Electoral Competition and Optimal Tariffs

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August 2005

[Abstract]

We show that the unique Nash equilibrium of a model of political competition between two parties in a Heckscher-Ohlin setting entails differentiated trade policies, with a party proposing a high tariff, and the other one a low one. The basic departure from a median voter model is the introduction of campaign contributions, which influence the vote of a group of uninformed voters. Parties are Downsian, not ideological, yet campaign contributions create an asymmetry between them. Thus, the heterogeneous behavior of parties, protectionism and pro-trade, is endogenously decided, rather than a prior assumed in previous works.

JEL Classifications: F13, F14, P16

Key words: tariff, political competition, median voter

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[1]I would like to thank the guidance provided by Robert C. Feenstra. I thank very useful help from Joaquim Silvestre, Peter H. Lindert, Deborah L. Swenson. I also thank Radek Szulga and numerous seminar participants at University of California-Davis, Oregon State University and the AEA Annual meetings at Philadelphia (2005) for useful comments. Financial support from the Institute of Governmental Affairs of UC-Davis is gratefully acknowledged. The responsibility for all errors belongs to mine. Corresponding address: Room 908, K.K. Leung Building, School of Economics and Finance, University of Hong Kong, Pokfulam Road, Hong Kong. E-mail: mjyu@econ.hku.hk.

I. Introduction

Why is trade not free? Economists admit that political intervention is a key factor of trade policy. Many literatures make significant contributions on explaining the formation of tariffs. These include Feenstra-Bhagwati (1982), Mayer (1984), Hillman-Heinrich Ursprung (1988), Magee-Brock-Young (1989), Grossman-Helpman (1994, 1996) and etc. A complete survey can be also found from Hillman (1989).

In previous work on political economy of trade, the heterogeneous behavior of parties, the protectionist and the pro-import party, is assumed as a prior. This paper, instead, presents a model where the parties' differentiated tariff policies are endogenously determined modulo a postulated asymmetry in the voters' perceptions of parties; by applying the Heckscher-Ohlin model in the median voter model. In words, when two parties compete for the office over trade policy, the two parties diverge from the median voter's choice. One party chooses a high tariff while the other picks a low one at the Nash equilibrium.

The median voter theorem claims that collective choice will follow the median voter's preference given a continuum of voters. Downs (1957) argued that the median voter theorem holds when two parties compete over a uni-dimensional issue: given single-peaked utility functions of voters, each party announces the policy that is the favorite of the median voter in the unique Nash equilibrium. Since then, many papers seek to examine the validity of the median voter theorem from various aspects (e.g., Wittman, 1983, Baron, 1994, Roemer, 1994.).

An adaptation of the Downsian model is used herein to describe the trade policy equilibrium in a Heckscher-Ohlin framework. Section II describes an economy with two-factor and two-industry, followed by a brief introduction of the behavior of two Downsian parties in section III. Section IV is a benchmark model. Parties choose tariff to maximize their vote shares in the election. Section V considers a more realistic case. Two types of voters, informed and uninformed group, vote for their favorite party in the election. Both parties maximize their vote shares, collecting campaign contributions from the informed voters. The contributions are used to sway the uninformed voters. At the Nash equilibrium, the two parties announce the same tariff platform in the benchmark setting. However, in the more realistic case, parties choose different trade policy instead. In other words, the heterogeneous behaviors of parties are a result rather than an assumption in this paper. Section VI provides an example to explain the findings. A brief summary is presented in Section VII.

II. The Economy

This is a two-by-two (2 factors and 2 sectors) Heckscher-Ohlin model. A small country with relatively capital abundant endowments produce a capital-intensive commodity (x_1) and a labor-intensive commodity (x_2), using capital ($\overline{K}$) and labor ($\overline{L}$). Voters (consumers) have identical, additively separable quasi-linear preferences. They maximize their utilities subject to their budget constraints:

$$\underset{x_1^i, x_2^i}{Max} U_i = x_1^i + u(x_2^i). \quad (1)$$

The capital-intensive commodity, x_1^i , is the numeraire good and serves as the consumption of voter i on an export good while the labor-intensive commodity, x_2^i, is the consumption of voter i on an import good. Throughout the model, the production of the export good and the import good ,wage, rental, aggregate import and the given total endowments of labor and capital are denoted by y_1 , y_2 , $w, r, m(p), \overline{L}$ and $\overline{K}$ respectively. The derivative of rate of return on capital and the derivative of aggregate import demand as $r'(p)$ and $m'(p)$ respectively.

The sub-utility functions $u(x_2^i)$ are differentiable, increasing, strictly concave and identical across voters. To analyze the impact of import tariff, the price of the export good is normalized to unity. The budget constraint is of the following form:

$$x_1^i + px_2^i = E^i\ , \tag{2}$$

where E^i is the total income while p denotes the domestic import good's relative price. Also, the specific tariff (t) provides a wedge between domestic relative price and the world relative price (p^w) so that $p = t + p^w$. To make the model tractable, other trade policy instruments such as voluntary export restraints (VERs) or quotas are ignored here. Solving this constrained optimization problem, the indirect utility function, $v^i(p, E^i)$, is of the following form:

$$v^i(p, E^i) = E^i + CS(p)\,, \tag{3}$$

where $CS(p) = u(d(p)) - pd(p)$ is the consumer surplus derived from the consumption of these goods and $d(p)$ is the import demand function [2].

