such an assumption.

Finally, the *endogenous yardstick competition* approach developed in the current paper is different from a small, but growing, literature on political yardstick competition in the political agency models, spawned by Besley and Case (1995). This literature has its roots in the yard-

[12] As discussed in Yu (2000), the spirit of the Nash bargaining approach is actually similar to that of the common-agency approach since the equilibrium government policy in both approaches maximizes the joint welfare between the incumbent government and the special interest group(s), except that in the Nash bargaining approach no party can make the "take-it-or-leave-it" offer since, in general, both parties have some bargaining power.

stick competition in the regulation and industrial organization literature.[13] The key idea is that in a world/region of *multiple* jurisdictions, the fact that voters can (more easily) compare the policy and performance of their national/local governments to those of *other jurisdictions* will induce yardstick competition among different jurisdictions, which could enhance government efficiency. The yardstick/benchmark performance in these models could be affected by an exogenous shock, which may or may not be common to all jurisdictions. Unlike these models, however, this current paper focuses on a *single* jurisdiction, in which voters compare an incumbent government/politician to a potential 'benchmark/yardstick candidate'. More importantly, the (expected) economic performance of this yardstick candidate can be *endogenously* affected by the policy of the incumbent government.

The rest of the paper is organized as follows. By backwards induction, Section 2 solves the second stage of the game, which characterizes the bargaining equilibrium between the tobacco industry and the incumbent government for the tax rate on tobacco. Section 3 solves both the non-cooperative and cooperative outcome of the first stage of the game. Section 4 discusses the condition that determines whether the equilibrium in the first stage is the non-cooperative outcome or the cooperative outcome. Section 5 concludes.

2 Direct Regulation - Tobacco Taxation

2.1 The Economic Structure

Suppose the production technology in the tobacco industry exhibits constant-return-to-scale and it uses labor and a specific factor to produce a good (x), called tobacco. The wage rate is equal to one by choice of units in the numeraire sector (x_o), which uses a constant-return-to-scale technology with labor as the only input factor. Let p be the price of tobacco, and $\pi(p)$ the (gross) profit of the tobacco industry (i.e., economic rent to the specific factor).

[13] E.g., see Holmstrom (1982), Shleifer (1985), Meyer and Vickers (1997), etc. This idea was first introduced into the political economy literature by Salmon (1987) but it is the relevant empirical findings by Besley and Case that spawned a growing body of the subsequent studies. Also, see a recent study on government accountability by Maskin and Tirole (2004).

Assume individual i has the following utility function:[14]

$$\begin{aligned} U^i &= \theta^i \, \mathrm{u}(x) - \lambda x + x_o - \mu e(X), \\ \theta^i &> 0, \lambda > 0, \mu > 0; \mathrm{u}'(.) > 0, \mathrm{u}''(.) < 0; e'(.) > 0, e''(.) > 0 \end{aligned} \tag{1}$$

where x_o is the consumption of the numeraire good and $\theta^i \, \mathrm{u}(x)$ is the utility of consuming good x. The second term λx is the disutility of smoking and parameter λ is individual i's *perception* (subjective belief) of the extent of the harmful effects of her own smoking. Parameter μ is the *perception* of the extent of the harmful effects of smoking by others in the society (i.e. affected by second-hand smoking). For ease of illustration, parameters λ and μ are assumed to be the same for all individuals but the value of θ^i will depend on whether the individual is a smoker or non-smoker.

Taking the price (p) and the aggregate consumption of tobacco (X) as given, individual i maximizes (1), subject to her budget constraint $y^i = (p+t)x + x_o$, where t is a consumption tax on tobacco and y^i is her income, which is the sum of her wage, her share of the profit of the tobacco industry (net the expenditure of pro-smoking advertising, M), if any, and an equal share of the tax revenue (net the government spending on anti-smoking campaigns, I).

Suppose the total population is L and each individual supplies one unit of labor. There are three groups of individuals in the society: smokers (S), non-smokers (N), and owners of the specific factor in the tobacco industry – the tobacco industrialists (T). Assume that all smokers are identical, with $\theta^i = \theta^S$, and their population share is α^S. An individual smoker has income $y^S = 1 + (tX - I)/L$ and her individual demand function for tobacco is

$$\theta^S \, \mathrm{u}'(x) - (p + t + \lambda) = 0 \tag{2}$$

or (using the inverse demand function),

$$x(p + t + \lambda) \equiv \mathrm{u}'^{-1}(\frac{p + t + \lambda}{\theta^S}) \tag{3}$$

All non-smokers are also identical, with $\theta^i = \theta^N$ and $y^N = y^S$, and their population share is α^N. Assume $\theta^N < \theta^S$ such that $\theta^N \, \mathrm{u}'(0) - (p + t + \lambda) < 0$.

[14] Separability is a common assumption in public economics literature and the quasi-linear assumption implies that the good x industry is small relative to the rest of the economy (i.e. ignoring the income effect). Also, assuming heterogeneous beliefs adds little extra insight except complicating analysis.

The population share of the tobacco industrialists is α^T, which is equal to $1-\alpha^N-\alpha^S$ but is very small relative to α^N and α^S. The tobacco industrialists are also identical, with $\theta^i=\theta^T$ and $y^T=1+(tX-I)/L+(\pi-M)/(\alpha^T L)$. Parameter θ^T can take any value (i.e., they can be smokers or non-smokers) but for the sake of simplicity, I assume $\theta^T=\theta^N$. That is, they form a lobby because they are the tobacco industrialists (not because they are smokers).

Therefore, the aggregate demand for x is

$$X^d(p+t+\lambda)=\alpha^S Lx(p+t+\lambda) \tag{4}$$

By Hotelling's lemma, the supply of tobacco is given by $\pi'(p)$. Setting demand equal to supply

$$\alpha^S Lx(p+t+\lambda)=\pi'(p) \tag{5}$$

we obtain the equilibrium price and the aggregate consumption, $p(t+\lambda)$ and $X(t+\lambda)$, with $p'(.)<0$ and $X'(.)<0$. To avoid more notations, we write the (gross) profit of the tobacco industry as $\pi(t+\lambda)$ with $\pi'(.)<0$. For the rest of our analysis, we only make the argument of our interest explicit in the functions.

