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A Theory of Unilateral Trade Policy

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Abstract

A Theory of Unilateral Trade Policy

We integrate strategic-trade and political-economy considerations in a unified framework to analyze unilateral trade policy. Foreign firms compete on Home's market through export or foreign direct investment (FDI). They also lobby Home's government which sets trade (tariff) and industrial (tax) policies to maximize a weighted sum of domestic welfare and lobby contributions. We show that protection by a low-cost Home may improve global welfare by inducing a more cost-efficient global production pattern. The strategic-trade motive for unilateral intervention to increase domestic welfare may prevail even without domestic firms, and may be enhanced by the presence of FDI firms. The political motive to induce lobby contributions may mitigate or even reverse strategic-trade motivated policy deviations, and trade policy deviation need not benefit special interests to be politically optimal. If the government cares more about lobby contributions than about domestic welfare, it is more likely to adopt a liberal rather than a protectionist trade policy, regardless of its impact on lobbies.

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JEL classification: F13, F12, D72, F21

1 Introduction

Analysis of trade policy in the literature generally adopts one of two major approaches: the strategic-trade approach or the formal political-economy approach. The former focuses on trade interventions that seek to maximize domestic welfare by exploiting strategic interaction between domestic and foreign firms (the *strategic-trade motive*).[1] The latter focuses on trade interventions induced by the policy-maker's maximization of a political objective function where in addition to domestic welfare, the (political or financial) support from special interests also enters. Trade interventions typically create winners and losers, so the formal political-economy literature emphasizes how trade policies may be tilted by attempts to win support from special interests by making them the beneficiaries (the *political motive*).[2]

Despite their common focus on trade interventions and despite their complementary nature, the two approaches have not integrated each other's insights. The strategic-trade approach adopts a simple altruistic view of the policy-maker as domestic welfare maximizer. It ignores the pervasive influence of politics and special-interest lobbying in shaping trade policy. Formal political-economy models generally ignore strategic interaction among agents in their policy games so as to focus on the role of politics. Both approaches have largely ignored the channels through which foreign direct investment (FDI) may affect the strategic and political incentives underlying unilateral trade interventions.

This paper makes a first attempt at synthesis of the two approaches. It recognizes that strategic-trade and political motives for trade interventions often are present at the same time and closely inter-related. Further, FDI with its increasing global presence may also affect the formation of trade policy in important ways. A proper understanding of trade policy may therefore benefit from the integration of the two complementary approaches, and from taking FDI into account.

We develop a framework that incorporates these concerns. In our setup, strategic interaction takes place between foreign firms that compete on Home's market through export or FDI. These firms also play a policy influence game of the Grossman-Helpman (1994) type with Home's government. Through political contributions firms seek to

[1] See Brander (1995) for a recent survey of the strategic trade policy literature.

[2] See Helpman (1995) and Rodrik (1995) for recent surveys of the political-economy literature on trade policy.

influence Home's trade (tariff) and industrial (tax) policies that directly affect their profits. Subject to foreign firms' lobbying, Home's government sets trade and industrial policies to maximize its political objective function. This is a weighted sum of domestic welfare and lobby contributions. The relative weight attached to lobby contributions describes the political bias of the government. We characterize equilibrium policies under different types of government which result from the trade-off between strategic-trade and political motives. We also compare policies across government types to gain insight into the policy distortions introduced by these motives, and the interaction between them in shaping unilateral trade policy.

A number of results emerge from the analysis.

First, protection by a low-cost Home may be globally optimal, because it exploits strategic interaction between export and FDI firms to induce a more cost-efficient global production pattern.

Second, FDI introduces new channels through which unilateral trade intervention may benefit domestic consumers. We show that the strategic-trade motive for unilateral intervention to increase domestic welfare may prevail even in the absence of domestic firms, and may be enhanced by the presence of FDI firms.

Third, trade policy that maximizes domestic welfare may deviate from the globally optimal policy in either direction. Moreover, any such policy deviation may be mitigated or even reversed by the political motive to induce lobby contributions. If the government cares more about lobby contributions than about domestic welfare, it will set a lower tariff than any other politically biased government when protection does not benefit lobbies. But it may not set a higher tariff when protection benefits lobbies, due to the provision of excessive profit incentive. Hence, political bias towards lobbies is more likely to induce a liberal rather than a protectionist trade policy, regardless of its impact on lobbies.

One main insight of the existing political-economy literature on trade policy is that trade policy biases arise to benefit special interests. By incorporating strategic interaction and multiple policy instruments, we question this common perception on two grounds. First, it focuses on the political motive for trade policy alone, and ignores the strategic-trade motive and political bias. If the government is biased towards consumers, the strategic-trade motive dominates and this may bias trade policy in a way that hurts rather than benefits special interests. Hence, depending on the nature of political bias, trade policy deviation need not benefit special interests to be politically optimal.[3] Second, with multiple policy instruments available, concession to special interests may well take place through adjustments in policies other than trade policy (e.g. industrial policy). It is then not obvious that trade policy need be biased in any specific direction to benefit special interests.

Our analysis also extends the strategic-trade policy literature in several ways. It is common in this literature to relate the strategic-trade motive for unilateral intervention to the presence of domestic firms competing with foreign rivals. Introducing FDI and industrial policy in this paper allows us to de-link the strategic-trade motive from the presence of domestic firms. It also suggests that the strategic-trade motive may be enhanced by the presence of FDI firms instead of domestic firms. Finally, and importantly, the analysis does not hinge on specific assumptions about the mode of strategic interaction between firms (Cournot or Bertrand). Hence it avoids a major drawback of the strategic trade policy literature where the robustness of results with respect to the assumed mode of strategic interaction is a main concern.[4]

In contrast to Johnson (1954) and Grossman and Helpman (1995a, 1995b) who model foreign influence on domestic trade policy through international negotiations, in this paper foreign influence affects domestic trade policy (and industrial policy) directly through lobbying and political contributions by export and FDI firms. With the increasing global presence of foreign firms through export and FDI, we believe this setup captures an increasingly important aspect of contemporary policy-making.

The rest of the paper is organized as follows. Section 2 presents the model. Sections 3 through 6 analyze and compare optimal trade (and industrial) policies under different types of government. Section 7 provides some general discussions, while Section 8 concludes the paper with some remarks on extensions. Proofs of some major results appear in the appendix.

2 The Model

Consider a country, Home, with a consumer population (labor force) of size 1. There

[3] Using US data, Goldberg and Maggi (1999) find that the government attaches very small relative weight (between $\frac{1}{88}$ and $\frac{1}{50}$) to lobby contributions in its objective function, suggesting it may be strongly biased towards consumers.

[4] See Eaton and Grossman (1986) for a critique in this regard.

are two types of goods: a domestic numeraire good Q_0 and n tradeable goods indexed by $i = 1, ..., n$. Tradeables are produced by foreign firms in one of two ways: overseas production with subsequent export to Home (denoted E), or local production in Home through FDI (denoted F).[5] Each tradeable good i is available in two varieties, M_i and X_i, each produced by a single firm. Hence, industry structure in each tradeable sector may involve one export firm and one FDI firm, denoted (E, F); two export firms, denoted (E, E); or two FDI firms, denoted (F, F). We restrict attention to the mixed industry structure (E, F) for two reasons. First, it allows us to focus on the trade policy implications of strategic interaction between foreign export and FDI firms. This has not previously been addressed in the literature. Second, and most importantly, the mixed structure seems to accord better with two facts than the alternatives (E, E) and (F, F):

Fact 1 Countries generally pursue policies that succeed in sustaining some FDI;

Fact 2 There are nevertheless few industries where all firms produce with FDI.

These facts suggest that countries may have an inherent preference for FDI;[6] yet policies compatible with the structure (F, F) may somehow be infeasible. In line with these facts, we only consider the mixed industry structure (E, F) in the remainder of the paper.

Firms. An export firm produces M_i abroad at unit cost c. It exports M_i to Home subject to an *ad valorem* tariff τ_i, so $(1 - \tau_i)\, q_i$ is the net-of-tariff price received by the firm, i.e. Home's terms of trade (TOT) for M_i.[7] We assume $\tau_i \in [\underline{\tau}_i, \overline{\tau}_i]$, where $\underline{\tau}_i < 0$, and $\overline{\tau}_i < 1$ is non-prohibitive.[8] (Both $\underline{\tau}_i$ and $\overline{\tau}_i$ may be institutionally determined.) An FDI firm produces X_i in Home after incurring a sunk cost $K_i > 0$ to overcome entry barriers and start production. X_i is produced using Home labor $l_i = bX_i$ at wage w, so unit cost is $bw < c$ by assumption. X_i is sold at Home price p_i.

[5] We do not consider import-competing domestic firms so as to focus on strategic interaction between *foreign* (export and FDI) firms and its implications. But as we will see, with simple modifications FDI firms can be re-interpreted as domestic firms in this paper.

[6] Countries may prefer FDI to export for a variety of reasons, e.g. the (hoped-for) inflow of scarce capital; transfer of technological, organizational and management know-how; backward and forward linkages generated in the host economy; and productivity spillovers.

[7] An alternative specification of ad valorem tariff, more common in the literature, is $t_i \in (-1, \infty)$ such that the export firm's net-of-tariff price (Home's TOT) is $\frac{q_i}{1+t_i}$. This is equivalent to our specification iff $\tau_i = \frac{t_i}{1+t_i}$. Our specification has the advantage of simplifying algebra in subsequent analysis.

[8] If $\tau_i < 0$, import is subsidized.