Following Mayer (1984), each voter is assumed to have the same labor endowment but different capital endowments (some are rich and some are poor).That is, the voter i has K^i units of capital and one unit of labor. Assuming the import tariff income (T)

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[2] The first order condition is given by $p = \dfrac{\partial u(x_2^i)}{\partial x_2^i}$. And then the import demand function $d(p)$ is an inverse function of price.

is redistributed with a lump sum subsidy for simplicity, the individual's budget constraint is:

$$x_1^i + px_2^i = w + rK^i + T/\overline{L} \quad . \tag{4}$$

Voter i's indirect utility function can be written as:

$$v^i(p) = CS(p) + w(p) + r(p) \cdot K^i + T(p)/\overline{L} \ . \tag{5}$$

Here w and r are actually affected by the import price p due to the Stolper-Samuelson theorem[3]. The consumer surplus is the same for each voter since they utility functions are identical. The only difference among voters is their incomes, which include the return to the factors and tariff revenue. Both of these are a function of the tariff level. Hence, given a different level of import tariff, each voter has a different level of utility.

III. The Political Parties

Two political parties, Party A and Party B are Downsian, not ideological. Both parties choose their tariff platform to maximize their vote share in the election. Unlike previous works of considering ideology, the two parties here only care their probability of winning, precisely, their vote share in the election. Throughout the paper, both parties are assumed to credibly commit to their platforms.

IV. The Benchmark Model

A voter supports Party A if and only if his/her indirect utility at Party A's tariff platform level is higher than that of Party B: $v^i(p^A) - v^i(p^B) > 0$ .Otherwise, he/she will vote for Party B. In particular, using (5), the set of the voters that support Party

[3] The import demand function is assumed to be a straight downward sloping line for simplicity. This assumption guarantees the existence of the single-peak property of the indirect utility functions.

A, Ω_A, can be written as:

$$\Omega_A = \{K^i | [CS(p^A) - CS(p^B)] + [w(p^A) - w(p^B)] + K^i [r(p^A) - r(p^B)] + [T(p^A) - T(p^B)] / \overline{L} > 0\}. \qquad (6)$$

One trivial case is that both parties choose the same platform initially. In that case, two parties obtain the 50-50 vote share in the election since there is no difference between two parties. Let $p^A \neq p^B$, and assume, without loss of generality, that $p^A > p^B$. With simple algebra, the set Ω_A can be written as:

$$\Omega_A = \{i | K^i < \widetilde{K}(p^A, p^B)\},$$

where the cutoff capital level $\widetilde{K}$ is obtained from (6):

$$\widetilde{K}(p^A, p^B) \equiv \frac{[CS(p^A) - CS(p^B)] + [w(p^A) - w(p^B)] + [T(p^A) - T(p^B)] / \overline{L}}{r(p^B) - r(p^A)} \qquad (7).$$

Similarly, Ω_B denotes the set of the voters who support Party B:

$$\Omega_B = \{i | K^i > \widetilde{K}(p^A, p^B)\}.$$

The intuition here is that voters are separated into two groups by parties' platforms: rich and poor. Voters whose capital endowments are lower than the cut-off point vote for Party A in the election.

The corresponding density function for voters is assumed to be $f(K^i)$ since voters are different only in their capital endowment level. The vote share for Party A therefore can be expressed as $\int_{\Omega_A} f(K^i) dK^i$. Denoting Party A's vote share function as $\varphi(p^A, p^B)$ and the set of possible trade platform of Party A as P[4], Party A chooses its optimal platform, p^A in P to maximize its vote share in the election:

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[4] P is bounded so that each domestic import relative price must lie between some minimum $\underline{p}$ and some maximum $\overline{p}$.

$$\max_{p^A \in P} \int_0^{\widetilde{K}(p^{A}, p^B)} f(K^i) dK^i \quad . \tag{8}$$

Throughout the paper, the equilibrium is restricted to locate in the interior of tariff platform. To obtain each party's optimal tariff level, one can easily obtain the first order condition for the maximization problem (8):

$$f(\widetilde{K}) \frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A} = 0 .$$

Since the density is always positive, the optimal trade platform just depends on $\frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A}$. With some calculation (see Appendix 1), one obtains:

$$\frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A} = \frac{\left(\widetilde{K} - \overline{K}/\overline{L}\right) r'(p^A) + t^A \cdot m'(p^A)/\overline{L}}{r(p^B) - r(p^A)} = 0 . \tag{9}$$

The optimal tariff platform for Party A (t^{Ao}) can be obtained by solving (9):

$$t^{Ao} = \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p^A)}{m'(p^A)/\overline{L}} \quad . \tag{10}$$

Party A's optimal tariff depends on three factors. First, the larger the difference between the mean of the aggregate capital-labor ratio and the cutoff point is, the higher the protection is. Secondly, the flatter the slope of the rate of returns on capital the higher the protection. Finally, the steeper the slope of the aggregate import demand curve is, the higher the protection is.

The Stolper-Samuelson theorem states that the effects of imposing an import tariff on the labor-intensive good are a rise in wage and a fall in the return on capital: $r'(p) < 0$; by the same token, $r(p^B) - r(p^A)$ >0. The import demand function is also downward sloping, $m'(p^A) < 0$ .Hence, it is certain that $\frac{\partial \varphi}{\partial p^A} < 0$ provided that $t^A > \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p^A)}{m'(p^A)/\overline{L}}$; Similarly, $\frac{\partial \varphi}{\partial p^A} > 0$ provided that $t^A < \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p^A)}{m'(p^A)/\overline{L}}$. In other words, the optimal trade platform level in (10) is also the maximizer of vote share for Party A.