Now the indirect utility of individual i becomes

$$V^i=CS^i+y^i-\mu e(X) \tag{6}$$

where $CS^i=\theta^i\,\mathrm{u}(x)-(p+t+\lambda)x$ is her consumer surplus of tobacco if she is a smoker; otherwise it is zero. Specifically, the indirect utility for a smoker is

$$\begin{aligned} V^S &= \theta^S\,\mathrm{u}(x)-(p+t+\lambda)x+1+(tX-I)/L-\mu e(X) \qquad (7)\\ \text{with}\quad t^S &= \arg\max\{V^S(t)=\theta^S\,\mathrm{u}(x(t))-(p(t)+t+\lambda)x(t)+1+(tX(t)-I)/L-\mu e(X(t))\}, \end{aligned}$$

for a non-smoker is

$$\begin{aligned} V^N &= 1+(tX-I)/L-\mu e(X) \qquad (8)\\ \text{with}\quad t^N &= \arg\max\{V^N(t)=1+(tX(t)-I)/L-\mu e(X(t))\}, \end{aligned}$$

and for a tobacco industrialist is

$$\begin{aligned} V^T &= 1+(tX-I)/L+(\pi-M)/(\alpha^T L)-\mu e(X) \qquad (9)\\ \text{with}\quad t^T &= \arg\max\{V^T(t)=1+(tX(t)-I)/L+(\pi(t)-M)/(\alpha^T L)-\mu e(X(t))\}. \end{aligned}$$

We assume $t^N > t^S > t^T$. The first inequality is obvious; the second holds as long as the return to the specific factor is significant.

Given the quasi-linear preference of (1), the aggregate demand function of (4) can be generated by a representative consumer with the following indirect utility function:

$$\begin{aligned} W &= \alpha^S L V^S + \alpha^N L V^N + \alpha^T L V^T \\ &= \alpha^S L \theta^S \, \mathrm{u}(x) - (p+\lambda)X + L + \pi - M - I - \mu E(X) \end{aligned} \tag{10}$$

where $E(X) \equiv Le(X)$ is the aggregate indirect health effect of second-hand smoking. The optimal tax that maximizes the welfare of the representative consumer (i.e. social welfare) is

$$t^* = \arg\max \{W(t) = \alpha^S L \theta^S \, \mathrm{u}(x(t)) - (p(t)+\lambda)X(t) + L + \pi(t) - M - I - \mu E(X(t))\} \tag{11}$$

The first-order condition of (11) is

$$\alpha^S L \theta^S \, \mathrm{u}'(.)x'(t^*) - (p+\lambda)X'(t^*) + L + \pi'(t^*) - M - I - \mu E'(.)X'(t^*) = 0 \tag{12}$$

After taking the derivatives, we obtain

Lemma 1 *$dt^*/d\lambda > 0$ and $dt^*/d\mu > 0$.*

2.2 The Political Structure – Endogenous Yardstick Competition

The endogenous yardstick competition can be derived from the *political competition* approach. Consider, for example, a probabilistic voting model with two parties and one policy dimension, a consumption tax on tobacco. Suppose candidate A (of party A) is in power and its policy is t_A. If candidate B (of party B) – the challenger – is already established and his policy is t_B, then consumer/voter i would vote for candidate A if

$$V^i(t_A) + \sigma^i + \delta > V^i(t_B), \qquad \sigma^i \lesseqgtr 0, \delta \lesseqgtr 0 \tag{13}$$

where $V^i(.)$ is voter i's indirect utility in (6) under different policies, σ^i measures voter i's ideological bias towards candidate A, and δ measures the average relative popularity of candidate A. A positive value of σ^i implies that voter i's bias is in favor of candidate A. But parameters σ^i and δ are random variables from the perspective of both candidates. Assume σ^i is uniformly distributed with mean equal to zero, and its density is the same among all groups. Thus,

all groups receive the same weight in the probabilistic model. In addition, suppose campaign spending affects the popularity of the candidate, and therefore δ has two components:

$$\delta = \widetilde{\delta} + h(C_A - C_B), \quad h > 0 \tag{14}$$

where $\widetilde{\delta}$ is distributed uniformly with mean equal to zero and density ψ, and C_j, $(j = A, B)$, is the campaign spending by candidate j. According to the second term in (14), the candidate who outspends the other becomes more popular, where the parameter h measures the effectiveness of campaign.[15] Following Persson and Tabellini (2000), I assume that candidates maximize the probability of winning (i.e., the probability that the vote share exceeds 1/2). Therefore, the electorate outcome is a random event from the perspective of both candidates, and candidate A's probability of winning is

$$G_A = \frac{1}{2} + \psi[W(t_A) - W(t_B) + h(C_A - C_B)] \tag{15}$$

where $W(.)$ is the aggregate welfare in (10) under different policies, and the last term in the square bracket reflects the influence of campaign spending on the expected vote share.[16]

Now, suppose that candidate A is the incumbent politician/government and candidate B is the challenger. But if the next election is still far away, the challenger is not yet established.[17] Therefore, in judging the incumbent politician, voters will have to find a "benchmark/yardstick" to compare. Suppose the benchmark is $(\overline{t}, \overline{C})$. Therefore, taking $\overline{t}$ and $\overline{C}$ as given, the incumbent politician maximizes the following objective function (dropping off subscript A)

$$G = \frac{1}{2} + \psi[W(t) - W(\overline{t}) + hC - h\overline{C}] \tag{16}$$

A natural benchmark is the policy that maximizes the social welfare, although it could be something else (e.g., the median voter's preference). In this paper, we choose $\overline{t} = t^*$. This also

[15] C_j could also be introduced into a voter's indirect utility function, which then will imply that campaign spendings are informative in the sense that they reduce voters' cost in understanding the policy of the candidate. Hettich and Winer (1999, ch. 6) discuss the efficiency of the different kinds of political advertising.

[16] See Persson and Tabellini (2000) for more details. As pointed out by these authors, the expression in (15) is equivalent to assuming that some voters, but not others, are informed about the candidates' ideological attributes (e.g., as in Baron, 1994; Grossman and Helpman, 1996).

[17] In a multi-party democracy, it is not always clear which party will become the main challenger to the incumbent government until the next election is very close. Even in a two-party democracy, who will become the challenger to the incumbent politician is decided not far away from the next election.

implies that voter i will approve (vote for) the incumbent politician if

$$V^i(t) + \sigma^i + \delta > V^i(t^*) \tag{17}$$

Without loss of generality, we suppress all the constant variables/parameters in (16) that are not of our interest (e.g., $\Psi, \overline{C}, 1/2$). Therefore, the incumbent government maximizes the following objective function

$$G = W(t) - W(t^*) + hC \tag{18}$$

We call (18) the *endogenous yardstick competition* approach. Assume C comes from (and is equal to) the total political contributions of organized special interest groups.

Notice that one nice feature of (18) is that it retains the same interpretation (i.e., in terms of the expected vote share) as (15) in the *political competition* approach. Furthermore, compared to the *political contribution* approach, it has the following advantage. In the endogenous yardstick competition approach, the level of social welfare is no longer an important indicator of the public support of the incumbent government. This is important, especially when our analysis will be carried out in an environment in which some underlying parameters are changing.[18] Now, a change in an underlying parameter that raises social welfare under the policy of the incumbent government, also increases the yardstick-level of social welfare. Hence, it is no longer obvious whether the political support of the incumbent government will actually increase or decrease. When the yardstick is exogenous, however, the yardstick competition approach is equivalent to the political contribution approach. Therefore, the endogenous yardstick is a key element in this proposed new approach.