M_i and X_i are imperfect substitutes in consumption with inverse demand functions $q_i = \widetilde{q}_i(\underset{-}{X_i}, \underset{-}{M_i})$ and $p_i = \widetilde{p}_i(\underset{-}{X_i}, \underset{-}{M_i})$, respectively. Let $M_i(\tau_i)$ and $X_i(\tau_i)$ be outputs as functions of τ_i. Then we can define

$$q_i(\tau_i) \equiv \widetilde{q}_i(X_i(\tau_i), M_i(\tau_i)),$$

$$p_i(\tau_i) \equiv \widetilde{p}_i(X_i(\tau_i), M_i(\tau_i)).$$

An export firm's net profit is

$$E_i(\tau_i) = [(1-\tau_i) q_i(\tau_i) - c] M_i(\tau_i). \quad (1)$$

An FDI firm's net profit is

$$F_i(\tau_i, \phi_i) = \phi_i [p_i(\tau_i) - bw] X_i(\tau_i) - K_i, \quad (2)$$

where ϕ_i is the profit retention rate and an indicator of the profit incentive for FDI provided by Home. We assume $\phi_i \in (0, \widehat{\phi}_i]$, where the constant $\widehat{\phi}_i \in (0,1)$ is the maximum feasible retention rate (which may be institutionally determined). $(1-\phi_i)$ is the profit tax rate. Employment in Home's numeraire sector is $l_0 = 1 - \sum_{i=1}^n l_i$ at wage $1 < w$.[9] Labor supply in Home is sufficiently large so $\sum_{i=1}^n l_i < 1$.

Note that FDI firms can be re-interpreted as domestic firms if we modify the model so that $\phi_i = 0$ (domestic firms' profits accrue entirely to domestic welfare), $w = 1$ (domestic firms' wage rate is 1) and $K_i = 0$ (no entry cost).

Consumers. The representative Home consumer derives utility from consuming the domestic numeraire good Q_0 and all n tradeable goods. Utility is

$$U(Q_0, X, M) = Q_0 + \sum_{i=1}^{n} u_i(X_i, M_i),$$

where $u_i(\cdot)$ is strictly increasing and concave, $X = \{X_i\}$ and $M = \{M_i\}$. The indirect utility function associated with $U(Q_0, X, M)$ is

$$V(I, p, q) = I + \sum_{i=1}^{n} S_i(p_i, q_i),$$

[9] FDI firms often pay higher wages than local firms, especially in developing countries. They may do so to overcome local operational barriers or out of efficiency-wage consideration, among other things.

where I is disposable income (expenditure), $p = \{p_i\}$, $q = \{q_i\}$, and $S_i(p_i, q_i) = u_i(X_i, M_i) - p_i X_i - q_i M_i$ is consumer surplus from consuming X_i and M_i, with $\frac{\partial S_i}{\partial p_i} = -X_i$ and $\frac{\partial S_i}{\partial q_i} = -M_i$. Assuming tax and tariff revenues are entirely transferred (without distortion) to Home consumers, aggregate Home welfare is

$$\begin{aligned} W(\tau, \phi) &= w \sum_i bX_i + \left(1 - \sum_i bX_i\right) && \text{(wage income)} \\ &\quad + \sum_i (1 - \phi_i)(p_i - bw) X_i && \text{(tax revenue)} \\ &\quad + \sum_i \tau_i q_i M_i && \text{(tariff revenue)} \\ &\quad + \sum_i S_i(p_i, q_i), && \text{(consumer surplus)} \end{aligned}$$

where X_i, M_i, p_i and q_i all are functions of τ_i, $\tau = \{\tau_i\}$ and $\phi = \{\phi_i\}$.

2.1 Strategic interaction

The functions $X_i(\tau_i), M_i(\tau_i), p_i(\tau_i)$ and $q_i(\tau_i)$ are determined by Home consumer preferences and foreign industry conduct. Assuming X_i and M_i are imperfect but close enough substitutes, and with mild and reasonable restrictions on their demand functions, we show in the appendix that these functions have the following properties under either Cournot or Bertrand competition between firms in each industry:

$$-M_i'(\tau_i) > X_i'(\tau_i) > 0, \tag{3a}$$

$$q_i'(\tau_i) > p_i'(\tau_i) > 0. \tag{3b}$$

Hence, higher tariff in Home generally expands the FDI firm's output at the expense of its export rival.[10] It also raises the prices of both competing varieties. The magnitudes of price and output impacts of tariff on the export firm exceed those on the FDI firm.

We now derive government policies (τ_i, ϕ_i) consistent with the mixed industry structure (E, F) in each tradeable sector. Let $\pi_i(\tau_i)$ and $\Pi_i(\phi_i) = \phi_i B_i - K_i$ (where B_i is a constant) be the net profits per firm with alternative industry structures (E, E) and

[10] $M_i'(\tau_i) < 0$ and $X_i'(\tau_i) > 0$ relate to the rent-shifting effect of protection, as shown by Brander and Spencer (1984) in a context of Cournot duopoly between foreign and domestic firms. Wang (1996) shows that this effect is also present with Cournot duopoly between exclusively foreign (export and FDI) firms, and no domestic firms are involved.

(F,F), respectively.[11] Then the mixed industry structure (E,F) prevails over (E,E) and (F,F) if $F_i(\tau_i,\phi_i) \geq \pi_i(\tau_i)$ and $E_i(\tau_i) \geq \Pi_i(\phi_i)$, because the FDI firm facing an export rival will not want to switch to export, and the export firm facing an FDI rival will not want to switch to FDI.[12] These conditions are satisfied iff

$$\phi_i \geq \underline{\phi}_i(\tau_i) \equiv \frac{\pi_i(\tau_i)+K_i}{[p_i(\tau_i)-bw]\,X_i(\tau_i)}, \tag{4a}$$

$$\phi_i \leq \overline{\phi}_i(\tau_i) \equiv \frac{E_i(\tau_i)+K_i}{B_i}. \tag{4b}$$

This motivates the following assumptions in line with Facts 1 and 2, respectively.

Assumption 1 $\phi_i \geq \underline{\phi}_i(\tau_i)$, where $\underline{\phi}_i(\tau_i) \in \left(0,\widehat{\phi}_i\right)$.

Assumption 2 $\overline{\phi}_i(\tau_i) \geq \widehat{\phi}_i$.

In line with Fact 1, Assumption 1 rules out (E,E): The Home government always seeks to sustain FDI by providing sufficient profit incentives, so that an FDI firm facing an export rival does not want to switch to export. In line with Fact 2, Assumption 2 rules out (F,F): The Home government can never induce all foreign firms to choose FDI [i.e. industry structure (F,F)], because this entails profit incentives $\phi_i > \overline{\phi}_i(\tau_i) \geq \widehat{\phi}_i$, which are not feasible.[13]

Under Assumptions 1 and 2, the set of feasible policies for each tradeable sector always sustains a mixed industry structure and is denoted

$$\Theta_i := \left\{(\tau_i,\phi_i) : \tau_i \in [\underline{\tau}_i,\overline{\tau}_i], \phi_i \in \left[\underline{\phi}_i(\tau_i),\widehat{\phi}_i\right]\right\},$$

which is illustrated in Figure 1.

[Insert Figure 1 here]

[11] Strictly speaking, even though firms choose the same production mode in an industry, the profits accruing to each firm may differ when products are imperfect substitutes. However, if products are close enough substitutes (as we assume), it is reasonable and simplifying to assume that profits are the same for both firms.

[12] When $F_i(\tau_i,\phi_i) = \pi_i(\tau_i)$, the FDI firm facing an export rival is indifferent between FDI and export. We assume it remains an FDI firm. Similarly, when $E_i(\tau_i) = \Pi_i(\phi_i)$, we assume an export firm facing an FDI rival remains an export firm.

[13] According to the definition of $\overline{\phi}_i(\tau_i)$ in (4b), $\overline{\phi}_i(\tau_i) \geq \widehat{\phi}_i$ may apply for several reasons: high entry cost K_i, low gross profits B_i (e.g. due to fierce competition with (F,F)), or relatively high profits $E_i(\tau_i)$ accruing to the export firm in a mixed structure (E,F).

If higher tariff does not worsen Home's TOT by too much (if at all), it will reduce the profits accruing to foreign export firms.[14] This motivates:

Assumption 3 $\pi_i'(\tau_i) < 0$ and $E_i'(\tau_i) < 0$.

Given $X_i' > 0$, $p_i' > 0$ and Assumption 3, the definition of $\underline{\phi}_i(\tau_i)$ in (4a) implies the following.

Lemma 1 $\underline{\phi}_i'(\tau_i) < 0$: *The minimum profit incentive that sustains FDI in each sector decreases with tariff.*

Intuitively, with strategic rivalry between export and FDI firms, higher tariff reduces the profits of the export firm and benefits its FDI rival. As a result, an increase in tariff τ_i enables a corresponding cut in the minimum profit incentive that sustains FDI. Put differently, tariff and profit incentive are substitutes in sustaining FDI.