Based on the symmetric setup of two parties, one can easily obtain the optimal platform level for Party B which is exactly identical to that of Party A (see Appendix 2):

$$t^{Bo} = \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p^B)}{m'(p^B)/\overline{L}} \quad . \tag{11}$$

The single-peak property of parties' vote share function suggests neither party will deviate from the median voter's choice. Otherwise, a party will lose some of its vote share. For example, if Party A deviates a little from its optimal platform: $t^A - t^{Ao} = \varepsilon > 0$, then its vote share falls: $\varphi(t^A, t^{Bo}) < \varphi(t^{Ao}, t^{Bo})$. Actually, one can easily find that (the proof is provided in Appendix 3):

$$\varphi(t^A, t^{Bo}) < \varphi(t^{Ao}, t^{Bo}), \forall t^A \neq t^{Ao} \tag{12A}$$

$$\text{and} \quad \varphi(t^{Ao}, t^B) > \varphi(t^{Ao}, t^{Bo}), \forall t^B \neq t^{Bo} \, . \tag{12B}$$

(12A) and (12B) establish that the optimal trade platform pair (t^{Ao}, t^{Bo}) is Nash equilibrium. There is no difference between the two parties' optimal tariff at the Nash equilibrium. Also, given the setup of continuum individual voters in the model, there must exist a median voter, whose preferred trade policy (t^{median}) is identical to both parties' optimal platform as well: $t^{Ao} = t^{Bo} = t^{median}$.

Hence, the two parties announce the same trade platform at the Nash equilibrium. Given no difference between the policies of two parties, the vote share of each will be one-half. It is also no doubt that the cutoff capital level coincides with the median capital level.

Proposition 1: *at the unique Nash equilibrium of the benchmark model, both parties choose an identical trade platform level (t^o),which is the median voter's ideal tariff,*

$$t^o = \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p)}{m'(p)/\overline{L}}.$$

V. The Model with Contribution Schedules

More realistically, let us consider two types of voters: informed and uninformed. Informed are as those in the benchmark model: their vote is determined by the platforms t^A and t^B (hence, p^A and p^B) of the parties. The uninformed, on the contrary, vote for one party or the other one depending on the relative strength of the campaign contributions received by each party. A new datum in the model is the fraction ρ of informed voters which is assumed to be given.

It is understood that some citizens contribute to the parties' campaign funds. The intuition here is some voters have strong preference on a party before the election while some others do not. For example, blue-collar workers prefer a higher tariff on clothing, and (they or their unions) are willing to contribute to the party that proposes a high tariff. Informed voters make campaign contribution to a party while uninformed voters do not. Each party uses the campaign contribution it collects to advertise to the uninformed voters. Affected by the campaign mass media, eventually, uninformed voters choose a specific party on the Election Day.

Campaign contributions are modeled as follows: the total amount of contributions to Party A is an *increasing* function $C^A(p^A)$ of the tariff t^A proposed by Party A, whereas the total amount of contributions to Party B is a *decreasing* function $C^B(p^B)$ of the tariff t^B proposed by Party B. Intuitively, some voters like high tariffs and look at Party A as the one that will implement them: accordingly, they contribute to the party's campaign amounts that are increasing in the tariff proposed by Party A. Conversely, other voters like low tariffs and look at Party B as the one that will implement them: contributing amounts that are decreasing in the tariff proposed by Party B.

The vote share for a party includes two parts: informed and uninformed vote share. Similar to the benchmark setup, informed voters differ only in their capital endowment levels.

Since the behavior of the informed voters is identical to the benchmark model. Assuming for the moment that $p^A > p^B$, the fraction of the informed voters who support Party A can be expressed as:

$$\varphi(p^A, p^B) \equiv \int_0^{\tilde{K}(p^A, p^B)} f(K^i) dK^i \in [0,1].$$

The vote share from uninformed group for Party A depends on the campaign contribution that it collects. A micro-model of how uninformed voters decide to vote has not been presented in previous literatures. Following such literatures (Jacobson 1987, Snyder 1989, Baron 1994 and Roemer 2001), a functional form, $C^A/(C^A + C^B)$, which describes the campaign contribution share, is used to characterize the behavior of uninformed voters in this paper: the more the contributions a party catches, the more the vote that the party gets from uninformed group.

Each party's contribution schedule is also assumed to depend on some own exogenous "operating sunk cost" (Z): besides the expenditure on the media, a party still needs to spend money on renting the office and hiring professional staff and etc. Since the organization ability of each party is different, both parties' operating costs are assumed to be different: $Z^A \neq Z^B$.

To make the model tractable, each party's contribution schedule is assumed to depend on its own trade platform level[5]. The main interest here is to check whether these two tariff-oriented parties have the heterogeneous behavior at the Nash equilibrium. In other words, if voters are divided into two groups, and informed group is allowed to make campaign contributions, will both parties still choose the same tariff in the equilibrium?