2.3 The Political Equilibrium Taxation

To focus on the interaction between the tobacco industry and the incumbent government, we assume that only the tobacco industrialists are able to form a special interest group, the tobacco lobby. In the second stage of the game, the tobacco lobby and the incumbent government engage in bargaining over the level of the tax (t) and the amount of political contributions

[18] Welfare analysis of advertising that changes consumer tastes also faces a similar problem. See Dixit and Norman (1978) for a suggestion of the welfare comparison of the outcomes under each benchmark, pre-advertising or post-advertising. Also, as will become clear, in the current model, the comparison in our analysis hinges more on the actual consumption level rather than the level of social welfare [e.g., $X(t) - X(t^*)$ rather than $W(t) - W(t^*)$].

(C_t).[19] To keep the structure as simple as possible, we model the bargaining process as a Nash bargaining game. Since the threat point is $\{t^*, 0\}$, the net gain from the bargaining is $G - \underline{G} = W(t) - W(t^*) + hC$ for the government and $\Pi - \underline{\Pi} = [\pi(t) - M - C] - [\pi(t^*) - M]$ for the industry, where $\underline{G} = 0$ and $\underline{\Pi} = \pi(t^*) - M$ are the threat-point outcome. The Nash bargaining solution solves the following optimization problem:

$$\max_{t, C_t} (G - \underline{G})^{\beta} (\Pi - \underline{\Pi})^{1-\beta} \qquad 0 < \beta < 1 \tag{19}$$

where β represents the bargaining power of the government relative to the industry. The Nash bargaining outcome, denoted by $\{t^o, C_t^o\}$, is given by

$$\begin{aligned} \text{i)} \qquad t^o &= \arg\max \ \{J_t = G + h\Pi\} \\ &= \arg\max \ \{W(t) - W(t^*) + h(\pi(t) - M)\} \end{aligned} \tag{20}$$

where $J_t = G + h\Pi$ can be interpreted as the joint surplus of the government and the tobacco industry.

$$\text{ii)} \qquad C_t^o = \frac{1}{h}\{[W(t^*) - W(t^o)] + \beta[W(t^o) - W(t^*) + h\pi(t^o) - h\pi(t^*)]\} \tag{21}$$

Obviously, $t^o < t^*$ and hence $X(t^o) > X(t^*)$. The first-order condition of (20) is

$$\sum_{i=1}^{N} \mathrm{u}_i' \, x_i' - (p + \lambda)X' + \pi' - \mu E' X' + h\pi' = 0. \tag{22}$$

After taking the derivatives, we obtain

Lemma 2 *$dt^o/d\lambda > 0$ and $dt^o/d\mu > 0$.*

The net welfare for the tobacco industry is

$$\begin{aligned} \Pi^o &= \pi(t^o) - M - C_t^o \\ &= \frac{1-\beta}{h}[W(t^o) - W(t^*) + h\pi(t^o)] + \beta\pi(t^*) - M \end{aligned} \tag{23}$$

and for the government,

$$\begin{aligned} G^o &= W(t^o) - W(t^*) + hC_t^o \\ &= \beta[W(t^o) - W(t^*) + h\pi(t^o) - h\pi(t^*)] \end{aligned} \tag{24}$$

The equilibrium joint surplus is $J_t^o = G^o + h\Pi^o$ and the threat-point joint surplus is $\underline{J} = h\underline{\Pi}$.

[19] Since there is only one organized group, the superscript is omitted for the rest of the analysis.

3 Pro-smoking and Anti-smoking Campaigns

Having solved the second stage of the game, this section focuses on the first stage of the game, where the battle over information on smoking takes place. It also discusses both non-cooperative and cooperative outcomes in the first stage of the game. Section 4 will discuss the conditions under which the equilibrium is the cooperative or non-cooperative outcomes.

According to a recent book by Sloan, et al. (2003), the past century witnessed a battle of messages over smoking. For decades, consumers received mixed signals. On the one hand, they were told that smoking was a bad habit and that statistical evidence unambiguously demonstrated the substantial health harms.[20] On the other hand, tobacco companies criticized or belittled the evidence, until very recently. Anti-smoking campaigns were countered by arguments from tobacco companies and affiliate organizations casting doubt on the evidence of the harmful effects of smoking.[21]

Governments and interest groups do not have to change the public's preference. It is sufficient that their persuasions can influence the public's perception/belief about the extent of the harmful effects of smoking. In the literature of political elections, there are several ways of capturing how political advertising could influence the voters' perception. Following Congleton (1986), we use a mechanism analogous to Bayes' law. A Bayesian mechanism is desirable because it captures the issue that persuasions have effects on the public's perception through affecting their posterior probability belief.[22] Unlike the signalling games in which informed agents try to reveal the signals they receive to the public, the role of the government and tobacco industry in this model is simply to either raise or lower the public's belief, respectively. To capture the battle over information on smoking, we assume that $\lambda = \lambda(I, M)$ with $\lambda_1 > 0$, $\lambda_2 < 0$, $\lambda_{12} = 0$, and $\mu = \mu(I, M)$ with $\mu_1 > 0$, $\mu_2 < 0$, $\mu_{12} = 0$, where I is the amount of money (financed by the tobacco tax revenue) spent on anti-smoking campaigns by the government, and M is that

[20] Only towards the latter part of the century did the government emerge as a major proponent of tobacco control since most of the evidence on the adverse health effects of smoking has been accumulated since 1950.

[21] Before the 70's, tobacco companies misinformed the public about the risks of smoking through their advertising campaigns (e.g. Hanson and Logue 1998). Today, even the tobacco companies do not dispute the conclusion that smoking is harmful to one's health.

[22] Assuming the general public uses Bayes' rule to update their belief is common in political science literature and is used recently in Grossman and Helpman (2001).

spent on pro-smoking campaigns by the tobacco lobby.[23]

The tobacco industry will try to lower λ and μ, and choose M to maximize (23). The optimal level of M, which will be a function of I, is given by

$$M(I) = \arg\max \ \{\Pi^o(M, I) = (\frac{1-\beta}{h})[W(t^o) - W(t^*) + h\pi(t^o)] + \beta\pi(t^*) - M\} \qquad (25)$$

Suppose initially there is no government anti-smoking campaign. Then, the optimal level of M is $M^T \equiv M(0)$.

