ONLINE APPENDIX FOR
“THE ECONOMIC STRUCTURE OF INTERNATIONAL TRADE-IN-SERVICES AGREEMENTS”

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August 2019
1. Proof of Proposition 1

Proposition 1. The domestic government’s unilateral policy choices in the presence of mode 3 service imports are characterized by an import tariff that is inefficiently high and a discriminatory subsidy to the hiring of local labor by foreign service providers in the domestic economy that is also inefficient: but conditional on domestic prices, all other policies – the nondiscriminatory sales tax, the standards imposed on domestic and foreign service providers, and the level of compliance-cost reducing investment – remain at their efficient levels.

Proof: To prove this proposition, we first characterize the efficient policies that a global planner would choose, and then characterize the unilaterally optimal policies that a domestic country planner would choose.

As stated in the text, the global planner chooses \([s_y, s_y^*, C_x, C_y, L_x, L_y, L_y^*, K_x, K_y, K_I, C_x^*, C_y^*, K_x^*, K_y^*]\) to solve:

\[
\text{Max } U(C_x, C_y) - Z(s_y, s_y^*, q_y(L_y, K_y), q_y^*(L_y^*, K_y^*))
\]

\[
s.t. \quad W^*(C_x^*) \geq \bar{W}^*
\]

\[
C_x \leq Q_x(s_y, s_y^*, L_x, K_x) - [C_x^* - Q_x(L_x, K_x^*)]
\]

\[
C_y \leq Q_y(s_y, L_y, K_y) + Q_y^*(s_y^*, K_I, L_y^*, K_y^*)
\]

\[
L_x + L_y + L_y^* \leq \bar{L}; \quad K_x + K_y + K_I \leq \bar{K}; \quad K_x^* + K_y^* \leq \bar{K}.
\]

Writing down the associated Lagrangean, it is direct to show that the first-order necessary conditions for an (interior) optimum are given by

\[
\frac{\partial U}{\partial C_x} = \frac{\partial U}{\partial C_y} = \frac{\phi}{\mu};
\]

\[
\phi \frac{\partial Q_x}{\partial L_x} = \omega = \left[ \mu \times [1 - \kappa(s_y)] - \theta(s_y) \right] \frac{\partial q_y}{\partial L_y} = \left[ \mu \times [1 - \kappa^*(s_y^*, K_I)] - \theta(s_y^*) \right] \frac{\partial q_y^*}{\partial L_y^*};
\]

\[
\phi \frac{\partial Q_x}{\partial K_x} = \psi = \left[ \mu \times [1 - \kappa(s_y)] - \theta(s_y) \right] \frac{\partial q_y}{\partial K_y} = \mu \frac{\partial Q_y}{\partial K_I}
\]

\[
\phi \frac{\partial Q_x^*}{\partial K_x^*} = \psi^* = \left[ \mu \times [1 - \kappa^*(s_y^*, K_I)] - \theta(s_y^*) \right] \frac{\partial q_y^*}{\partial K_y^*}
\]

\[
-q_y \times \theta'(s_y) = -\left[ \mu \times \frac{\partial Q_y}{\partial s_y} + \phi \frac{\partial Q_x}{\partial s_y} \right], \quad -q_y^* \times \theta'(s_y^*) = -\left[ \mu \times \frac{\partial Q_y^*}{\partial s_y^*} + \phi \frac{\partial Q_x^*}{\partial s_y^*} \right],
\]

\[1\] The second-order conditions associated with the maximization problems considered here and throughout the Online Appendix are satisfied under our convexity assumptions for \(\kappa\) and \(\varphi\).
where primes denote derivatives and where $\phi$, $\mu$, $\omega$, $\psi$ and $\psi^*$ are Lagrange multipliers.