At the Nash equilibrium, each party chooses its platform in order to maximize its vote share given the platform chosen by the other party. Assuming again $p^A > p^B$, Party A faces a un-constrained maximization problem:

$$\underset{p^A \in \mathrm{P}}{Max} \;\; \rho \cdot \int_0^{\tilde{K}(p^A, p^B)} f(K^i) dK^i + (1-\rho) \cdot \frac{C^A(p^A)}{C^A(p^A) + C^B(p^B)} \;. \tag{17}$$

By the same token, Party B chooses its optimal trade platform to maximize its vote share as well:

$$\underset{p^B \in \mathrm{P}}{Max}\, \rho \cdot \left[1 - \int_0^{\tilde{K}(p^A, p^B)} f(K^i) dK^i \right] + (1-\rho) \cdot \frac{C^B(p^B)}{C^A(p^A) + C^B(p^B)} . \tag{18}$$

Observing (17), informed voters who support Party A are relatively labor abundant

[5] An example is provided to explain this assumption in the next section.

and hence would prefer a higher import tariff by the Stolper-Samuelson theorem. Hence, the higher the import tariff platform that Party A posts, the more the campaign contributions informed voters donate. By the same token, since informed voters who support Party B are relatively capital abundant, the higher the import tariff Party B posts, the less the campaign contributions informed voters make instead. Based on this consideration, we have assumptions as follows:

Assumptions:

(1) *The marginal contribution schedule of Party A of its trade platform is positive and independent from Party B's contribution schedule:* $\frac{\partial C^A}{\partial p^A} > 0, \frac{\partial C^A}{\partial p^B} = 0$.

(2) *The marginal contribution schedule of Party B of its trade platform is negative and independent from Party A's contribution schedule:* $\frac{\partial C^B}{\partial p^B} < 0, \frac{\partial C^B}{\partial p^A} = 0$.

To solve for the Nash equilibrium, let us assume Party A deviates a little from t^{median}, say $p^A - t^{median} = \varepsilon > 0$ while still keep another party's platform unchanged: $p^B = t^{median}$. The interest is to see whether both parties choose the same tariff in the equilibrium.

The F.O.C of (17) is:

$$\underbrace{\rho}_{(+)} \cdot \underbrace{f(\widetilde{K})}_{(+)} \frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A} + \underbrace{\frac{(1-\rho)}{(C^A + C^B)^2}}_{(+)} \underbrace{\frac{\partial C^A}{\partial p^A}}_{(+)} \underbrace{C^B}_{(+)} = 0 \ . \tag{19}$$

Party A's vote share function is not necessarily a concave function of its tariff platform. However, for tractability, let us restrict our attention to the concave case, which clearly is possible. Hence, (19) also implies:

$$\frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A} < 0\,. \tag{20}$$

With some similar calculations shown before, (20) can be written as:

$$\frac{(\widetilde{K} - \overline{K}/\overline{L})r'(p^A) + t^A m'(p^A)/\overline{L}}{r(p^B) - r(p^A)} < 0\,.$$

Given $p^A - p^B = \varepsilon > 0$, the denominator of the above expression is positive. It means the optimal tariff for Party A (t^{A*}) has the following property:

$$t^{A*} > \frac{(\overline{K}/\overline{L} - \widetilde{K})r'(p^A)}{m'(p^A)/\overline{L}}\,. \tag{21}$$

Compared with benchmark equilibrium condition (10), (21) indicates that now the optimal trade platform for Party A is larger than the trade platform that the median voter chooses (recall that $t^{median} = t^{Ao}$). Given the concavity of its vote share function, the vote share for Party A at point t^{median} is smaller than that at the maximizer point t^{A*}; otherwise, Party A does not want to deviate.

Similarly, taking the F.O.C of (18), one obtains:

$$-\underbrace{\rho}_{(+)} \cdot \underbrace{f(\widetilde{K})}_{(+)} \frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^B} + \underbrace{\frac{(1-\rho)}{(C^A + C^B)^2}}_{(+)} \underbrace{\frac{\partial C^B}{\partial p^B}}_{(-)} \underbrace{C^A}_{(+)} = 0\,. \tag{22}$$

Given the assumption that $\frac{\partial C^B}{\partial p^B} < 0$, the F.O.C. implies $\frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^B} < 0$ as well. With some calculation shown in Appendix 2, it turns out:

$$\frac{(\overline{K}/\overline{L} - \widetilde{K})r'(p^B) + tm'(p^B)/\overline{L}}{r(p^B) - r(p^A)} < 0\,. \tag{23}$$

Keeping Party A's platform unchanged, Party B is assumed to decrease its tariff a little from the median voter's preferred platform: $t^B - t^{median} = \varepsilon < 0$. In other words, $p^B < p^A$. The necessary condition of Party B's optimal tariff platform (t^{B*}) is:

$$t^{B*} < \frac{(\overline{K}/\overline{L} - \widetilde{K})r'(p^B)}{m'(p^B)/\overline{L}} . \quad (24)$$

(24) means that the optimal trade platform for Party B is now lower than the trade platform that the median voter chooses (recall that $t^{median} = t^{Bo}$). In other words, At the Nash equilibrium, both parties' optimal platforms are different. Party A prefers a high tariff while Party B prefers a low tariff. Figure 1 illustrates this finding.

[Insert Figure 1 Here]

Proposition 2: *at the unique Nash equilibrium of the model with campaign contributions, the two parties choose different tariff levels:* $p^A > p^B$.

Intuitively, the party which chooses a high tariff at the Nash equilibrium, Party A, is called "Protectionism Party". Conversely, the party which picks a low tariff, Party B, is labeled as "Pro-trade Party". In other words, the heterogeneous behavior of parties is a result rather than an assumption in this paper.