After Section 3.1, it will become clearer that the role of expenditure M, which lowers λ (and μ), is more than just advertising to increase the demand for tobacco.[24]

3.1 The Effects of Government Anti-smoking Campaigns

Whether it is a nation-wide war on smoking or just a battle against the tobacco industry in a state, the politics of tobacco is fascinating. In November 1988, for instance, the state of California passed the California Tobacco Tax and Health Promotion Act (Proposition 99), which increased the tax on cigarettes by 25 cents per pack and earmarked 20 percent of the revenues from this new tax for anti-smoking media campaigns. One would expect that the tobacco industry would fight back by intensifying its media advertising in order to weaken the impact of the increasing tax and the anti-smoking campaign. However, the industry media expenditures in the state actually decreased soon after the passage of Proposition 99 (Hu *et al.* 1995). On the other hand, the tobacco industry's political expenditures/contributions soared.[25]

To examine the effects of government anti-smoking campaigns, we start from $I = 0$ and $M = M^T$, and analyze the effect of an increase in I. The full non-cooperative equilibrium outcome will be characterized in Section 3.2. As discussed earlier, government anti-smoking campaigns could be the result of lobby from anti-tobacco interests. But since this paper focuses

[23] We assume $\lambda_{12} = 0$ and $\mu_{12} = 0$ to eliminate any other strategic interaction that is not the interest of this paper.

[24] Tobacco advertising may also increase θ^i (e.g., to make kids feel cool about smoking) and α^S. Given the nature of the battle over information on smoking, we focus on the effect on λ (and μ), although these effects are analytically equivalent for the results in the paper.

[25] "Following Proposition 99's passage, tobacco industry political expenditures in California in current dollars increased 10-fold, from $790,050 in the 1985-1986 election to $7,615,091 in 1991-1992" (Begay et al. 1993). It appears that, according to the study, the tobacco industry exerted behind-the-scenes lobbying in the California legislature to divert funds earmarked for anti-smoking campaigns to other purposes (which will be captured in Section 3.4). However, I will identify another reason in Section 3.1.

on the interaction between the incumbent government and the tobacco industry, we investigate the government's incentive for initiating anti-smoking campaigns.

From (20) and (24), notice that the government's welfare is equal to β share of the net gain of the joint surplus:

$$\begin{aligned} G^o &= \beta[W(t^o) - W(t^*) + h\pi(t^o) - h\pi(t^*)] \\ &= \beta[J_t(t^o) - \underline{J}] \end{aligned} \tag{26}$$

Taking derivative with respect to I and using the envelope theorem, we obtain

$$\begin{aligned} \frac{1}{\beta}\frac{dG^o}{dI} &= \frac{dJ_t(t^o)}{dI} - \frac{d\underline{J}}{dI} \\ &= \underbrace{[X(t^*) - X(t^o)]\lambda_1 + [E(X(t^*)) - E(X(t^o))]\mu_1}_{(-)} - \underbrace{h\pi'(.)(\frac{dt^*}{dI} + \lambda_1)}_{(-)} \end{aligned} \tag{27}$$

Therefore, we have the following proposition.

Proposition 1 *Although a government anti-smoking campaign reduces the joint surplus, the government can benefit from it. Specifically,*

(i) $dJ_t^o/dI < 0$;

$$\text{(ii) } dG^o/dI > 0 \quad \text{if} \quad \pi'(t^*) < \frac{(t^* - t^o)\Delta^*}{h}[\frac{X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}{\Delta^*\lambda_1 + X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}] \tag{28}$$

where $\Delta^* < 0$ *is the second-order condition for (11).*

Proof: See the appendix.

Notice that the result relies on the difference in the consumption level, $X(t^o) - X(t^*)$, rather than the welfare/utility level, $W(t^o) - W(t^*)$. Also, the result does not depend on β, the bargaining power of the government relative to tobacco lobby.[26]

The intuitions of the results are as follows. A higher level of λ and μ will reduce the joint surplus because the aggregate consumption of tobacco at the bargaining equilibrium is relatively higher (i.e. $X(t^o) > X(t^*)$). Then, why would an incumbent government launch anti-smoking campaigns to raise λ and μ? The reason for this is as follows. An anti-smoking campaign has two effects on the industry's profit. A higher λ reduces $\pi(t^*)$ directly because it lowers

[26] In contrast to Maggi and Rodríguez-Clare (1998) and Drazen and Limão (2003), our results do not require the assumption that the bargaining power of the government relative to the lobby has to be sufficiently small.

the aggregate demand for tobacco. It also lowers $\pi(t^*)$ because of an increase in t^* (due to the higher level of λ and μ). These two effects reduce the tobacco industry's welfare at the threat-point, which consequently creates more surplus in the bargaining for the government to share. The government will be better off if the first term in (27) is less than the second. In essence, what the government does in anti-smoking campaigns is reduce the tobacco industry's alternative welfare (i.e., welfare of your opponent's outside option). By doing so, the government can improve its equilibrium welfare even though the relative bargaining power β remains the same.[27]

Noticing that $\pi'(.) < 0$,we can also write condition (28) as

$$|\pi'(t^*)| > \frac{(t^o - t^*)\Delta^*}{h}[\frac{X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}{\Delta^*\lambda_1 + X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}] \tag{29}$$

Since the term in the square bracket of (29) is positive but less than 1, a sufficient condition would be $|\pi'(t^*)| > \Delta^*(t^o - t^*)/h$. We will have more discussion about condition (29) in Section 3.3. For the rest of our analysis, we only consider the case in which (29) holds. When (29) does not hold, it will be an uninteresting case in which I is always equal to zero.

The results of Proposition 1 can be illustrated in Figure 1. Suppose the initial Nash bargaining equilibrium is at point A, with $\{G_A, \Pi_A\}$ as the equilibrium outcome, and $\{\underline{G}, \underline{\Pi}\}$ as the threat-point outcome. A government anti-smoking campaign shifts the joint surplus line from J_t to J_t'. But it also reduces the threat-point level of the tobacco industry's welfare from $\underline{\Pi}$ to $\underline{\Pi}'$. As a result, the original indifference curve associated with point A is shifted left to the one associated with point A'. Notice that since the initial indifference curves are homothetic at $(\underline{G}, \underline{\Pi})$ as the origin and the new/shifted indifference curves are homothetic at $(\underline{G}, \underline{\Pi}')$ as the origin, G_B is higher than G_A at the new Nash bargaining equilibrium (at point B).

Notice that in the model, we have $\underline{G} = 0$ and government anti-smoking campaigns do not affect $\underline{G}$. But this is just a modelling strategy (for simplicity) and it is easy to see that, by relaxing this assumption, our results will still hold as long as the impact of government anti-smoking campaigns on $\underline{\Pi}$ is much greater than that on $\underline{G}$ (so that point B is still higher than point A, as in Figure 1).

[27] As will become clear, unlike in the current analysis, the effects of a change in the bargaining power are much simpler. For instance, an increase in β will not affect t^o and $J(t^o)$, but it will increase C^o and consequently, G^o will be higher but Π^o and $\Pi^o - \underline{\Pi}$ will be lower.

From Lemmas 1 and 2, it is straightforward to obtain the next result, which characterizes the effect of anti-smoking campaigns on the level of the equilibrium tax rate.