2.2 The policy game

Through political contributions, each FDI or export firm lobbies the Home government to influence its tariff and tax policies that directly affect the firm's profits.[15] Following Grossman and Helpman (1994), we consider a two-stage policy influence game Γ. In stage one, a firm with historically given production mode m $(m = E, F)$ in industry i chooses a feasible contribution scheme $C_{mi} : \Theta_i \to \Re_+$ to maximize its (anticipated) net payoff: $[F_i(\tau_i, \phi_i) - C_{Fi}(\tau_i, \phi_i)]$ for an FDI firm and $[E_i(\tau_i) - C_{Ei}(\tau_i)]$ for an export firm. In stage two Home government chooses a feasible policy vector $(\tau, \phi) \in \Theta_1 \times \Theta_2 \times ... \times \Theta_n$ to maximize its objective function. Given (τ, ϕ), firms in each industry may re-consider, but will eventually retain, their historically given production modes, because by Assumptions 1 and 2 $(\tau_i, \phi_i) \in \Theta_i$ are consistent with a mixed industry structure in each sector. Given (τ, ϕ), firms in each industry then (compete in output or price to) maximize profits and pay contributions to the Home government according to C_{mi}. The sequencing of events is as follows:

[14] Home's TOT deteriorates if $(1-\tau_i) q_i$ increases when τ_i increases, i.e. if $[(1-\tau_i) q_i' - q_i] > 0$. Since $E_i'(\tau_i) = [(1-\tau_i) q_i - c] M_i' + [(1-\tau_i) q_i' - q_i] M_i$, we obtain $E_i'(\tau_i) < 0$ iff $[(1-\tau_i) q_i' - q_i] < [(1-\tau_i) q_i - c] \frac{-M_i'}{M_i}$, where the righthand-side is positive. A similar condition can be derived for $\pi_i'(\tau_i) < 0$ if $\pi_i(\tau_i)$ is explicitly specified.

[15] In Helpman's (1995) terminology, firms engage in "focused lobbying".

$$1.\ \text{Firms: } C_{mi}(\cdot) \rightarrow 2.\ \text{Gov't: } (\tau,\phi) \rightarrow 3.\ \text{Firms: } \begin{array}{l} \{F_i(\tau_i,\phi_i),\ C_{Fi}(\tau_i,\phi_i)\}, \\ \{E_i(\tau_i),\ C_{Ei}(\tau_i)\}. \end{array}$$

The government's objective function is a weighted sum of domestic welfare and political contributions from foreign firms:[16]

$$\widehat{G}(\tau,\phi;a) = W(\tau,\phi) + a\left[\sum_i C_{Fi}(\tau_i,\phi_i) + \sum_i C_{Ei}(\tau_i)\right],$$

where $a \geq 0$ is the relative weight attached to lobby contributions by the government and reflects its political bias.

Definition 1 *Home government is biased towards lobbies ($\mathcal{L}$) if $a > 1$, eclectic ($\mathcal{E}$) if $a = 1$, biased towards consumers ($\mathcal{C}$) if $a \in (0,1)$, and benevolent ($\mathcal{B}$) if $a = 0$.*

Note that a government "biased towards consumers" also cares about lobby contributions, but it cares more about consumer welfare. Likewise, a government "biased towards lobbies" also cares about consumer welfare, but it cares more about lobby contributions.

In a subgame-perfect Nash equilibrium of Γ, firms choose $C_{mi}(\cdot)$ in stage one subject to a government participation constraint and anticipating government optimization in stage two. As noted by Bernheim and Whinston (1986) and Grossman and Helpman (1994), the game has multiple equilibria because many contribution schemes satisfying equilibrium conditions are feasible. A useful refinement commonly used in the literature is to restrict attention to equilibria with *truthful* contribution schemes. In our context these schemes may be defined as

$$C^T_{mi}(\tau_i,\phi_i;\underline{m}_i) = \max\{0, m_i(\tau_i,\phi_i) - \underline{m}_i\}, \quad m = E, F. \tag{5}$$

A truthful scheme reflects a firm's true gains from a policy pair (τ_i,ϕ_i) in excess of some base level $\underline{m}_i$. We shall henceforth restrict attention to subgame-perfect Nash equilibria with truthful contribution schemes, abbreviated as TPE (Truthful Political Equilibrium). In a TPE with firms making positive contributions, Home government is induced to maximize a weighted sum of domestic welfare and foreign producer surpluses:

$$\widetilde{G}(\tau,\phi;a) = W(\tau,\phi) + a\left[\sum_i F_i(\tau_i,\phi_i) + \sum_i E_i(\tau_i)\right].$$

[16] Grossman and Helpman (1996) elaborate on the theoretical foundation of this form of government objective function based on electoral-competition and special-interest politics.

To simplify notation we define

$$L(\tau,\phi) \equiv \sum_i F_i(\tau_i,\phi_i) + \sum_i E_i(\tau_i) \tag{6}$$

so that $\widetilde{G}(\tau,\phi;a)$ can be re-written as:

$$\widetilde{G}(\tau,\phi;a) = W(\tau,\phi) + aL(\tau,\phi). \tag{7}$$

Since $\frac{\partial \widetilde{G}(\tau,\phi;a)}{\partial \phi_i} = (a-1)(p_i - bw)X_i$, optimal profit incentive for sector i varies with the government's political bias and is given by the following function, in view of Θ_i:

$$\psi_i(\tau_i) \begin{cases} = \widehat{\phi}_i & if\ a > 1, \\ = \underline{\phi}_i(\tau_i) & if\ a < 1, \\ \in [\underline{\phi}_i(\tau_i), \widehat{\phi}_i] & if\ a = 1. \end{cases} \tag{8}$$

In subsequent analysis we consider Home policies in a TPE under different types of government. We assume unique interior solutions to the government's optimization problem satisfying the first-order conditions $\frac{d\widetilde{G}(\tau,\psi(\tau);a)}{d\tau_i} = 0$, and assume all appropriate second-order conditions $\frac{d^2\widetilde{G}(\tau,\psi(\tau);a)}{d\tau_i^2} < 0$ are satisfied.

Notational conventions: (a) For any variable z_i, z_i' denotes its derivative w.r.t. τ_i, unless noted otherwise. (b) Given the additive separability of W in (τ_i,ϕ_i), $\frac{\partial W(\tau,\phi)}{\partial \tau_i}$ depends only on (τ_i,ϕ_i) and not on policies in other sectors. Hence, we shall write $\frac{\partial W(\tau_i,\phi_i)}{\partial \tau_i}$ instead of $\frac{\partial W(\tau,\phi)}{\partial \tau_i}$ to simplify notation. Similarly for partial derivatives of the functions L and $\widetilde{G}$. $\square$

3 $\mathcal{E}$-Government $(a = 1)$: Global optimum

According to (7) an $\mathcal{E}$-government is induced by lobbies to maximize

$$\widetilde{G}(\tau,\phi;1) = W(\tau,\phi) + L(\tau,\phi) \equiv G(\tau), \tag{9}$$

i.e. the sum of domestic welfare and aggregate foreign profits.[17] This is a benchmark case as the government is politically biased towards neither consumers nor lobbies. We take $G(\tau)$ to be a simplified measure of global welfare in our model since, beyond Home,

[17] One can easily verify that $G(\tau) = \sum_i (p_i - b)X_i + \sum_i (q_i - c)M_i + \sum_i S_i(p_i,q_i) + 1 - \sum_i K_i$, which does not depend on ϕ : Any gains of FDI firms from higher profit incentives are exactly offset by welfare losses of Home consumers when $a = 1$.

the rest of the world is represented by foreign firms only. Then an $\mathcal{E}$-government's chosen policy $\tau_i^{\mathcal{E}}$ can also be taken as globally optimal. It satisfies

$$\frac{dG\left(\tau_i^{\mathcal{E}}\right)}{d\tau_i} = \left[p_i\left(\tau_i^{\mathcal{E}}\right) - b\right] X_i'\left(\tau_i^{\mathcal{E}}\right) + \left[q_i\left(\tau_i^{\mathcal{E}}\right) - c\right] M_i'\left(\tau_i^{\mathcal{E}}\right) \equiv G_i'\left(\tau_i^{\mathcal{E}}\right) = 0. \qquad (10)$$

X_i' and $-M_i'$ measure the expansion of FDI output and reduction of import, respectively, due to higher tariff. The ratio $\frac{-M_i'}{X_i'} > 1$ provides a *distortion index* of protection, with a larger value indicating greater distortion (deadweight loss) due to higher tariff. $(p_i - b)$ and $(q_i - c)$ are welfare gains from producing and consuming one unit of X_i and M_i, respectively. The ratio $\frac{p_i - b}{q_i - c}$ is a *welfare-gain index* of Home production, with a larger value indicating greater welfare gains from Home production (by the FDI firm) relative to production elsewhere (by the export firm). The following result follows directly from (10).

Proposition 1 $\tau_i^{\mathcal{E}} \gtreqless 0$ *iff* $\frac{p_i(0)-b}{q_i(0)-c} \gtreqless \frac{-M_i'(0)}{X_i'(0)}$.

Hence, the global optimum may involve tariff, subsidy or free trade. Tariff in low-cost Home is globally optimal $\left(\tau_i^{\mathcal{E}} > 0\right)$ if and only if, at free trade, the welfare gains from Home production strictly dominate the distortionary effect of protection. The gains arise from exploiting strategic rivalry between foreign export and FDI firms, so that protection by low-cost Home generates a more cost-efficient production pattern globally: It increases low-cost production in Home by FDI firms and reduces high-cost production elsewhere by export firms.[18]

It is interesting to note that, although globally welfare-improving, a unilateral tariff may not be adopted by Home without foreign firms' lobbying. Further, the global gains from protection are not evenly distributed between Home consumers and foreign firms: With truthful contribution schemes, Home government captures all the global gains from protection to the benefit of domestic consumers.

Since $\frac{-M_i'}{X_i'} > 1$ by (3a), Proposition 1 implies:

Corollary 1 $\tau_i^{\mathcal{E}} \geq 0$ *only if* $c - b > q_i(0) - p_i(0)$.

[18]This result can be compared with the result of Brander and Spencer (1984). They showed in a reciprocal-dumping model that unilateral tariff may improve global welfare by limiting the waste associated with substantial transport costs. Our analysis differs from theirs in that no domestic firms are involved, products are differentiated, and production costs differ between countries.