Our last interest is both parties' vote shares in the equilibrium. From (20), when Party A increases its trade platform a little from t^{median}, it loses some informed voters. Simultaneously, a raise of its trade platform also increases its vote share within the uninformed group (recall $\partial C^A / \partial p^A > 0$). The change of total vote share depends on which effect is dominant. If the vote loss within informed voters dominates the vote gain within the uninformed voter, then Party A will get less than a half of vote and lost the election, *vice versa*. However, without more information about parties' operating sunk costs, informed voters' exact utility function and exact form of probability density function; one can not predict the election outcome.

VI. An Example of the Contribution Schedules

The main aim of this section is to provide an example to illustrate the assumptions posted in the previous section, using a widely accepted contribution schedule introduced by Grossman-Helpman (1994). Specifically, when the tariff is evaluated at median voter preferred level, the previous assumptions, $\partial C^A / \partial p^A > 0$, $\partial C^B / \partial p^B < 0$, $\partial C^A / \partial p^B = 0$ and $\partial C^B / \partial p^A = 0$, holds well mathematically.

Following Grossman-Helpman (1994), a party's campaign contribution schedule depends on both its supporters' welfare and its operating sunk cost. In particular, they use the following form:

$$C^A(p^A, p^B, z^A) = \max\left[0, W(p^A, p^B) - z^A\right], \tag{25}$$

where $W(p^A, p^B)$ is the collective welfare of the informed voters who support Party A and z^A is an exogenous parameter. Assuming the collective welfare is higher than the cost, our model implies:

$$C^A(p^A, p^B, z^A) = \int_0^{\tilde{K}(p^A, p^B)} v^i(p^A) f(K^i) dK^i - z^A\,. \tag{26}$$

Notice that each voter's indirect utility in (26) is just a function of p^A since all these voters vote for and contribute to Party A. After some calculation (see Appendix 4), one gets:

$$C^A(p^A, p^B, z^A) = \int_0^{\tilde{K}(p^A, p^B)} \left[w(p^A) + r(p^A)K + t^A m(p^A)/L + CS(p^A)\right] f(K^i) dK^i - z^A\,.$$

Starting from the median voter's choice, t^{median}, Party A increases its platform p^A a little so that $t^A - t^{median} = \varepsilon > 0$ while Party B still keeps its platform at the median voters ideal point, $t^B = t^{median}$. Taking the partial derivative with respect to t^A around point t^{median}, it turns out:

$$\left.\frac{\partial C^A(p^A,p^B)}{\partial p^A}\right|_{t^A=t^{median}} = v^i(p^A)f(K^i)\left.\frac{\partial \widetilde{K}}{\partial p^A}\right|_{t^A=t^{median}} + \int_o^{\widetilde{K}} \frac{\partial v^i}{\partial p^A} f(K^i)dK^i \Big|_{t^A=t^{median}}. \qquad (27)$$

The first term in the RHS of (27) disappears since $\left.\frac{\partial \widetilde{K}}{\partial p^A}\right|_{t^A=t^{median}} = 0$ by (10). Hence, the sign of LHS just depends on the second term in the RHS. With some calculation (see Appendix 4), one has:

$$\int_o^{\widetilde{K}} \frac{\partial v^i}{\partial p^A} f(K^i)dK^i = \int_o^{\widetilde{K}} \underbrace{r'(p^A)}_{(-)}\underbrace{(K^i-\widetilde{K})}_{(-)} f(K^i)dK^i > 0 \ . \qquad (28)$$

Recall $r'(p^A)$ is negative by the Stolper-Samuelson theorem. Also, each voter's capital endowment, K^i, is within the range $[0,\widetilde{K}]$. That is, $K^i - \widetilde{K} < 0, \forall K^i \in [0,\widetilde{K}]$. In other words, the LHS of (28) is positive. But this implies that LHS of (27) is positive too. Hence, Party A's marginal contribution of its own trade platform is positive. The first assumption works well in this example.

A similar result for Party B is presented here:

$$\left.\underbrace{\frac{\partial C^B(p^A,p^B)}{\partial p^B}}_{(-)}\right|_{t^B=t^{median}} = -v^i(p^B)f(K^i)\left.\frac{\partial \widetilde{K}}{\partial p^B}\right|_{t^B=t^{median}} + \int_{\widetilde{K}}^{K^{\max}} \underbrace{\frac{\partial v^i}{\partial p^B}}_{(-)} f(K^i)dK^i \Big|_{t^B=t^{median}} \ , \qquad (29)$$

where $K^{\max}$ denotes the voter with maximum capital endowment. Note again that the first term in the RHS of (29) disappears since $\left.\frac{\partial \widetilde{K}}{\partial p^B}\right|_{t^B=t^{median}} = 0$; hence, the sign of the second term in the RHS determines the sign of LHS. With simple algebra, we have:

$$\int_{\widetilde{K}}^{K^{\max}} \frac{\partial v^i}{\partial p^B} f(K^i)dK^i = \int_{\widetilde{K}}^{K^{\max}} \underbrace{r'(p^B)}_{(-)}\underbrace{(K^i-\widetilde{K})}_{(+)} f(K^i)dK^i < 0 .$$

But this just implies that Party B's marginal contribution of its own trade platform, the

LHS of (29), is negative.

One can check that the contribution schedules of both parties do not have any relationship with their cross trade platforms, using this specific contribution schedule.