Lemma 3 (i) $dt^*/dI > 0$; (ii) $dt^o/dI > 0$.

An anti-smoking campaign increases the public's awareness of the adverse effects of smoking and consequently raises t^* and t^o. How will this affect the level of political contributions from the tobacco industry? From (24) and the envelope theorem, we have

$$h\frac{dC_t^o}{dI} = [X(t^o) - X(t^*)]\lambda_1 + [E(X(t^o)) - E(X(t^*))]\mu_1 - W'(t^o)\frac{dt^o}{dI} + \frac{dG^o}{dI} \tag{30}$$

The first two terms are the first-order/direct effects, and they are positive. The third term is the second-order/feedback effect, due to the subsequent change of t^o(as a result of the higher level of λ and μ), and is negative. Under the normal circumstance, the first-order effects dominate the second-order effect. Therefore, we have the following results.

Proposition 2 *Government anti-smoking campaigns not only increase the equilibrium tax rate but can also force the tobacco industry to increase its political contributions. Specifically,*

$$dC_t^o/dI > 0 \quad \text{if} \quad W'(t^o)\frac{dt^o}{dI} < [X(t^o) - X(t^*)]\lambda_1 + [E(X(t^o)) - E(X(t^*))]\mu_1 \tag{31}$$

As mentioned in Section 1, the tobacco industry's political contributions in California increased dramatically soon after the passage of Proposition 99. A common explanation is that the tobacco industry exerted behind-the-scenes lobbying in order to water down California's anti-smoking campaigns (Begay, 1993). This explanation will be examined in Section 3.4 as the cooperative outcome of the first stage of the game. Proposition 2, however, suggests that political contributions from the tobacco industry could also go up even as the non-cooperative outcome. This result actually is consistent with the stylized fact that political contributions from the tobacco industry continue to increase while the governments at all levels in the U.S. continue to launch anti-smoking campaigns against the tobacco industry.

To better understand why the level of political contributions from the tobacco industry could be higher as a result of government anti-smoking campaigns, we should look at how they affect the tobacco industry's welfare at the bargaining equilibrium ($\Pi^o = \pi(t^o) - M^T - C_t^o$) and at the threat-point ($\underline{\Pi} = \pi(t^*) - M^T$). The next proposition characterizes the results.

Proposition 3 *The tobacco industry's welfare is reduced as a result of government anti-smoking campaigns, but its potential loss of not/less lobbying becomes even greater. That is,* $d\underline{\Pi}/dI <$

$d\Pi^o/dI < 0$.

Proof: See the appendix.

Although government anti-smoking campaigns reduce the welfare of the tobacco industry in the bargaining equilibrium, the threat-point outcome becomes even worse for the tobacco industry. As a result, (ironically) this now implies that the net gain from the bargaining becomes higher for the tobacco industry, i.e., $d(\Pi^o - \underline{\Pi})/dI > 0$ (from Proposition 3).[28] Therefore, the government will benefit from sharing this gain and consequently, C_t^o has to increase. In essence, government anti-smoking campaigns push the tobacco industry into a weaker bargaining position. The result of Proposition 3 is very clear in Figure 1. That is, although $\Pi_B < \Pi_A$, we have $\Pi_B - \underline{\Pi}' > \Pi_A - \underline{\Pi}$ (since $\Pi_{A'} - \underline{\Pi}' = \Pi_A - \underline{\Pi}$ and $\Pi_B > \Pi_{A'}$).

3.2 The Non-cooperative Outcome

In this section, we characterize the non-cooperative equilibrium outcome of the first stage of the game. That is, the government and the tobacco industry face the following optimization problem:

$$\max_I \ \{G^o(I, M) = \beta[W(t^o) - W(t^*) + h\pi(t^o) - h\pi(t^*)]\} \tag{32}$$

$$\max_M \ \{\Pi^o(M, I) = (\frac{1-\beta}{h})[W(t^o) - W(t^*) + h\pi(t^o)] + \beta\pi(t^*) - M\} \tag{33}$$

respectively. Using the envelope theorem, we obtain the following first-order condition for (32),

$$G_1^o = \beta[X(t^*) - X(t^o)]\lambda_1 + \beta[E(X(t^*)) - E(X(t^o))]\mu_1 - \beta h\pi'(t^*)(\frac{dt^*}{dI} + \lambda_1) = 0 \tag{34}$$

Solving for I, we obtain the government's best response function, $I(M)$. Similarly, the first-order condition for (33) is

$$\Pi_1^o = (\frac{1-\beta}{h})\{[X(t^*) - X(t^o)]\lambda_2 + [E(X(t^*)) - E(X(t^o))]\mu_2\} + \beta\pi'(t^*)(\frac{dt^*}{dM} + \lambda_2) - 1 = 0 \tag{35}$$

Solving for M, we obtain the tobacco industry's best response function, $M(I)$.

The second-order and regularity conditions for the interior solution require that Π_{11}^o, Π_{12}^o, $G_{11,}^o$ $G_{12}^o < 0$ and $\Pi_{11}^o G_{11}^o - \Pi_{12}^o G_{12}^o > 0$. From (34) and (35) , we can solve the Nash equilibrium

[28] Alternatively, we can also write $d\Pi^o/d\underline{\Pi} > 1$. Hillman (1989, pp29) derives a similar insight in an analysis of political economy of trade protection: "..., although the domestic price necessarily declines with a fall in the world price, the level of protection may increase or decrease."

outcome of the non-cooperative game, $\{\underline{M}, \underline{I}\}$. This non-cooperative outcome will also serve as the threat-point outcome of the cooperative game in the first stage of the game in Section 3.4.

Notice that the slope of the tobacco industry's best response function is negative since $M'(I) = -\Pi^o_{12}/\Pi^o_{11} < 0$. Similarly, the slope of the government's best response function is also negative ($I'(M) = -G^o_{12}/G^o_{11} < 0$). Thus, the industry's pro-smoking and the government's anti-smoking campaigns are strategic substitutes. This might explain what was found in Hu et al. (1995) that soon after the passage of Proposition 99, the tobacco industry reduced the amount of media expenditures in the state, rather than increasing it to weaken the impact of the government anti-smoking campaign.[29]

Also, notice that the results in Section 3.1 will hold even when the tobacco industry responds optimally, as in Section 3.2. Since the best response function for the tobacco industry is negatively slopped, M decreases in response to the government anti-smoking campaign. As a result, λ and μ become large, which will reinforce all the results in Section 3.1.