That is, protection or free trade is globally optimal only if the cost difference between export and FDI goods is large enough (i.e. larger than their free-trade price difference). Otherwise, trade subsidy is called for.

(10) further implies the following comparative static results:

Corollary 2 $\frac{\partial \tau_i^{\mathcal{E}}}{\partial c} > 0$ *and* $\frac{\partial \tau_i^{\mathcal{E}}}{\partial b} < 0$.

Hence, the globally optimal tariff decreases with production cost in Home, b, and increases with production cost abroad, c. This is hardly surprising given that higher tariff increases FDI output in low-cost Home and reduces high-cost output elsewhere.

We now proceed to examine what policy deviations from the global benchmark, if any, arise when Home's government is politically biased towards domestic consumers or foreign lobbies, i.e. when $a \neq 1$.

4 $\mathcal{B}$-Government $(a = 0)$: Domestic optimum

Before studying the optimal policies of a $\mathcal{B}$-government, it is useful to outline some general effects of trade policy on domestic welfare. For this purpose, we define

$$RS_i(\tau_i, \psi_i) \equiv [(p_i - b) - \psi_i(p_i - bw)] X_i', \tag{11a}$$

$$NMU_i(\tau_i, \psi_i) \equiv \left[\psi_i p_i' + \psi_i'(p_i - bw)\right] X_i, \tag{11b}$$

$$TOT_i(\tau_i) \equiv \left[(1 - \tau_i) q_i' - q_i\right] M_i, \tag{11c}$$

where ψ_i depends on τ_i, as specified in (8). Then, in general we obtain,

$$\frac{dW(\tau_i, \psi_i)}{d\tau_i} = RS_i(\tau_i, \psi_i) - NMU_i(\tau_i, \psi_i) - TOT_i(\tau_i) + \tau_i q_i M_i'. \tag{12}$$

Hence, tariff has four distinct effects on Home welfare:

First, tariff affects the FDI firm's output and employment. This in turn affects Home's wage-income by $b(w-1)X_i'$, due to higher wages in FDI firms. It also affcets Home's tax-revenue by $(1-\psi_i)(p_i - bw) X_i'$, due to taxation of FDI firms' profits. These two terms add up to the rent-shifting (RS) effect of tariff, captured by $RS_i(\tau_i, \psi_i) > 0$.[19] It delineates two channels (wage-income and tax-revenue) through which tariff combined

[19] The RS effect is positive due to $X_i' > 0$ (oligopolistic rivalry between firms), $w > 1$ (wage difference), $p_i > bw$ (price mark-up), and $(1-\psi_i) > 0$ (profit taxation).

with corporate taxation may benefit Home consumers by shifting oligopoly rents from the export firm to its FDI rival. No domestic firms need be involved. With a domestic firm instead of the FDI firm, we would set $\psi_i = 0$ and $w = 1$ so $RS_i(\tau_i, \psi_i)$ would reduce to $(p_i - b) X_i'$.[20]

Second, tariff affects the net mark-up (NMU) of FDI firms, $\psi_i(p_i - bw)$, when $p_i' > 0$ and $\psi_i' \neq 0$. This is captured by $NMU_i(\tau_i, \psi_i)$. If tariff can substitute for profit incentive so that $\psi_i' < -\frac{\psi_i p_i'}{(p_i - bw)} < 0$, higher tariff by reducing ψ_i will reduce the FDI firm's NMU, thereby improving Home welfare. This may happen e.g. when $\psi_i(\tau_i) = \underline{\phi}_i(\tau_i)$. With a domestic firm instead of the FDI firm, we would set $\psi_i = 0$ so the NMU term would vanish.

Third, tariff affects Home's terms-of-trade, $(1 - \tau_i) q_i$. The sign of $TOT_i(\tau_i)$ depends on the shape of $q_i(\tau_i)$.

Finally, tariff has a consumption distortion effect, $\tau_i q_i M_i'$, which bears the opposite sign of τ_i.

To summarize: The TOT and consumption-distortion effects in our model are familiar from the trade policy literature. The RS and NMU effects identify new channels through which tariff combined with corporate taxation may affect domestic welfare even in the absence of domestic firms. These effects have not been previously addressed in the literature.

We now turn to the optimal policies of a $\mathcal{B}$-government. It maximizes domestic welfare $W(\tau, \psi)$, according to (7). Denote its policy pair for sector i as $\left(\tau_i^{\mathcal{B}}, \phi_i^{\mathcal{B}}\right)$, which satisfies $\phi_i^{\mathcal{B}} = \underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right)$ and

$$\frac{dW\left(\tau_i^{\mathcal{B}}, \underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right)\right)}{d\tau_i} = 0. \tag{13}$$

Making use of (12), we obtain the following result from (13).

Proposition 2 *The domestically optimal trade policy is*

$$\tau_i^{\mathcal{B}} = \frac{RS_i\left(\tau_i^{\mathcal{B}}, \underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right)\right) - NMU_i\left(\tau_i^{\mathcal{B}}, \underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right)\right) - TOT_i\left(\tau_i^{\mathcal{B}}\right)}{-q_i\left(\tau_i^{\mathcal{B}}\right) M_i'\left(\tau_i^{\mathcal{B}}\right)}. \tag{14}$$

[20] $RS_i(\tau_i, \psi_i)$ is a modified counterpart of Helpman and Krugman's (1989) production efficiency (PE) effect. However, PE effect relates to a *domestic* firm competing with a foreign firm, whereas $RS_i(\tau_i, \psi_i)$ relates to a *foreign* (FDI) firm competing with another *foreign* (export) firm. Hence, the wage-income gains (due to $w > 1$) are added to the PE effect, and the profit gains of the FDI firm (due to $\psi_i > 0$) are subtracted from it.

Hence, $\tau_i^{\mathcal{B}}$ has three components relating to the rent-shifting, net-mark-up and terms-of-trade effects, respectively. Trade intervention $\left(\tau_i^{\mathcal{B}} \neq 0\right)$ generally improves domestic welfare, unless the three effects exactly cancel out at free trade.[21]

In general, therefore, domestic welfare considerations will motivate trade interventions that exploit the strategic interdependence between firms to benefit Home consumers. This is the *strategic-trade motive* for intervention, measured by $\left.\frac{dW(\tau_i,\psi_i(\tau_i))}{d\tau_i}\right|_{\tau_i=0}$ and encompassing the RS, NMU and TOT effects. The strategic-trade motive is well recognized in the literature, usually in a context of strategic interaction between *domestic* and foreign firms.[22] One contribution of our analysis here is to show that the motive may prevail even *without* domestic firms: With strategic interaction between foreign export and FDI firms, Home protection that shifts rents from export firms to FDI firms may also benefit Home through e.g. higher wage income and profit tax revenue.

Another contribution of our analysis is to show that the presence of FDI firms may affect the strategic-trade motive differently as compared to the case with domestic firms. Notice that not all of the FDI firms' profits accrues to Home (due to $\psi_i > 0$), whereas all of domestic firms' profits would do ($\psi_i = 0$). So $RS_i(\tau_i, \psi_i)$ is smaller with FDI firms instead of domestic firms, with the difference given by $\psi_i(p_i - bw)X_i'$ in (11a). On the other hand, with FDI firms trade intervention generates an additional effect $NMU_i(\tau_i, \psi_i)$. This may be negative and add to the incentives for intervention. In view of (2) and (11b), the above two effects add up to

$$\psi_i(p_i - bw)X_i' + \left[\psi_i p_i' + \psi_i'(p_i - bw)\right]X_i = \frac{dF_i(\tau_i, \psi_i(\tau_i))}{d\tau_i} \tag{15}$$

which is positive if $\psi_i(\tau_i)$ equals $\widehat{\phi}_i$ (or any other admissible constant), and has ambiguous sign if $\psi_i(\tau_i) = \underline{\phi}_i(\tau_i)$, because then $\psi_i' = \underline{\phi}_i' < 0$ by Lemma 1. The following result follows from (15):

Lemma 2 *Higher tariffs may benefit or hurt FDI firms. In particular,* $\frac{dF_i(\tau_i,\psi_i(\tau_i))}{d\tau_i} < 0 \Leftrightarrow \psi_i' < -\frac{\psi_i\left[p_i'X_i + (p_i - bw)X_i'\right]}{(p_i - bw)} < 0.$

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[21] Since $RS_i\left(\tau_i, \underline{\phi}_i(\tau_i)\right) > 0$, a sufficient (but not necessary) condition for protection to be domestically optimal $\left(\tau_i^{\mathcal{B}} > 0\right)$ is that it does not increase the FDI firm's NMU or worsen Home's TOT at free trade.

[22] See Brander and Spencer (1984) for a seminal contribution, and Brander (1995) for a comprehensive survey of the literature.

Hence, higher tariffs hurt FDI firms iff tariffs make good enough substitutes for profit incentives, which may happen if $\psi_i(\tau_i) = \underline{\phi}_i(\tau_i)$. In that case higher tariffs enable Home to cut back sufficiently on its profit incentives so that on balance, FDI firms are worse off.[23]

Noting (11a), (11b) and (15), (12) can be re-written as

$$\frac{dW(\tau_i, \psi_i)}{d\tau_i} = (p_i - b)X_i' - \frac{dF_i(\tau_i, \psi_i(\tau_i))}{d\tau_i} - TOT_i(\tau_i) + \tau_i q_i M_i'. \tag{16}$$

Since the sign of $\frac{dF_i(\tau_i,\psi_i(\tau_i))}{d\tau_i}$ would be zero with a domestic firm ($\psi_i = 0$) and may be negative with an FDI firm (Lemma 2), we obtain the following result:

Proposition 3 *The strategic-trade motive for tariff (subsidy) as measured by* $\left.\frac{dW(\tau_i,\psi_i)}{d\tau_i}\right|_{\tau_i=0}$ *is enhanced (mitigated) by the presence of FDI firm instead of domestic firm iff* $\frac{dF_i(\tau_i,\psi_i(\tau_i))}{d\tau_i} < 0$, *i.e. iff tariff is a good enough substitute for profit incentive.*

The following comparative static results follow from (13).