Given $\left.\frac{\partial \widetilde{K}}{\partial p^A}\right|_{t^A=t^B=t^{median}}=0$ and $\left.\frac{\partial \widetilde{K}}{\partial p^B}\right|_{t^A=t^B=t^{median}}=0$, we have:

$$\left.\frac{\partial C^A(p^A,p^B)}{\partial p^B}\right|_{t^A=t^{median}}=v^i(p^A)f(K^i)\left.\frac{\partial \widetilde{K}}{\partial p^B}\right|_{t^A=t^{median}}=0 \qquad (30A)$$

and
$$\left.\frac{\partial C^B(p^A,p^B)}{\partial p^A}\right|_{t^B=t^{median}}=-v^i(p^B)f(K^i)\left.\frac{\partial \widetilde{K}}{\partial p^A}\right|_{t^B=t^{median}}=0\,. \qquad (30B)$$

Thus far, the assumptions used before hold well using a widely accepted example. As a consequence, the previous theoretical findings are robust.

VII. Conclusions

Previous trade works on political economy take the heterogeneous parties' behaviors as given, by assuming a protectionist party and a pro-import party. The main contribution of this paper is to show that the heterogeneous parties' behavior is endogenously informed, rather than exogenously given, by applying a Heckscher-Ohlin model in a Downsian model.

In a two-by-two Heckscher-Ohlin model with two parties, parties choose their optimal tariff to maximize their vote share from informed and uninformed voters. Informed voters, who have different capital endowment, make financial contributions to their preferred party. Such money is also used to sway the uninformed voters. Under this framework, the paper shows the optimal tariffs of the two parties are different from each other. The one which chooses a high tariff hence can be named as Protectionism Party; and the other one which picks a low tariff is so-called Pro-trade

Party.

The model can be extended in several directions. One of them is to consider the two parties compete in many policy instruments besides tariff. Such a scenario is closer to the reality at the expense of the possible failure of pure-strategy Nash equilibrium. Another possible extension is to give the behaviors of the uninformed group a more general form, though the functional form used here makes a good sense in the real world. Finally, it is interesting to integrate empirics into this theoretical model and show its predictive power. These are the topics we will pursue in the future work.

VIII. Appendix

A1: Party A's Optimal Tariff Condition in the Benchmark Case

Considering the following maximization problem

$$\underset{p^A \in P}{Max}\, \varphi(p^A, p^B) \equiv \int_0^{\widetilde{K}(p^A, p^B)} f(K^i)dK^i \ ,$$

its First Order Condition is given as:

$$\frac{\partial \varphi(p^A, p^B)}{\partial p^A} = f(\widetilde{K}) \frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A} = 0 \ , \tag{A1}$$

where $\widetilde{K}(p^A, p^B) \equiv \frac{[CS(p^A) - CS(p^B)] + [w(p^A) - w(p^B)] + [T(p^A) - T(p^B)]/\overline{L}}{r(p^B) - r(p^A)}$. The F.O.C of utility's maximization implies $CS'(p^A) = -d(p^A)$, where $CS'(p)$ is the derivative of consumer surplus and $d(p)$ is the import good's consumption. Given the tariff revenue $T(p^A) = t \cdot m(p^A) = (p^A - p^W)m(p^A)$, we get $T'(p^A) = m(p^A) + t \cdot m'(p^A)$. Furthermore, notice that $d(p^A)$ is the individual level of consumption of the import good, we know $m(p^A) = d(p^A)\overline{L} - y_2$. Hence,

$$\frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A} = \frac{w'(p^A) - y_2/\overline{L} + t \cdot m'(p^A)/\overline{L} + \widetilde{K} \cdot r'(p^A)}{r(p^B) - r(p^A)} \ . \tag{A2}$$

One can use the GDP function, $GDP = y_1 + p^A y_2 = w\overline{L} + r\overline{K}$, to simplify (A2). It turns out $\frac{y_2}{\overline{L}} = w'(p^A) + \frac{\overline{K}}{\overline{L}} r'(p^A)$, taking the partial derivative with respect to p^A, and using the Envelope theorem. Now plug it into (A2):

$$\frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^A} = \frac{[\widetilde{K} - \overline{K}/\overline{L}]r'(p^A) + t \cdot m'(p^A)/\overline{L}}{r(p^B) - r(p^A)} = 0 \ . \tag{A3}$$

Since $r(p^B) \neq r(p^A)$ given that $p^B \neq p^A$, (A3) thus implies (10) in the paper:

$$t^{Ao} = \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p^A)}{m'(p^A)/\overline{L}} \ . \tag{A4}$$

(Q. E. D.)

A2: Party B's Optimal Tariff Condition in the Benchmark Case

Party B chooses an optimal trade platform to maximize its vote share as well:

$$\underset{p^B \in P}{Max}(1-\varphi(p^A, p^B))$$

The F.O.C. is $-f(\widetilde{K})\dfrac{\partial \widetilde{K}(p^A, p^B)}{\partial p^B} = 0$ .With similar algebra, one obtains:

$$\frac{\partial \widetilde{K}(p^A, p^B)}{\partial p^B} = \frac{[\overline{K}/\overline{L} - \widetilde{K}]r'(p^B) - t \cdot m'(p^B)/\overline{L}}{r(p^B) - r(p^A)} = 0 \ . \qquad \text{(A5)}$$

Simplifying, it turns out:

$$t^{Bo} = \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p^B)}{m'(p^B)/\overline{L}}. \qquad \text{(A6)}$$

Again, given the assumption that $\widetilde{K} < \overline{K}/\overline{L}$ the condition, $\dfrac{\partial \widetilde{K}(p^A, p^B)}{\partial p^B} > 0$ holds and consequently $\dfrac{\partial [1-\varphi(p^A, p^B)]}{\partial p^B} < 0$ provided that $t^B > \dfrac{(K/L - \widetilde{K})r'(p^B)}{m'(p^B)/\overline{L}}$.On the other hand, $\dfrac{\partial \widetilde{K}(p^A, p^B)}{\partial p^B} < 0$ and hence $\dfrac{\partial [1-\varphi(p^A, p^B)]}{\partial p^B} > 0$ if $t^B < \dfrac{(K/L - \widetilde{K})r'(p^B)}{m'(p^B)/\overline{L}}$.