3.3 The Causes

What will induce the government to launch anti-smoking campaigns? From condition (28), or (29) as also listed below

$$|\pi'(t^*)| > \frac{(t^o - t^*)\Delta^*}{h}[\frac{X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}{\Delta^*\lambda_1 + X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}],$$

notice that the higher the value of parameter h, the easier the condition will be satisfied under which the government will benefit from anti-smoking campaigns. From (14) and (18), a higher value of h means that campaign spending becomes more effective in influencing the expected vote share. Therefore, we have

Remark 1 *A rise in the effectiveness of campaign spending on the expected vote share induces the government to launch anti-smoking campaigns.*

Furthermore, we can also examine how a change in h would affect $\underline{I}$, the equilibrium effort of government anti-smoking campaigns. The next proposition has the result.[30]

[29]However, there is also evidence that the tobacco industry turns to lobbying and other form of advertising (Hu et al. 1995).

[30]It is not difficult to show by introducing asymmetry in the effectiveness of the tobacco industry's pro-smoking and the government's anti-smoking campaigns in the model (similar to Yu, 2005), that the equilibrium level of government anti-smoking campaigns $\underline{I}$ will also increase if the growing medical evidence favors government anti-smoking campaigns.

Proposition 4 *$d\underline{I}/dh > 0$. That is, a rise in the effectiveness of campaign spending on the expected vote share leads to a higher level of government anti-smoking campaigns.*

Proof: See appendix.

If campaign spending becomes more effective in influencing the expected vote share, the government can afford to deviate more from t^* in choosing t^o.[31] But why would a rise of h increase the government spending on anti-smoking campaigns? To understand the intuition behind this result, we need to recall why the government could benefit from anti-smoking campaigns in the first place. From (27), notice that the key for the government to gain is that anti-smoking campaigns reduce the joint surplus at the threat-point. A rise in h increases the amount of this reduction at the margin and, therefore, raises the marginal gain of anti-smoking campaigns.

Furthermore, we have the following result.

Proposition 5 *$dC_t^o/dh > 0$. That is, a rise in the effectiveness of campaign spending on the expected vote share also leads to an increase in the equilibrium political contributions from the tobacco industry.*

Proof: Use Propositions 2 and 4, and notice that $dC_t^o/dh = (dC_t^o/dI)(d\underline{I}/dh) > 0$ ■

3.4 The Cooperative Outcome

When California's governor ordered the Department of Health Services not to sign a new $16 million contract for anti-smoking media campaigns in January 1992, he cited California facing the worst budget crisis in its history – a $6 billion deficit over the next 18 months. However, anti-tobacco advocates claim that the $16 million for the anti-smoking media campaign is only a drop in California's $60 billion budget; the real reason was that the tobacco industry exerted behind-the-scenes lobbying in the California legislature to divert funds for California's widely acclaimed anti-smoking media campaign to other purposes.[32] In this section, we characterize the cooperative equilibrium outcome of the first stage of the game.

In the first stage, the tobacco lobby offers political contributions C_I (apart from C_t in the second stage of the game) in exchange for a lower level of anti-smoking campaigns (I). The

[31] Total differentiation of the first-order condition for (20) gives $dt^o/dh < 0$.

[32] For example, according to Skolnick (1992), "After losing [failing to prevent the approval of Proposition 99], the industry turned its attention towards lobbying and making political contributions, through which it hoped to obtain enactment legislation that would divert tobacco tax revenues from funding anti-smoking programs to paying for medical care for the poor."

tobacco industry then optimally chooses M according to (25). To keep the structure as simple as possible, we also model the first stage of the game as a Nash bargaining process, i.e.,

$$\max_{I,C_I} \{G^o(I, M(I)) + hC_I - G^o(\underline{I}, \underline{M})]\}^{\beta} \{\Pi^o(M(I), I) - C_I - \Pi^o(\underline{M}, \underline{I})\}^{1-\beta} \tag{36}$$

The interior solution of the cooperative outcome, $\{I^o, C_I^o\}$, should satisfy the following two conditions:

$$\text{i) } I^o = \arg\max\{J_I = G^o(I, M(I)) + h\Pi^o(M(I), I)\} \tag{37}$$

$$\text{ii) } C_I^o = \frac{1}{h}\{[G^o(\underline{I}, \underline{M}) - G^o(I^o, M(I^o))] + \beta[G^o(I^o, M(I^o)) + h\Pi^o(M(I^o), I^o) - G^o(\underline{I}, \underline{M}) - h\Pi^o(\underline{M}, \underline{I})]\} \tag{38}$$

From (23-24), we obtain

$$J_I = G^o(I, M(I)) + h\Pi^o(M(I), I) = W(t^o) - W(t^*) + h\pi(t^o) - hM \tag{39}$$

Therefore, the first-order condition for (37) becomes,

$$\begin{aligned} \frac{dJ_I}{dI} &= \frac{\partial J_I}{\partial I} + \frac{\partial J_I}{\partial M} M'(I) \qquad (40) \\ &= \underbrace{[X(t^*) - X(t^o)][\lambda_1 + \lambda_2 M'(I^o)]}_{(-)} + \underbrace{[E(X(t^*)) - E(X(t^o))][\mu_1 + \mu_2 M'(I^o)]}_{(-)} - \underbrace{hM'(I^o)}_{(-)} = 0 \end{aligned}$$

Notice that if parameter h is very small, dJ_I/dI is always negative. Then, the tobacco industry is able to continue bribing the government to reduce I until it reaches zero. Specifically, if

$$h < \{[X(t^*) - X(t^o)][\lambda_1 + \lambda_2 M'(0)] + [E(X(t^*)) - E(X(t^o))][\mu_1 + \mu_2 M'(0)]\}/M'(0)$$

the cooperative outcome of the first stage of the game is

$$\begin{aligned} \text{(i)} \quad I^o &= 0 \\ \text{(ii) } C_I^o &= \frac{1}{h}\{[G^o(\underline{I}, \underline{M}) - G^o(0, M^T)] + \beta[G^o(0, M^T) + h\Pi^o(M^T, 0) - G^o(\underline{I}, \underline{M}) - h\Pi^o(\underline{M}, \underline{I})]\} \end{aligned}$$

Interestingly, this result seems to support the following finding by Skolnick (1992) citing the work by Begay and Glantz (1992): "... the industry succeeded in getting a section into enactment legislation, which was passed in 1991, that allows the progressive underfunding of anti-tobacco education and research program. ... [Begay and Glantz] predict that this legislation will totally

eliminate the anti-tobacco programs by 1996-1997 fiscal year." What really happened in California is that, according to Monardi et al. (1996), despite the Superior Court judges repeatedly ruling the California Legislature's and Governor's diversion of monies from the Proposition 99 media campaign illegal, $280 million had been diverted from anti-tobacco education and research since it was started in 1988.

4 The Equilibrium Outcome

The tide in California finally turned in 1998 when the new governor started to remedy the action of the previous administration in debilitating the state-funded California Tobacco Control Program (Magzamen and Glantz, 1999). He vetoed $32 million that the Legislature had appropriated from anti-smoking education programs. In November 1998, the California state passed Proposition 10, which further increased tax on tobacco to fund a program that will promote child development programs and education campaigns. On June 12, 1997, the State of California became the 37th state to file lawsuits against the tobacco industry.