Corollary 3 $\frac{\partial \tau_i^{\mathcal{B}}}{\partial w} > 0$.

Intuitively, higher wage rate in FDI firms generates a stronger wage-income effect that benefits Home. So the domestically optimal tariff will be higher.

Corollary 4 $\frac{\partial \tau_i^{\mathcal{B}}}{\partial b} > 0$ *if* $w, \underline{\phi}_i, X_i'$ *or* $\left|\underline{\phi}_i'\right|$ *is large enough.*

Intuitively, if $w, \underline{\phi}_i, X_i'$ or $\left|\underline{\phi}_i'\right|$ is large enough, $[RS_i(\tau_i, \psi_i) - NMU_i(\tau_i, \psi_i)]$ will be increasing in b. Higher labor intensity in FDI firms will then enable Home to extract more rents from these firms through the RS and NMU effects. So the domestically optimal tariff will increase with b.

5 $\mathcal{C}$-government $(a < 1)$

In view of (7), a $\mathcal{C}$-government maximizes a weighted sum of consumer welfare and lobby welfare, and cares relatively more about the former. Denote its optimal policy pair for sector i by $\left(\tau_i^{\mathcal{C}}, \phi_i^{\mathcal{C}}\right)$. Then (8) implies $\phi_i^{\mathcal{C}} = \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)$, and $\tau_i^{\mathcal{C}}$ satisfies

$$\frac{dW\left(\tau_i^{\mathcal{C}}, \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right)}{d\tau_i} + a\frac{dL\left(\tau_i^{\mathcal{C}}, \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right)}{d\tau_i} = 0, \tag{17}$$

[23] Note that higher tariffs necessarily reduce FDI firms' net-mark-ups in this case.

where $a < 1$. Making use of (12), we find from (17)

$$\tau_i^{\mathcal{C}} = \frac{RS_i\left(\tau_i^{\mathcal{C}}, \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right) - NMU_i\left(\tau_i^{\mathcal{C}}, \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right) - TOT_i\left(\tau_i^{\mathcal{C}}\right) + PO_i\left(\tau_i^{\mathcal{C}}, \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right)}{-q_i\left(\tau_i^{\mathcal{C}}\right) M_i'\left(\tau_i^{\mathcal{C}}\right)} \tag{18}$$

where in general,

$$PO_i\left(\tau_i, \psi_i\left(\tau_i\right)\right) \equiv a\frac{dL\left(\tau_i, \psi_i\left(\tau_i\right)\right)}{d\tau_i}. \tag{19}$$

According to (18), $\tau_i^{\mathcal{C}}$ has four components. The first three relate to the strategic-trade motive for trade policy. They are similar to the terms comprising $\tau_i^{\mathcal{B}}$ in (14). The last term, $PO_i\left(\tau_i^{\mathcal{C}}, \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right)$, is introduced by the influence-peddling of foreign firms vis-a-vis a government that cares about lobby contributions. As defined in (19), it depends on two factors: the government's political bias parameter a, and the marginal impact of trade policy on aggregate lobby welfare summarized by $\frac{dL(\tau_i, \psi_i(\tau_i))}{d\tau_i}$. With truthful contribution schemes defined in (5), $\frac{dL(\tau_i, \psi_i(\tau_i))}{d\tau_i}$ also reflects the government's marginal gains from a given trade policy in the form of lobby contributions. In this sense it captures the *political motive* underlying trade policy.[24]

Since $E_i' < 0$ (Assumption 3) and higher tariff may benefit or hurt the FDI firm (Lemma 2), its impact on foreign firms as a whole is ambiguous. From (9) and $G_i'\left(\tau_i^{\mathcal{E}}\right) = 0$ we find that if a deviation from $\tau_i^{\mathcal{E}}$ benefits lobbies, it will hurt consumers, and vice versa. Formally:

Lemma 3 $\frac{dL\left(\tau_i^{\mathcal{E}}, \psi_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} = -\frac{dW\left(\tau_i^{\mathcal{E}}, \psi_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i}$.

Lemma 3 reveals that strategic-trade and political motives generally distort trade policy away from $\tau_i^{\mathcal{E}}$ in opposite directions and with equal strength. The next result is derived in the appendix.

Lemma 4 $\tau_i^{\mathcal{B}} \gtreqless \tau_i^{\mathcal{E}}$ *or* $\tau_i^{\mathcal{C}} \gtreqless \tau_i^{\mathcal{E}} \Leftrightarrow \frac{dL\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} \lesseqgtr 0 \Leftrightarrow \frac{dW\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} \gtreqless 0.$

Note that $\tau_i > \tau_i^{\mathcal{E}}$ hurts lobbies when $\frac{dL\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} < 0$, and $\tau_i < \tau_i^{\mathcal{E}}$ hurts lobbies when $\frac{dL\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} > 0$. Hence, optimal trade policy under a $\mathcal{B}$- or a $\mathcal{C}$-government deviates from $\tau_i^{\mathcal{E}}$ if and only if such a deviation hurts foreign lobbies as a whole or,

[24] Although there may be direct conflict of interests within the group of foreign lobbies (between export and FDI firms), it is only the net effect, $\frac{dL(\tau_i, \psi_i(\tau_i))}{d\tau_i}$, that concerns a politically-minded government. Hence, only lobbies most affected by policies in their respective industries gain policy influence and make their voices heard.

equivalently, benefits domestic consumers (when the FDI firm is provided minimum profit incentive $\underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)$). This happens because in either case, the government cares more about domestic welfare than about lobby contributions. $\tau_i^{\mathcal{E}}$ will be chosen by a $\mathcal{B}$- or a $\mathcal{C}$-government if and only if its marginal impacts on export and FDI firms exactly cancel out.[25]

The next result shows inter alia how concerns about lobby contributions under a $\mathcal{C}$-government distorts $\tau_i^{\mathcal{C}}$ relative to $\tau_i^{\mathcal{B}}$. The proof is in the appendix.

Proposition 4 *Under a $\mathcal{C}$-government one of the following holds:*
(i) $\tau_i^{\mathcal{E}} < \tau_i^{\mathcal{C}} < \tau_i^{\mathcal{B}}$ and $\phi_i^{\mathcal{C}} > \phi_i^{\mathcal{B}}$;
(ii) $\tau_i^{\mathcal{E}} > \tau_i^{\mathcal{C}} > \tau_i^{\mathcal{B}}$ and $\phi_i^{\mathcal{C}} < \phi_i^{\mathcal{B}}$;
(iii) $\tau_i^{\mathcal{E}} = \tau_i^{\mathcal{C}} = \tau_i^{\mathcal{B}}$ and $\phi_i^{\mathcal{C}} = \phi_i^{\mathcal{B}}$.

Hence, any trade policy deviation from $\tau_i^{\mathcal{E}}$ under a $\mathcal{C}$-government bears the same direction as that under a $\mathcal{B}$-government, but is smaller in magnitude.

To understand the result, we note from Lemma 4 that if an increase in $\tau_i^{\mathcal{E}}$ benefits consumers, it will hurt lobbies. A $\mathcal{C}$-government biased towards consumers will therefore raise tariff beyond $\tau_i^{\mathcal{E}}$, but the tariff increase will be mitigated by its negative effect on lobbies. By comparison, a $\mathcal{B}$-government not caring about lobby contributions will totally disregard the negative effect on lobbies. So it will raise tariff by more than a $\mathcal{C}$-government does. By the same logic, a $\mathcal{B}$-government – if it chooses to cut tariff from $\tau_i^{\mathcal{E}}$ – will also cut it by more than a $\mathcal{C}$-government does. The bottom line is therefore the following: Due to its political bias towards consumers, the political motive of a $\mathcal{C}$-government mitigates but does not reverse any strategic-trade motivated deviation from $\tau_i^{\mathcal{E}}$ under a $\mathcal{B}$-government that maximizes consumer welfare.

6 $\mathcal{L}$-government $(a > 1)$

In view of (7), an $\mathcal{L}$-government also maximizes a weighted sum of consumer welfare and lobby welfare, but it cares relatively more about the latter. Denote its optimal policies for sector i by $\left(\tau_i^{\mathcal{L}}, \phi_i^{\mathcal{L}}\right)$. Then (8) implies $\phi_i^{\mathcal{L}} = \widehat{\phi}_i$, and $\tau_i^{\mathcal{L}}$ satisfies

$$\frac{dW\left(\tau_i^{\mathcal{L}}, \widehat{\phi}_i\right)}{d\tau_i} + a\frac{dL\left(\tau_i^{\mathcal{L}}, \widehat{\phi}_i\right)}{d\tau_i} = 0, \tag{20}$$

[25] Given (6) and $E_i' < 0$, $\frac{dL\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} = 0$ implies that $\frac{dF_i\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} > 0$. Hence the marginal impacts on export and FDI firms must be non-zero and exactly offset each other at $\tau_i^{\mathcal{E}}$.

where $a > 1$. Making use of (12) and (19), we find from (20)

$$\tau_i^{\mathcal{L}} = \frac{RS_i\left(\tau_i^{\mathcal{L}}, \widehat{\phi}_i\right) - NMU_i\left(\tau_i^{\mathcal{L}}, \widehat{\phi}_i\right) - TOT_i\left(\tau_i^{\mathcal{L}}\right) + PO_i\left(\tau_i^{\mathcal{L}}, \widehat{\phi}_i\right)}{-q_i\left(\tau_i^{\mathcal{L}}\right) M_i'\left(\tau_i^{\mathcal{L}}\right)}. \tag{21}$$

$\tau_i^{\mathcal{L}}$ has four components similar to those of $\tau_i^{\mathcal{C}}$ in (18). There are however two major differences. First, it is maximum profit incentive $\widehat{\phi}_i$ instead of the minimum schedule $\underline{\phi}_i(.)$ that enters $RS_i(\cdot)$, $NMU_i(\cdot)$ and $PO_i(.)$. Second, $PO_i\left(\tau_i^{\mathcal{L}}, \widehat{\phi}_i\right)$ exceeds $\frac{dL\left(\tau_i^{\mathcal{L}}, \widehat{\phi}_i\right)}{d\tau_i}$ in magnitude, because $a > 1$. Due to these differences, the political motive modifies domestically optimal trade policy differently as compared to the case of a $\mathcal{C}$-government. To see how, we first establish some lemmas.