(Q.E.D.)

A3: Optimal Tariff is the Nash Equilibrium

The vote share for Party A will decrease when Party A deviates a little from its optimal platform. In particular, if Party A pick up a trade platform t^A so that $t^A - t^{Ao} = \varepsilon, \varepsilon \in R$, then its vote share is less than one half: $\varphi(t^A, t^{Bo}) < \varphi(t^{Ao}, t^{Bo}) = 1/2$.
In other words,

$$\varphi(t^A, t^{Bo}) < \varphi(t^{Ao}, t^{Bo}), \forall t^A \neq t^{Ao}. \qquad \text{(A7)}$$

Similarly, we have:

$$1-\varphi(t^{Ao}, t^B) < 1-\varphi(t^{Ao}, t^{Bo}), \forall t^B \neq t^{Bo}.$$

Hence:

$$\varphi(t^{Ao}, t^B) > \varphi(t^{Ao}, t^{Bo}), \forall t^B \neq t^{Bo}. \qquad \text{(A8)}$$

Thus, the optimal trade platform pair (t^{Ao}, t^{Bo}) is the Nash equilibrium. (Q.E.D.)

A4: Validity of an Assumption of Contribution Schedules

Considering the contribution schedule as expression (26),

$$C^A(p^A, p^B) = \int_0^{\widetilde{K}(p^A, p^B)} v^i(p^A) f(K^i) dK^i - z^A$$

Given the quasi-linear utility function, it can be written below:

$$C^A(p^A, p^B) = \int_0^{\widetilde{K}(p^A, p^B)} [CS(p^A) + E^i] f(K^i) dK^i - z^A \tag{A9}$$

$$= \int_0^{\widetilde{K}(p^A, p^B)} [CS(p^A) + w + rK^i + tm/\overline{L}] f(K^i) dK^i - z^A$$

$$= \int_0^{\widetilde{K}(p^A, p^B)} [CS(p^A) + w(p^A) + r(p^A)K^i + tm(p^A)/\overline{L}] f(K^i) dK^i - z^A$$

Taking the partial derivative with respect to p^A, one obtains (27) in the paper:

$$\left.\frac{\partial C^A(p^A, p^B)}{\partial p^A}\right|_{t^A = t^{median}} = v^i(p^A) f(K^i) \left.\frac{\partial \widetilde{K}}{\partial p^A}\right|_{t^A = t^{median}} + \int_o^{\widetilde{K}} \frac{\partial v^i}{\partial p^A} f(K^i) dK^i \, .$$

Re-write the second item in the RHS of (27), using similar technique show before:

$$\int_0^{\widetilde{K}} \frac{\partial v^i}{\partial p^A} f(K^i) dK^i = \int_0^{\widetilde{K}} [-d(p^A) + w'(p^A) + r'(p^A)K^i + tm'(p^A)/\overline{L} + m(p^A)/\overline{L}] f(K^i) dK^i$$

$$= \int_0^{\widetilde{K}} [-d(p^A) + w'(p^A) + r'(p^A)K^i + t \cdot m'(p^A)/\overline{L} + d(p^A) - y_2/\overline{L}] f(K^i) dK^i$$

$$= \int_0^{\widetilde{K}} [(y_2/\overline{L} - r'(p^A)\frac{\overline{K}}{\overline{L}}) + r'(p^A)K^i + t \cdot m'(p^A)/\overline{L} - y_2/\overline{L}] f(K^i) dK^i$$

$$= \int_0^{\widetilde{K}} [r'(p^A)(K^i - \frac{\overline{K}}{\overline{L}}) + t \cdot m'(p^A)/\overline{L}] f(K^i) dK^i \, . \tag{A10}$$

Substituting the tariff with the median voter's ideal point,

$$t^{median} = t^{Ao} = \frac{(\overline{K}/\overline{L} - \widetilde{K}) \cdot r'(p^A)}{m'(p^A)/\overline{L}} \, ,$$

and simplifying the second term in the RHS, one gets:

$$\int_0^{\widetilde{K}} \frac{\partial v^i}{\partial p^A} f(K^i) dK^i = \int_0^{\widetilde{K}} [r'(p^A)(K^i - \frac{\overline{K}}{\overline{L}}) + t \cdot m'(p^A)/\overline{L}] f(K^i) dK^i$$

$$= \int_0^{\widetilde{K}} [r'(p^A)(K^i - \frac{\overline{K}}{\overline{L}}) + (\frac{\overline{K}}{\overline{L}} - \widetilde{K}) r'(p^A)] f(K^i) dK^i \tag{A11}$$

$$= \int_0^{\widetilde{K}} [\underbrace{r'(p^A)}_{(-)} \underbrace{(K^i - \widetilde{K})}_{(-)}] f(K^i) dK^i > 0 \quad . \qquad \text{(Q. E. D.)}$$

References

Baron, D.,1994. "Electoral Competition with Informed and Uninformed Voters", *American Political Science Review* 88 (1), 33-47.