A similar picture has emerged at the national level in the U.S. In addition to the various anti-smoking programs by the federal government (as discussed at the beginning of the paper), the Comprehensive Smoking Education Act of 1984 instituted four rotating health warning labels on cigarette packages and advertisements, all of which were designated as "Surgeon General's Warnings." In 1993, the Environmental Protection Agency (EPA) officially recognized second-hand smoke as a cause of cancer in non-smokers. In 1994, the House Subcommittee on Health and Environment held a series of congressional hearings on smoking and health, and its findings led to renewed interest in having the FDA regulate cigarettes as a drug. Furthermore, on the 23rd of August 1996, Clinton announced the nation's first comprehensive program to prevent children and adolescents from smoking cigarettes or using smokeless tobacco. Most recently, after the successful lawsuits against the tobacco industry by many state governments, the federal government in the U.S. has also launched its lawsuit against several top cigarette makers (including Philip Morris, R.J. Reynolds, etc.) for lying to the public about the health hazards of smoking, etc. (*The Economist,* 18th-24th September 2004, pp65-66).

What determines whether it will be the cooperative or non-cooperative equilibrium outcome in the first stage of the game? From (40) in this model, notice that if parameter h is very large,

dJ_I/dI will always be positive. Specifically, when

$$h > \frac{1}{M'(\underline{I})}\{[X(t^*) - X(t^o)][\lambda_1 + \lambda_2 M'(\underline{I})] + [E(X(t^*)) - E(X(t^o))][\mu_1 + \mu_2 M'(\underline{I})]\}$$

we have $dJ_I/dI > 0$ at $(\underline{I}, \underline{M})$. That is, a reduction of I will actually lower their join surplus. Thus, the tobacco industry is not able to bribe the government to reduce the level of anti-smoking campaigns. Therefore, we obtain the following proposition.

Proposition 6 *If $h > \widetilde{h}$, the non-cooperate outcome is the equilibrium in the first stage of the game; otherwise, the cooperative outcome is the equilibrium, where* $\widetilde{h} = \{[X(t^*) - X(t^o)][\lambda_1 + \lambda_2 M'(\underline{I})] + [E(X(t^*)) - E(X(t^o))][\mu_1 + \mu_2 M'(\underline{I})]\}/M'(\underline{I})$.

Why does the non-cooperative outcome become the equilibrium if h is large? The reason for this is as follows. When I is reduced, the tobacco industry will optimally increase M. However, an increase of \$1 in M, *ceteris paribus,* reduces the joint surplus by $\$h$. If h is large, there will be no gain in the join surplus, and hence the tobacco industry cannot afford to bribe the government to reduce the level of anti-smoking campaigns.

From (14) and (18) notice that parameter h measures the effectiveness of campaign spending. If there are more swing voters, campaign spending is likely to be more effective. Therefore, in addition to the political pressure from the anti-tobacco lobby, Proposition 6 has identified a purely political reason for the government anti-smoking campaigns. The increasing trend in the political contributions from the tobacco industry is also consistent with our results of the non-cooperative equilibrium outcome in Section 3.

5 Concluding Remarks

This paper develops an endogenous yardstick competition approach to analyze the impact of government anti-smoking campaigns on the political interaction between the government and the tobacco lobby. It is shown that by engaging in anti-smoking campaigns, the incumbent government can improve its bargaining position relative to the tobacco industry in the determination of the political equilibrium taxation on tobacco. Government anti-smoking campaigns not only increase the equilibrium taxation on tobacco, but they also force the tobacco lobby to increase its political contributions. These effects of government anti-smoking campaigns are further reinforced when political campaign spending becomes more effective in increasing expected vote share.

The proposed endogenous yardstick competition approach will fill a gap in the literature on research in the political economy of government policy. The approach is new, but its methodology retains some elements of both the political competition approach and the political contribution approach. When the yardstick is exogenous, for example, our approach is equivalent to the political contribution approach. Therefore, the endogenous yardstick is a key element in this proposed new approach. However, unlike the rival political candidate in the political competition approach, the "benchmark candidate" in the endogenous yardstick competition approach does not behave strategically.

The main message of this paper is about the potential impact of government anti-smoking campaigns on the political interaction between the government and the tobacco lobby. Using the modern game theory, we have also obtained a few other results from the equilibrium analysis. Caution should be taken, however, when we try to interpret the results literally for the anti-smoking campaigns at various government levels. (I am not proposing a conspiracy theory!) In addition, as discussed at the beginning of this paper, the role of the anti-tobacco interests is certainly very important, but it is not the focus of this paper.[33]

Finally, although I use government anti-smoking campaigns for the analysis, more generally, this paper focuses on the government's strategy of engaging in public persuasion in order to benefit itself from the political interaction with special interest groups. The main insight of this paper might be useful when we analyze some other types of government policies (e.g., environmental policy). As long as public preferences are taken into account to some extent by the government in the political process, both the government and the special interest groups can explore how to benefit from engaging in public persuasion.

[33]See Yu (2005) for such a framework.

Appendix

Proof of Proposition 1: From (20), using the envelope theorem, we obtain

(i)
$$\begin{aligned}\frac{dJ_t^o}{dI} &= -X(t^o)\lambda_1 - E(X(t^o))\mu_1 + X(t^*)\lambda_1 + E(X(t^*))\mu_1 \\ &= [X(t^*) - X(t^o)]\lambda_1 + [E(X(t^*)) - E(X(t^o))]\mu_1 < 0\end{aligned}$$

(ii) From (24), using the envelope theorem and (11), we obtain

$$\begin{aligned}\frac{1}{\beta}\frac{dG^o}{dI} &= -X(t^o)\lambda_1 - E(X(t^o))\mu_1 + X(t^*)\lambda_1 + E(X(t^*))\mu_1 - h\pi'(.)(\frac{dt^*}{dI} + \lambda_1) \\ &= [X(t^*) - X(t^o)]\lambda_1 + [E(X(t^*)) - E(X(t^o))]\mu_1 \\ &\quad -h\pi'(.)\frac{(\Delta^* + X'(t^*))\lambda_1 + E'X'(t^*)\mu_1}{\Delta^*}\end{aligned}$$

where $\Delta^* < 0$ is the second-order condition for (11).