Lemma 5 $\tau_i^{\mathcal{L}} \gtreqless \tau_i^{\mathcal{E}} \Leftrightarrow \frac{dL\left(\tau_i^{\mathcal{E}}, \widehat{\phi}_i\right)}{d\tau_i} \gtreqless 0 \Leftrightarrow \frac{dW\left(\tau_i^{\mathcal{E}}, \widehat{\phi}_i\right)}{d\tau_i} \lesseqgtr 0$. *(see appendix for proof)*

Hence, optimal trade policy under an $\mathcal{L}$-government deviates from $\tau_i^{\mathcal{E}}$ if and only if such a deviation benefits lobbies or, equivalently, hurts domestic consumers (when the FDI firm is provided maximum profit incentive $\widehat{\phi}_i$). This is the opposite of Lemma 4. It obtains because an $\mathcal{L}$-government cares more about lobby contributions than about domestic welfare $(a > 1)$.

Lemma 6 $\frac{\partial^2 W(\tau_i, \phi_i)}{\partial \tau_i \partial \phi_i} < 0$.[26]

Hence, marginal domestic welfare gains from tariff decrease with profit incentive, because higher profit incentive raises the share of any (marginal) gains from tariff accruing to the FDI firm. This also explains the next related lemma.

Lemma 7 $\frac{\partial^2 L(\tau_i, \phi_i)}{\partial \tau_i \partial \phi_i} > 0$.[27]

That is, marginal lobby welfare gains from tariff increase with profit incentive for FDI. Insofar as lobby welfare gains eventually translate into political gains (lobby contributions) for the government through the truthful contribution schemes defined in (5), Lemma 7 shows that profit incentive and tariff are *political substitutes*.

We can now state the main result of this section which is proved in the appendix.

[26]Proof: $\frac{\partial^2 W(\tau_i, \phi_i)}{\partial \tau_i \partial \phi_i} = -(p_i - bw) X_i' - p_i' X_i < 0$.

[27]Proof: $\frac{\partial^2 L(\tau_i, \phi_i)}{\partial \phi_i \partial \tau_i} = (p_i - bw) X_i' + p_i' X_i > 0$.

Proposition 5 *Under an $\mathcal{L}$-government:*
(i) If $\frac{dL\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i} \leq 0$, *then* $\tau_i^{\mathcal{L}} \leq \tau_i^{\mathcal{E}} < \tau_i^{\mathcal{C}} < \tau_i^{\mathcal{B}}$;
(ii) If $\frac{dL\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i} > 0$, *then* $\tau_i^{\mathcal{L}} > \tau_i^{\mathcal{E}} \gtreqless \tau_i^{\mathcal{B}}$;
(iii) $\phi_i^{\mathcal{L}} > \max\left\{\phi_i^{\mathcal{B}}, \phi_i^{\mathcal{C}}\right\}$.

Proposition 5 has interesting interpretations. Relative to the benchmark policy $\tau_i^{\mathcal{E}}$, if protection does not benefit aggregate lobby interests, an $\mathcal{L}$-government will set a lower tariff than a $\mathcal{B}$- or a $\mathcal{C}$-government. But it may not set a higher tariff even if protection benefits aggregate lobby interests. Hence, political bias towards lobbies is more likely to induce a liberal rather than a protectionist trade policy, regardless of its impact on aggregate lobby interests. Such bias also leads to higher profit incentives for FDI.

To understand the results, we note from Lemma 5 that if an increase in $\tau_i^{\mathcal{E}}$ does not benefit lobbies, an $\mathcal{L}$-government will adopt $\tau_i^{\mathcal{L}} \leq \tau_i^{\mathcal{E}}$ along with $\widehat{\phi}_i$. Further, an increase in $\tau_i^{\mathcal{E}}$ will not hurt domestic consumers and, from Lemma 6, will certainly benefit them if profit incentive is lowered from $\widehat{\phi}_i$, as is the case under a $\mathcal{B}$-government. Since a $\mathcal{B}$-government maximizes consumer welfare, it will therefore adopt $\tau_i^{\mathcal{B}} > \tau_i^{\mathcal{E}} \geq \tau_i^{\mathcal{L}}$. (The relative position of $\tau_i^{\mathcal{C}}$ between $\tau_i^{\mathcal{B}}$ and $\tau_i^{\mathcal{E}}$ then follows from Proposition 4(i).) Also according to Lemma 5, if an increase in $\tau_i^{\mathcal{E}}$ benefits lobbies, an $\mathcal{L}$-government will adopt $\tau_i^{\mathcal{L}} > \tau_i^{\mathcal{E}}$ along with $\widehat{\phi}_i$. Further, an increase in $\tau_i^{\mathcal{E}}$ given $\widehat{\phi}_i$ will hurt domestic consumers, so for this reason a $\mathcal{B}$-government may cut tariff below $\tau_i^{\mathcal{E}}$. However, a $\mathcal{B}$-government will also provide lower profit incentive (relative to $\widehat{\phi}_i$) somewhere on the minimum scheme $\underline{\phi}_i(\tau_i)$. This increases the marginal domestic welfare gains of tariff at $\tau_i^{\mathcal{E}}$ (Lemma 6), so a $\mathcal{B}$-government may also raise tariff beyond $\tau_i^{\mathcal{E}}$. On balance, it is therefore unclear whether the two opposing effects lead to $\tau_i^{\mathcal{B}} < \tau_i^{\mathcal{E}}$ or not. In consequence, the relationship between $\tau_i^{\mathcal{L}}$ and $\tau_i^{\mathcal{B}}$ also remains unclear.

7 Discussion

Our analysis has identified three sources of trade policy distortions: (i) The strategic-trade motive, reflected in $\frac{dW(\tau_i,\psi_i(\tau_i))}{d\tau_i}$, to increase domestic welfare by exploiting strategic interaction among firms; (ii) The political motive, reflected in $\frac{dL(\tau_i,\psi_i(\tau_i))}{d\tau_i}$, to induce lobby contributions through policies that benefit lobbies; and (iii) The political bias of government, reflected in $a \neq 1$. Optimal trade policy reflects the interaction between strategic-trade and political motives, influenced by the nature of political bias. Figure

2 illustrates how.

[Insert Figure 2 here]

Optimal policy under a $\mathcal{B}$-government, $\tau_i^{\mathcal{B}}$, is based on the strategic-trade motive alone; the political motive vanishes because the government does not care about lobby contributions ($a = 0$). $\tau_i^{\mathcal{B}}$ may deviate from $\tau_i^{\mathcal{E}}$ in either direction, because increased protection may benefit or hurt consumers. The benchmark policy $\tau_i^{\mathcal{E}}$ under an $\mathcal{E}$-government is characterized by the absence of political bias ($a = 1$), so the strategic-trade and political motives distort policy in opposite directions and exactly offset each other. Under a $\mathcal{C}$-government, bias towards consumers makes the strategic-trade motive dominant, but it is mitigated by the political motive. Under an $\mathcal{L}$-government, bias towards lobbies makes the political motive dominant. However, the bias also generates a *policy-substitution* effect: The government adopts higher profit incentive which enables it to lower tariff (or raise subsidy), insofar as tariff and profit incentive are political substitutes (in the sense of Lemma 7). The policy-substitution effect enhances the political motive when protection does not benefit lobbies, and opposes it when protection benefits lobbies. Hence, in the former case an $\mathcal{L}$-government adopts a more liberal policy than a $\mathcal{B}$- or a $\mathcal{C}$-government. In the latter case it may be more or less protectionist than a $\mathcal{B}$- or a $\mathcal{C}$-government.

From this discussion and Propositions 4 and 5, we note the following:

Remark 1 *Strategic-trade motivated policy deviation from $\tau_i^{\mathcal{E}}$ may be mitigated (under a $\mathcal{C}$-government), neutralized (under an $\mathcal{E}$-government) or reversed (under an $\mathcal{L}$-government) by the political motive, depending on the nature of political bias.*

It is interesting to note that, under a $\mathcal{C}$-government, political motive helps pushing trade policies closer to the globally optimal one. Our results contrast with those in the existing political-economy literature on trade policy. The latter typically predict policy deviations being *enhanced* by political considerations.