Brock, W.A. and S.P. Magee,1978. "The Economics of Special Interest Policies: The case of the Tariff", *American Economic Review* 68, 246-250.

Downs, A., 1957. An Economic Theory of Democracy. New York: Harper and Row.

Feenstra, R.C.,2004. " Political Economy of Trade Policy", Advanced International Trade: Theory and Evidence, Princeton University Press.

Feenstra, R.C. and J.N. Bhagwati, 1982. "Tariff Seeking and the Efficient Tariff", in J.N. Bhagwati, ed., Import Competition and Response, The University of Chicago Press.

Grossman, G.M. and E. Helpman, 1994. "Protection for Sale", *American Economic Review* 84 (4), 833-850.

Grossman, G.M. and E. Helpman, 1996. "Electoral Competition and Special Interest Politics", *Review of Economic Studies* 63,265-286.

Hillman, A.L. and H. W. Ursprung, 1988. "Domestic Politics, Foreign Interests, and International Trade Policy", *American Economic Review* 78(4),729-745.

Hillman, A.L.,1989. The Political Economy of Protection, Chur, Switzerland; New York, Harwood Academic Publishers.

Jacobson, G. ,1987. The Politics of Congressional Elections,2nd ed., Boston: Little, Brown.

Kemp, M. and C. Khang, 1975. "A Convexity Property of the Two-By-Two Model of Production", *Journal of International Economics* 5, 255-261.

Magee, S., W. Brock and L. Young ,1989. Black Hole Tariffs and Endogenous Policy Theory, Cambridge University Press.

Mayer, W., 1984. “Endogenous Tariff Formation”, *American Economic Review* 74, 970-985.

Mayer, W. and J. Li, 1994. “Interest Groups, Electoral Competition, and Probabilistic Voting for Trade Policies”, *Economics and Politics* 6, 59-77.

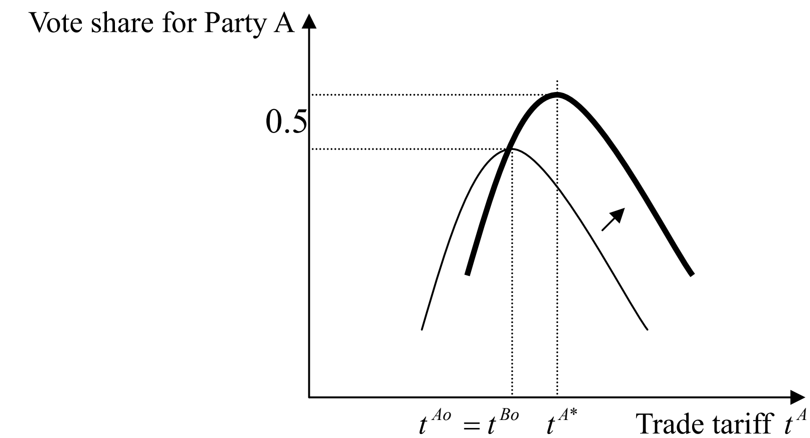
Rodrik, D. ,1997. “Political Economy of Trade Policy”, in Grossman, G.E. and K. Rogoff ed., Handbook of International Economics, Volume 3, pp. 1458-1490.

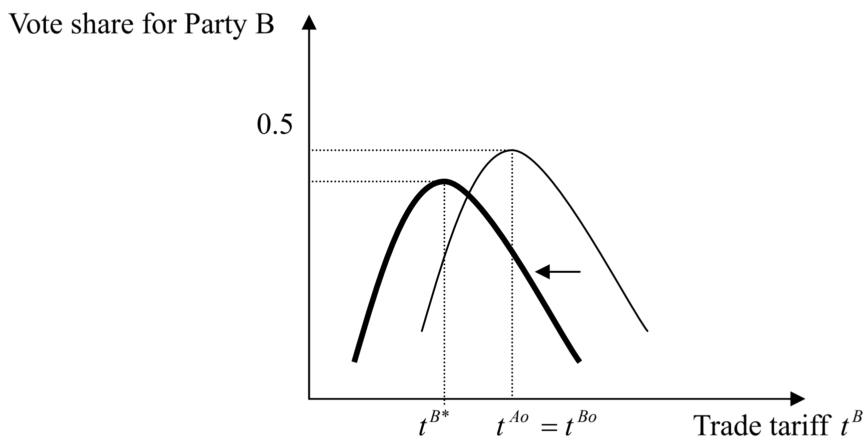
Roemer, J.E., 1994. *“*A Theory of Policy Differentiation in Single-issue Electoral Politics*”*. *Social Choice and Welfare* 11, 355-380.

Roemer, J.E., 2001. Political Competition: Theory and Applications, Harvard University Press.

Wittman, D, 1983. “Candidate Motivations: a Synthesis of Alternatives”, *American Political Science Review* 77, 142-157.

Figure 1: Model with Contribution Schedules





Graphs here describe a possible scenario for a model with campaign contributions. The bold lines denote the vote share curves for both parties with campaign contributions; the light lines denote the vote share curves for both parties in the benchmark model. Parties choose the same tariff in the benchmark case: $t^{Ao} = t^{Bo}$. However, they choose different tariff level when considering contributions. Party A choose a high tariff (t^{A*}) and party B chooses a low one (t^{B*}).