According to (A2), the solution to the global planner’s problem can be implemented in a perfectly competitive market economy where the foreign country maintains a policy of free trade, and where the domestic country implements a Pigouvian tariff on imported services $\tau$ and a nondiscriminatory Pigouvian sales tax on domestically produced and imported services $t$, set at the levels

$$
\tau = \left[ \theta(s_y^*) - \theta(s_y) \right], \quad t = \theta(s_y),
$$

and standards $s_y$ and $s_{y*}$ and a level of compliance-cost reducing investment $K_I$ that satisfy

$$
-q_y \times \theta'(s_y) = - \left[ P_y^c \times \frac{\partial Q_y}{\partial s_y} + P_x \frac{\partial Q_x}{\partial s_y} \right], \quad -q_{y*}^c \times \theta'(s_{y*}) = - \left[ P_y^c \times \frac{\partial Q_{y*}}{\partial s_{y*}} + P_x \frac{\partial Q_x}{\partial s_{y*}} \right]
$$

(A4)

$$
P_y^c \times \frac{\partial Q_y^*}{\partial K_I} = r,
$$

where we have expressed the Pigouvian sales tax and import tariff in specific terms assessed per unit of raw service. Here, $P_y^c$ is the consumer price of services in the domestic economy under the efficient Pigouvian sales tax and tariff, $P_x$ denotes the domestic (and world) price of $x$, and $r$ is the rental rate on capital in the domestic economy.

To see that this yields the planner’s solution, note first that with $\phi = P_x$, $\mu = P_y^c$ and $\psi = r$, the government choices of $s_y$, $s_{y*}$ and $K_I$ characterized in (A4) conform directly to the conditions in (A2). And under the tariff/tax policies in (A3), and with $\psi^* = r^*$ and $\omega = w$ where $r^*$ is the foreign rental rate on capital and $w$ is the domestic wage of labor, and finally letting $P_y^q$ and $P_y^p$ denote the domestic and foreign service provider producer prices respectively, utility maximizing consumers consume to satisfy the condition $\frac{\partial U}{\partial C_x} = \frac{P_y}{P_x}$, and profit maximizing firms hire and produce to satisfy the conditions $P_x \frac{\partial Q_x}{\partial L_x} = w$, $P_x \frac{\partial Q_x}{\partial K_x} = r$, $P_y^q \frac{\partial Q_y^*}{\partial K_y} = r^*$, $P_y^q \times [1 - \kappa(s_y)] \frac{\partial q_y}{\partial L_y} = w$, $P_y^q \times [1 - \kappa^*(s_{y*}, K_I)] \frac{\partial q_{y*}^*}{\partial L_y} = w$, $P_y^q \times [1 - \kappa(s_y)] \frac{\partial q_y}{\partial K_y} = r$ and $P_y^q \times [1 - \kappa^*(s_{y*}, K_I)] \frac{\partial q_{y*}^*}{\partial K_y} = r^*$, which using $P_y^q = P_y^q + t = P_y^q + t + \tau$, conforms to the remaining conditions in (A2).

We next characterize the optimal unilateral policies. We assume that the foreign country maintains a policy of laissez faire (which as we have demonstrated above is consistent with efficiency) and focus on the domestic country’s unilaterally optimal policies. These policies can be characterized as the solution to the domestic country planner’s problem, once the appropriate international constraints faced by the planner are introduced.

A first international constraint faced by the domestic country planner is the foreign country
inverse import demand curve for \( x \). To derive this constraint, we begin with the foreign country balanced trade condition. Recalling that we are considering here the case of a pure mode 3 service import, where foreign service providers combine foreign capital with domestic labor to deliver services to domestic consumers, the balanced trade condition for the foreign country can be written as

\[ P_x M_x^* = P_y^q \times \frac{\partial Q_y^s(s_y^*, K_1, L_y^*, K_y^*)}{\partial K_y^*} \times K_y^*, \]

or

\[ P^w M_x^* = \frac{\partial Q_y^s(s_y^*, K_1, L_y^*, K_y^*)}{\partial K_y^*} \times K_y^*, \]  