If $\frac{dL\left(\tau_i^{\mathcal{C}}, \phi_i\left(\tau_i^{\mathcal{C}}\right)\right)}{d\tau_i} = 0$, the political motive vanishes under a $\mathcal{C}$-government. From (13) and (17) we then obtain $\tau_i^{\mathcal{C}} = \tau_i^{\mathcal{B}}$. Similarly, we obtain $\tau_i^{\mathcal{C}} \to \tau_i^{\mathcal{B}}$ if $a \to 0$. Hence, not surprisingly:

Remark 2 *Purely strategic-trade motivated policy ($\tau_i^{\mathcal{B}}$) is the limiting policy of a $\mathcal{C}$-government when either (i) trade policy deviations cannot generate any political gains; or (ii) the government cares little about such gains.*

In contrast, if $\frac{dL\left(\tau_i^{\mathcal{L}},\widehat{\phi}_i\right)}{d\tau_i} = 0$, the political motive also vanishes under an $\mathcal{L}$-government. But its political bias towards lobbies generates a policy-substitution effect: The $\mathcal{L}$-government provides greater profit incentive than a $\mathcal{B}$-government, so it will adopt lower tariff. Consequently, we obtain $\tau_i^{\mathcal{L}} < \tau_i^{\mathcal{B}}$ in this case.

Finally, from (17) and (20) we obtain the following comparative static result.

Corollary 5 $sign\left(\frac{\partial \tau_i^{\mathcal{C}}}{\partial a}\right) = sign\left(\frac{dL\left(\tau_i^{\mathcal{C}},\underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right)}{d\tau_i}\right)$; $sign\left(\frac{\partial \tau_i^{\mathcal{L}}}{\partial a}\right) = sign\left(\frac{dL\left(\tau_i^{\mathcal{L}},\widehat{\phi}_i\right)}{d\tau_i}\right)$.

Hence, if lobbies as a whole benefit (suffer) from higher tariff, then the optimal tariff under a $\mathcal{C}$-government or an $\mathcal{L}$-government increases (decreases) with its political bias towards lobbies, a. To understand this result and its implications, we note from (18) and (21) that a affects $\tau_i^{\mathcal{C}}$ and $\tau_i^{\mathcal{L}}$ directly through the political component $PO_i\left(\tau_i, \psi_i\left(\tau_i\right)\right)$. This term mitigates strategic-trade motivated deviation under a $\mathcal{C}$-government and may reverse it under an $\mathcal{L}$-government. $PO_i\left(\tau_i, \psi_i\left(\tau_i\right)\right)$ bears the same sign as $\frac{dL(\tau_i,\psi_i(\tau_i))}{d\tau_i}$ and, all else equal, increases in magnitude as a rises. Hence, increased bias towards lobbies under a $\mathcal{C}$-government reduces any policy deviation, so that $\tau_i^{\mathcal{C}} \to \tau_i^{\mathcal{E}}$ as $a \to 1$. Under an $\mathcal{L}$-government, however, increased bias towards lobbies may enhance policy deviation (when protection hurts lobbies).

8 Conclusion

This paper has developed a unified framework to analyze how strategic-trade and political motives for trade intervention may interact to shape unilateral trade policy. The role of FDI in affecting the strategic and political incentives for unilateral trade intervention is also taken into account. We have shown how, by exploiting strategic interaction between foreign export and FDI firms, unilateral trade intervention may improve global as well as domestic welfare. Further, the strategic-trade motive may prevail even without domestic firms, and may be enhanced by the presence of FDI firms. Political concession to special interests may mitigate, neutralize or even reverse any strategic-trade-motivated policy distortions. With both trade and industrial policies available for income transfer, a government caring more about foreign firms than about domestic consumers need not be more protectionist, and may indeed be more liberal, than a government which maximizes domestic welfare alone.

The paper could be extended in several directions. A general extension is to consider bilateral policy-setting where the foreign country is also represented by an active government and consumers, in addition to firms. On the strategic-trade side, domestic firms could be introduced which compete on the foreign market. One could perhaps also consider multi-firm oligopoly and free entry. On the political-economy side, one could allow for asymmetric valuation of the political contributions of export and FDI firms. One could also introduce lobbying by domestic firms. Finally, one could consider the policy game in a repeated setting. These extensions provide directions for future work.

9 Appendix

Derivation of (3a) and (3b)

We ignore all subscripts i to simplify notation. X and M are imperfect substitutes in consumption, with inverse demand functions $p = \widetilde{p}(\underset{-}{X}, \underset{-}{M})$ and $q = \widetilde{q}(\underset{-}{X}, \underset{-}{M})$, respectively; and demand functions $X = \widehat{X}(\underset{-}{p}, \underset{+}{q})$ and $M = \widehat{M}(\underset{+}{p}, \underset{-}{q})$, respectively.

Cournot competition. In this case, an FDI firm chooses X to maximize profits $\widetilde{F}(X, M) = [\widetilde{p}(X, M) - bw]\, X$,[28] and an export firm chooses M to maximize profits $\widetilde{E}(X, M) = [(1-\tau)\, \widetilde{q}(X, M) - c]\, M$. The first-order conditions are

$$\widetilde{F}_X = p - bw + \widetilde{p}_X X = 0, \tag{22a}$$

$$\widetilde{E}_M = (1-\tau)\, q - c + (1-\tau)\, \widetilde{q}_M M = 0, \tag{22b}$$

where $\widetilde{F}_X$ denotes the partial derivative of $\widetilde{F}$ w.r.t. X, etc.. The second-order conditions are $\widetilde{F}_{XX} < 0$ and $\widetilde{E}_{MM} < 0$. The Cournot equilibrium stability condition is $\widetilde{F}_{XX}\widetilde{E}_{MM} - \widetilde{F}_{XM}\widetilde{E}_{MX} \equiv D > 0$. With Cournot competition, it is natural to assume X and M are strategic substitutes so that $\widetilde{F}_{XM} < 0$ and $\widetilde{E}_{MX} < 0$. Further, (22b) implies $\widetilde{E}_{M\tau} = -\left(q + \widetilde{q}_M M\right) = -\frac{c}{1-\tau} < 0$. We can now totally differentiate (22a) and (22b) to find

$$X'(\tau) = \frac{\widetilde{E}_{M\tau}\widetilde{F}_{XM}}{D} > 0, \tag{23a}$$

$$M'(\tau) = -\frac{\widetilde{E}_{M\tau}\widetilde{F}_{XX}}{D} < 0. \tag{23b}$$

Hence,

$$X'(\tau) + M'(\tau) = \frac{\widetilde{E}_{M\tau}}{D}\left[(\widetilde{p}_M - 2\widetilde{p}_X) + X\left(\widetilde{p}_{XM} - \widetilde{p}_{XX}\right)\right] < 0, \tag{24}$$

[28] In reality, an FDI firm maximizes $\phi\widetilde{F}$ where ϕ is the profit retention rate. We drop ϕ here to simplify the algebra.

assuming $\widetilde{p}_X \leq \widetilde{p}_M$ and $\widetilde{p}_{XX} \leq \widetilde{p}_{XM} \leq 0$, i.e. own effects are not weaker than cross effects in magnitude and $\widetilde{p}$ is not strictly convex in X. Combining (24) with $X'(\tau) > 0$ and $M'(\tau) < 0$ establishes (3a).

Next, we notice

$$p'(\tau) = \widetilde{p}_X X'(\tau) + \widetilde{p}_M M'(\tau), \tag{25a}$$

$$q'(\tau) = \widetilde{q}_X X'(\tau) + \widetilde{q}_M M'(\tau). \tag{25b}$$

In line with the previous assumption $\widetilde{p}_X \leq \widetilde{p}_M$, we also assume $\widetilde{q}_M \leq \widetilde{q}_X$. Then, making use of (23a), (23b) and (24), (25b) implies $q'(\tau) > 0$. (25a) implies $p'(\tau) > 0$ provided X and M are close enough substitutes such that $\widetilde{p}_X$ and $\widetilde{p}_M$ are not too different: $\frac{\widetilde{p}_M}{\widetilde{p}_X} \in \left(\frac{X'}{-M'}, 1\right)$.

Finally, (25a) and (25b) imply

$$q'(\tau) - p'(\tau) = (\widetilde{q}_X - \widetilde{p}_X) X' + (\widetilde{q}_M - \widetilde{p}_M) M'(\tau) > 0, \tag{26}$$

assuming $\widetilde{p}_X \leq \widetilde{q}_X$ and $\widetilde{q}_M \leq \widetilde{p}_M$ with at least one strict inequality, i.e. own effects are not weaker than cross effects in magnitude. Combining (26) with $q'(\tau) > 0$ and $p'(\tau) > 0$ establishes (3b).

Bertrand competition. In this case, an FDI firm chooses p to maximize its profits $\widehat{F}(p,q) = [p - bw]\, \widehat{X}(p,q)$, and an export firm chooses q to maximize its profits $\widehat{E}(p,q) = [(1-\tau) q - c]\, \widehat{M}(p,q)$. The first-order conditions are

$$\widehat{F}_p = X + (p - bw)\, \widehat{X}_p = 0, \tag{27a}$$

$$\widehat{E}_q = (1-\tau) M + [(1-\tau) q - c]\, \widehat{M}_q = 0. \tag{27b}$$

The second-order conditions are $\widehat{F}_{pp} < 0$ and $\widehat{E}_{qq} < 0$. The Bertrand equilibrium stability condition is $\widehat{F}_{pp}\widehat{E}_{qq} - \widehat{F}_{pq}\widehat{E}_{qp} \equiv \widehat{D} > 0$. With Bertrand competition, it is natural to assume p and q are strategic complements so that $\widehat{F}_{pq} > 0$ and $\widehat{E}_{qp} > 0$. Further, (22b) implies $\widehat{E}_{q\tau} = -\left(M + q\widehat{M}_q\right) = -\frac{c\widehat{M}_q}{1-\tau} > 0$. We can now totally differentiate (27a) and (27b) to find

$$p'(\tau) = \frac{\widehat{E}_{q\tau}\widehat{F}_{pq}}{\widehat{D}} > 0, \tag{28a}$$

$$q'(\tau) = -\frac{\widehat{E}_{q\tau}\widehat{F}_{pp}}{\widehat{D}} > 0. \tag{28b}$$

Hence,

$$q'(\tau) - p'(\tau) = -\frac{\widehat{E}_{q\tau}}{\widehat{D}}\left[\left(\widehat{X}_q + 2\widehat{X}_p\right) + (p - bw)\left(\widehat{X}_{pq} + \widehat{X}_{pp}\right)\right] > 0, \tag{29}$$

assuming $\left|\widehat{X}_p\right| \geq \left|\widehat{X}_q\right|$ and $\widehat{X}_{pp} \leq \widehat{X}_{pq} \leq 0$, i.e. own effects are not weaker than cross effects in magnitude and $\widehat{X}$ is not strictly convex in p. Combining (29) with $q'(\tau) > 0$ and $p'(\tau) > 0$ establishes (3b).