Therefore, we have $dG^o/dI > 0$ if

$$\pi'(t^*) < (\frac{\Delta^*}{h})[\frac{(X(t^*) - X(t^o))\lambda_1 + (E(X(t^*)) - E(X(t^o)))\mu_1}{(\Delta^* + X'(t^*))\lambda_1 + E'X'(t^*)\mu_1}] \tag{41}$$

Using Taylor expansion (neglecting the second- and higher order effect), we have

$$X(t^*) - X(t^o) = (t^* - t^o)X'(t^*) \tag{42}$$

and

$$E(X(t^*)) - E(X(t^o)) = (t^* - t^o)E'X'(t^*) \tag{43}$$

Therefore,

$$\pi'(t^*) < \frac{(t^* - t^o)\Delta^*}{h}[\frac{X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}{\Delta^*\lambda_1 + X'(t^*)\lambda_1 + E'X'(t^*)\mu_1}] \tag{44}$$

Notice that since the term in the square bracket is positive but less than 1, a sufficient condition would be

$$\pi'(t^*) < \frac{(t^* - t^o)\Delta^*}{h} \text{ or } |\pi'(t^*)| > \frac{(t^o - t^*)\Delta^*}{h} \qquad \blacksquare \tag{45}$$

Proof of Proposition 3: Since $\Pi^o = \pi(t^o) - \underline{M} - C_t^o$ and $G^o = \beta(J_t^o - \underline{J})$

$$\begin{aligned}\Pi^o &= \pi(t^o) - C_t^o - \underline{M} \\ &= \pi(t^o) - \frac{1}{h}[W(t^*) - W(t^o) + \beta(J_t^o - \underline{J})] - \underline{M} \\ &= (\frac{1-\beta}{h})[W(t^o) - W(t^*) + h\pi(t^o)] + \beta\pi(t^*) - \underline{M}\end{aligned}$$

Therefore, using the envelope theorem, we obtain

$$\frac{d\Pi^o}{dI} = (\frac{1-\beta}{h})\{[X(t^*) - X(t^o)]\lambda_1 + [E(X(t^*)) - E(X(t^o))]\mu_1\} + \beta\pi'(.)(\frac{dt^*}{dI} + \lambda_1) < 0$$

Since $\underline{\Pi} = \pi(t^*) - \underline{M}$,

$$\begin{aligned}
\Pi^o - \underline{\Pi} &= \pi(t^o) - C_t^o - \pi(t^*) \\
&= \pi(t^o) - \frac{1}{h}[W(t^*) - W(t^o) + \beta(J_t^o - \underline{J})] - \pi(t^*) \\
&= \frac{1}{h}(J_t^o - \underline{J}) + \beta(J_t^o - \underline{J}) \\
&= \frac{1-\beta}{h}(J_t^o - \underline{J}) \\
&= \frac{(1-\beta)}{h\beta}G^o
\end{aligned}$$

Therefore,

$$\frac{d(\Pi^o - \underline{\Pi})}{dI} = \frac{(1-\beta)}{h\beta}\frac{dG^o}{dI} > 0 \blacksquare$$

Proof of Proposition 4: Totally differentiating (34) and (35), we have

$$G_{11}^o dI + G_{12}^o dM = \beta\pi'(.)(\frac{dt^*}{dI} + \lambda_1)dh \tag{46}$$

$$\Pi_{12}^o dI + \Pi_{11}^o dM = (\frac{1-\beta}{h^2})\{[X(t^*) - X(t^o)]\lambda_2 + [E(X(t^*)) - E(X(t^o))]\mu_2\}dh \tag{47}$$

Given the second-order and regularity conditions discussed above, we obtain

$$\frac{d\underline{I}}{dh} = \frac{1}{D}\{\beta\pi'(.)(\frac{dt^*}{dI} + \lambda_1)\Pi_{11}^o - (\frac{1-\beta}{h^2})[(X(t^*) - X(t^o))\lambda_2 + (E(X(t^*)) - E(X(t^o)))\mu_2]G_{12}^o\} > 0$$

where $D = \Pi_{11}^o G_{11}^o - \Pi_{12}^o G_{12}^o > 0$. $\blacksquare$

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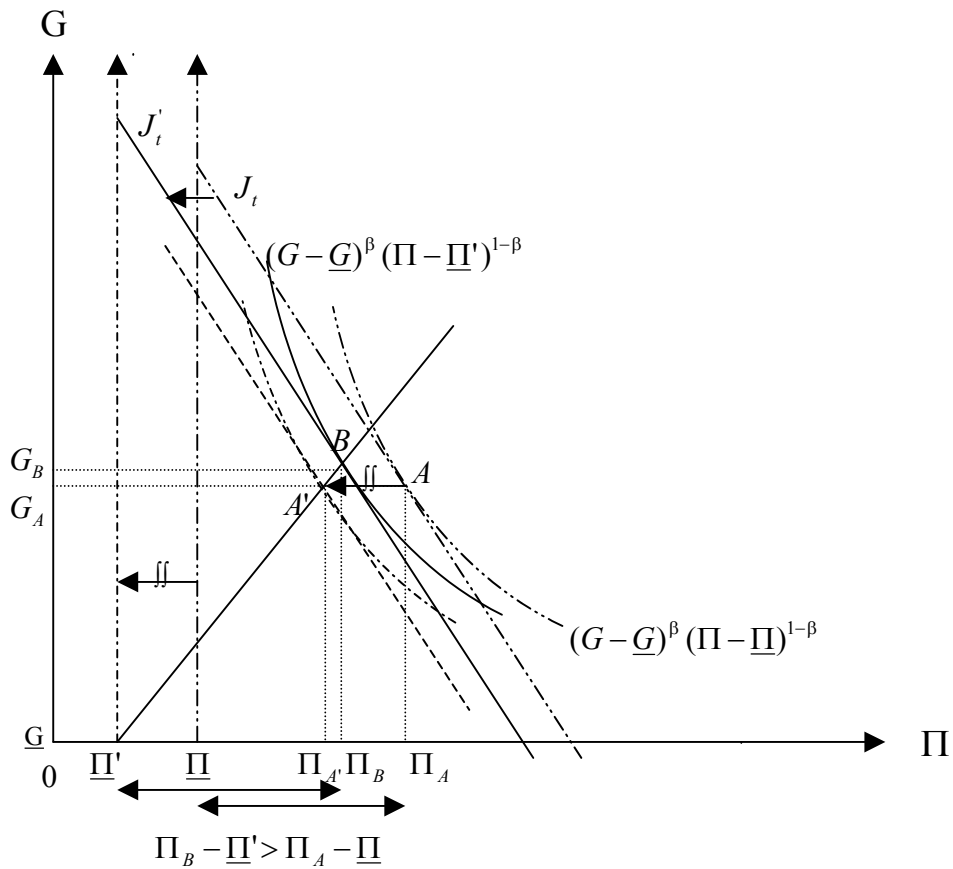
G
J_t'
J_t
$(G-\underline{G})^{\beta}(\Pi-\underline{\Pi}')^{1-\beta}$
B
A
A'
G_B
G_A
$(G-\underline{G})^{\beta}(\Pi-\underline{\Pi})^{1-\beta}$
$\underline{G}$
0
$\underline{\Pi}'$
$\underline{\Pi}$
$\Pi_{A'}$
Π_B
Π_A
Π
$\Pi_B-\underline{\Pi}'>\Pi_A-\underline{\Pi}$

Figure 1