(A5)

where \( P^w \equiv P_x / P_y^q \) is the “world” relative price of \( x \) to \( y \) at which the two countries trade goods for services (i.e., the ratio of the price received by domestic exporters of \( x \) to the price received by foreign exporters of \( y \)) and \( M_x^* \) is the level of foreign country import demand for \( x \), and where we have used the fact that all foreign service production is for export and that the implied rental rate per unit of foreign capital is given by

\[ \text{inverse import demand curve for } x. \]

\[ \begin{align*}
\text{delivery services to domestic consumers, the balanced trade condition for the foreign country can be written as } P_x M_x^* &= P_y^q \times \frac{\partial Q_y^s(s_y^*, K_1, L_y^*, K_y^*)}{\partial K_y^*} \times K_y^*, \\
&\quad \text{or } P^w M_x^* = \frac{\partial Q_y^s(s_y^*, K_1, L_y^*, K_y^*)}{\partial K_y^*} \times K_y^*, \\
&\quad \text{where } P^w \equiv P_x / P_y^q \text{ is the “world” relative price of } x \text{ to } y \text{ at which the two countries trade goods for services (i.e., the ratio of the price received by domestic exporters of } x \text{ to the price received by foreign exporters of } y \text{) and } M_x^* \text{ is the level of foreign country import demand for } x, \\
&\quad \text{and where we have used the fact that all foreign service production is for export and that the implied rental rate per unit of foreign capital is given by } P_y^q \times \frac{\partial Q_y^s(s_y^*, K_1, L_y^*, K_y^*)}{\partial K_y^*}. \text{ The right-hand side of (A5) is the contribution made by foreign capital to the foreign mode-3 exports of } y. \text{ The left-hand side of (A5) is the value of foreign imports of } x \text{ measured in units of } y \text{ at world prices.}
\end{align*} \]

Using \( Q_y^s(s_y^*, K_1, L_y^*, K_y^*) \equiv [1 - \kappa^s(s_y^*, K_1)] \times q_y^* (L_y^*, K_y^*) \), we can equivalently write the foreign country balanced trade condition in terms of its implied exports of raw services:

\[ P^w M_x^* = \frac{\partial q_y^* (L_y^*, K_y^*)}{\partial K_y^*} \times K_y^*(p^w, L_y^*), \]

(A6)

where \( p^w \equiv P^w / [1 - \kappa^s(s_y^*, K_1)] \) is the raw world relative price of \( x \) to \( y \) at which the two countries trade. The function \( K_y^*(p^w, L_y^*) \) in (A6) is defined by the capital hiring condition in the foreign country, which can be expressed in terms of raw services as

\[ p^w = \frac{\partial q_y^* (L_y^*, K_y^*)}{\partial K_y^*} \times K_y^*(p^w, L_y^*), \]

and it is straightforward to show that \( K_y^*(p^w, L_y^*) \) is decreasing in \( p^w \) and increasing in \( L_y^* \).

Condition (A6) defines the foreign country inverse import demand curve \( p^w(M_x^*, L_y^*) \), and implicit differentiation yields

\[ \frac{\partial p^w(M_x^*, L_y^*)}{\partial M_x^*} = \left[ M_x^* - \frac{\partial K_y^*}{\partial p^w} \left( \frac{\partial q_y^*}{\partial K_y^*} + \frac{\partial^2 q_y^*}{\partial K_y^*} \right) \right] < 0. \]

(A7)

As (A7) indicates, the foreign country inverse import demand curve slopes downward. Note, too, that \( \frac{\partial p^w(M_x^*, L_y^*)}{\partial M_x^*} \to 0 \) when the domestic country is small on world markets (i.e., when \( \frac{\partial K_y^*}{\partial p^w} \to -\infty \) and it faces an infinitely elastic supply of foreign capital for mode 3 service imports).\(^2\)

\(^2\)To confirm this from (A7), note that \( \frac{\partial K_y^*}{\partial p^w} \to -\infty \) implies \( \frac{\partial^2 q_y^*}{\partial K_y^*} \to 0. \)
With the definition of \( p^w(M^*_x, L^*_y) \) in hand, we can use the foreign country balanced trade condition (A6) to write the raw output of foreign service providers \( q^*_y(L^*_y, K^*_y) \) equivalently as

\[
q^*_y(L^*_y, K^*_y) = \frac{\partial q^*_y(L^*_y, K^*_y)}{\partial L^*_y} \times L^*_y + \frac{\partial q^*_y(L^*_y, K^*_y)}{\partial K^*_y} \times K^*_y
\]

(A8)

\[
= \frac{\partial q^*_y(L^*_y, K^*_y(p^w(M^*_x, L^*_y), L^*_y))}{\partial L^*_y} \times L^*_y + p^w(M^*_x, L^*_y) \times M^*_x
\]

\[
\equiv \tilde{q}^*_y(L^*_y, M^*_x),
\]

where the first equality follows from constant returns to scale and where we use the notation \( \tilde{q}^*_y \) to distinguish the function \( q^*_y(L^*_y, M^*_x) \) defined by the second line of (A8) from the function \( q^*_y(L^*_y, K^*_y) \). We can then also define \( \tilde{Q}^*_y(s^*_y, K^*_1, L^*_y, M^*_x) \equiv [1 - \kappa^*(s^*_y, K^*_1)] \times \tilde{q}^*_y(L^*_y, M^*_x) \).