Next, we notice

$$X'(\tau) = \widehat{X}_p p'(\tau) + \widehat{X}_q q'(\tau), \tag{30a}$$

$$M'(\tau) = \widehat{M}_p p'(\tau) + \widehat{M}_q q'(\tau). \tag{30b}$$

In line with the previous assumption $\left|\widehat{X}_p\right| \geq \left|\widehat{X}_q\right|$, we also assume $\left|\widehat{M}_q\right| \geq \left|\widehat{M}_p\right|$. Then, making use of (28a), (28b) and (29), (30b) implies $M'(\tau) < 0$. (30a) implies $X'(\tau) > 0$ provided X and M are close enough substitutes such that $\left|\widehat{X}_p\right|$ and $\left|\widehat{X}_q\right|$ are not too different: $\frac{\widehat{X}_q}{-\widehat{X}_p} \in \left(\frac{p'}{q'}, 1\right)$.

Finally, (25a) and (25b) imply

$$X'(\tau) + M'(\tau) = \left(\widehat{X}_p + \widehat{M}_p\right)p' + \left(\widehat{X}_q + \widehat{M}_q\right)q' < 0, \tag{31}$$

assuming $\left|\widehat{X}_p\right| \geq \left|\widehat{M}_p\right|$ and $\left|\widehat{M}_q\right| \geq \left|\widehat{X}_q\right|$ with at least one strict inequality, i.e. own effects are not weaker than cross effects in magnitude. Combining (31) with $X'(\tau) > 0$ and $M'(\tau) < 0$ establishes (3a). ■

Proof of Lemma 4

Note that

$$\tau_i^{\mathcal{B}} \gtreqless \tau_i^{\mathcal{E}} \overset{(i)}{\Leftrightarrow} \frac{dW\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} \gtreqless \frac{dW\left(\tau_i^{\mathcal{B}}, \underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right)\right)}{d\tau_i} = 0 \overset{(ii)}{\Leftrightarrow} \frac{dL\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} \lesseqgtr 0.$$

Step (i) follows from the first- and second-order conditions for $\tau_i^{\mathcal{B}}$ to be domestically optimal. Step (ii) follows from Lemma 3. Similarly, we note that

$$\tau_i^{\mathcal{C}} \gtreqless \tau_i^{\mathcal{E}} \overset{(i)}{\Leftrightarrow} \frac{d\widetilde{G}\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right); a < 1\right)}{d\tau_i} \gtreqless \frac{d\widetilde{G}\left(\tau_i^{\mathcal{C}}, \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right); a < 1\right)}{d\tau_i} = 0$$

$$\overset{(ii)}{\Leftrightarrow} \frac{dL\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} \lesseqgtr 0 \overset{(iii)}{\Leftrightarrow} \frac{dW\left(\tau_i^{\mathcal{E}}, \underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i} \gtreqless 0.$$

Step (i) follows from the first- and second-order conditions for $\tau_i^{\mathcal{C}}$ to be optimal under a $\mathcal{C}$-government. Step (ii) follows from expanding $\frac{d\widetilde{G}\left(\tau_i^{\mathcal{E}},\underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right);a<1\right)}{d\tau_i}$, where we note from (7) and (9) that $\widetilde{G}=G+(a-1)L$, and moreover $G_i'\left(\tau_i^{\mathcal{E}}\right)=0$ and $a<1$. Step (iii) follows from Lemma 3. ■

Proof of Proposition 4

Notice that

$$\tau_i^{\mathcal{C}}>\tau_i^{\mathcal{E}} \overset{(i)}{\Leftrightarrow} G_i'\left(\tau_i^{\mathcal{C}}\right)<G_i'\left(\tau_i^{\mathcal{E}}\right)=0 \overset{(ii)}{\Leftrightarrow} \frac{dW\left(\tau_i^{\mathcal{C}},\underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\right)}{d\tau_i}=\frac{a}{a-1}G_i'\left(\tau_i^{\mathcal{C}}\right)>0 \overset{(iii)}{\Leftrightarrow} \tau_i^{\mathcal{C}}<\tau_i^{\mathcal{B}}.$$

Step (i) follows from the first- and second-order conditions for $\tau_i^{\mathcal{E}}$ to be globally optimal. Step (ii) follows from re-writing (17), where we note from (9) that $L=G-W$, and moreover $a<1$. Step (iii) follows from the first- and second-order conditions for $\tau_i^{\mathcal{B}}$ to be domestically optimal. Following the same steps one can show $\tau_i^{\mathcal{C}}<\tau_i^{\mathcal{E}}\Leftrightarrow\tau_i^{\mathcal{C}}>\tau_i^{\mathcal{B}}$ and $\tau_i^{\mathcal{C}}=\tau_i^{\mathcal{E}}\Leftrightarrow\tau_i^{\mathcal{C}}=\tau_i^{\mathcal{B}}$. Since $\underline{\phi}_i'(\tau_i)<0$ by Lemma 1, we obtain $\phi_i^{\mathcal{C}}=\underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right)\gtreqless\underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right)=\phi_i^{\mathcal{B}}$ according as $\tau_i^{\mathcal{C}}\lesseqgtr\tau_i^{\mathcal{B}}$. ■

Proof of Lemma 5

Notice that

$$\tau_i^{\mathcal{L}}\gtreqless\tau_i^{\mathcal{E}} \overset{(i)}{\Leftrightarrow} \frac{d\widetilde{G}\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i;a>1\right)}{d\tau_i}\gtreqless\frac{d\widetilde{G}\left(\tau_i^{\mathcal{L}},\widehat{\phi}_i;a>1\right)}{d\tau_i}=0 \overset{(ii)}{\Leftrightarrow} \frac{dL\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i}\gtreqless 0 \overset{(iii)}{\Leftrightarrow} \frac{dW\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i}\lesseqgtr 0.$$

Step (i) follows from the first- and second-order conditions for $\tau_i^{\mathcal{L}}$ to be optimal under an $\mathcal{L}$-government. Step (ii) follows from expanding $\frac{d\widetilde{G}\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i;a>1\right)}{d\tau_i}$, where we note from (7) and (9) that $\widetilde{G}=G+(a-1)L$, and moreover $G_i'\left(\tau_i^{\mathcal{E}}\right)=0$ and $a>1$. Step (iii) follows from Lemma 3. ■

Proof of Proposition 5

Notice that if $\frac{dL\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i}\leq 0$, then

$$\tau_i^{\mathcal{L}}\leq\tau_i^{\mathcal{E}} \overset{(1)}{\Leftrightarrow} \frac{dW\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i}\geq 0 \overset{(2)}{\Rightarrow} \frac{dW\left(\tau_i^{\mathcal{E}},\underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)\right)}{d\tau_i}>\frac{dW\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i}\geq 0 \overset{(3)}{\Leftrightarrow} \tau_i^{\mathcal{E}}<\tau_i^{\mathcal{B}}.$$

Step (1) follows from Lemma 5. Step (2) follows from Lemma 6 and $\underline{\phi}_i\left(\tau_i^{\mathcal{E}}\right)<\widehat{\phi}_i$. Step (3) follows from the first and second-order conditions for $\tau_i^{\mathcal{B}}$ to be optimal under a $\mathcal{B}$-government. Now making use of Proposition 4(i), we obtain Proposition 5(i).

Similarly, from Lemma 5 we know that if $\frac{dL\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i} > 0$, then

$$\tau_i^{\mathcal{L}} > \tau_i^{\mathcal{E}} \Leftrightarrow \frac{dW\left(\tau_i^{\mathcal{E}},\widehat{\phi}_i\right)}{d\tau_i} < 0.$$

From Lemma 6 and $\underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right) < \widehat{\phi}_i$ we also know that

$$\frac{dW\left(\tau_i^{\mathcal{B}},\widehat{\phi}_i\right)}{d\tau_i} < \frac{dW\left(\tau_i^{\mathcal{B}},\underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right)\right)}{d\tau_i} = 0.$$

Hence, we cannot determine which of $\tau_i^{\mathcal{E}}$ and $\tau_i^{\mathcal{B}}$ is larger. Nor can we determine whether $\tau_i^{\mathcal{L}} > \tau_i^{\mathcal{B}}$ or not. This establishes Proposition 5(ii).

Finally, Proposition 5(iii) follows from $\phi_i^{\mathcal{L}} = \widehat{\phi}_i > \underline{\phi}_i\left(\tau_i^{\mathcal{B}}\right) = \phi_i^{\mathcal{B}}$ and $\phi_i^{\mathcal{L}} = \widehat{\phi}_i > \underline{\phi}_i\left(\tau_i^{\mathcal{C}}\right) = \phi_i^{\mathcal{C}}$. ■

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