A second international constraint faced by the planner is the international market clearing condition \( E_x = M^*_x \), where we use \( E_x \) to denote the domestic country export supply of \( x \).

Armed with these two international constraints, we can now state the domestic country planner’s problem. As stated in the text, this planner chooses \([s_y, s^*_y, C_x, C_y, E_x, M^*_x, L_x, L_y, L^*_y, K_x, K_y, K^*_1,]\) to solve:

\[
Max \quad U(C_x, C_y) - Z(s_y, s^*_y, q_y(L_y, K_y), \tilde{q}^*_y(L^*_y, M^*_x))
\]

(A9)

\[
s.t. \quad C_x \leq Q_x(s_y, s^*_y, L_x, K_x) - E_x \]

\[
C_y \leq Q_y(s_y, L_y, K_y) + \tilde{Q}^*_y(s^*_y, K^*_1, L^*_y, M^*_x)
\]

\[
L_x + L_y + L^*_y \leq \bar{L}; \quad K_x + K_y + K^*_1 \leq \bar{K}; \quad E_x = M^*_x.
\]

Writing down the associated Lagrangean, it is direct to show that the first-order necessary conditions for an (interior) optimum are given by

\[
\frac{\partial U}{\partial C_x} = \frac{\phi}{\mu}; \quad \frac{\partial U}{\partial C_y} = \frac{\phi}{\mu};
\]

\[
\phi \frac{\partial Q_x}{\partial L_x} = \omega = [\mu \times [1 - \kappa(s_y)] - \theta(s_y)] \frac{\partial q_y}{\partial L_y} = [\mu \times [1 - \kappa^*(s^*_y, K^*_1)] - \theta(s^*_y)] \frac{\partial \tilde{q}^*_y}{\partial L^*_y};
\]

\[
\phi \frac{\partial Q_x}{\partial K_x} = \psi = [\mu \times [1 - \kappa(s_y)] - \theta(s_y)] \frac{\partial q_y}{\partial K_y} = \mu \frac{\partial Q^*_y}{\partial K^*_1};
\]

\[
\phi = [\mu \times [1 - \kappa^*(s^*_y, K^*_1)] - \theta(s^*_y)] \frac{\partial \tilde{q}^*_y}{\partial M^*_x}
\]

\[
-q_y \times \theta'(s_y) = -[\mu \times \frac{\partial Q^*_y}{\partial s_y} + \phi \frac{\partial Q^*_x}{\partial s_y}], \quad -q^*_y \times \theta'(s^*_y) = -[\mu \times \frac{\partial Q^*_y}{\partial s^*_y} + \phi \frac{\partial Q^*_x}{\partial s^*_y}].
\]
Noting that

\[
\frac{\partial \tilde{y}_y^*(L_{y^*}, M_x^*)}{\partial M_x^*} = \frac{\partial^2 q_y^*}{\partial L_{y^*} \partial K_y^*} \times L_{y^*} + p^w + M_x^* \frac{\partial p^w}{\partial M_x^*}, \quad (A11)
\]

\[
\frac{\partial \tilde{y}_y^*(L_{y^*}, M_x^*)}{\partial L_{y^*}} = \frac{\partial q_y^*}{\partial L_{y^*}} + \frac{\partial^2 q_y^*}{\partial L_{y^*}^2} \times L_{y^*} + M_x^* \times \frac{\partial p^w}{\partial L_{y^*}}, \quad \text{and}
\]

\[
\frac{\partial p^w(M_x^*, L_{y^*})}{\partial L_{y^*}} = \left[ \frac{\partial q_y^*}{\partial L_{y^*}} \times L_{y^*} + \frac{\partial^2 q_y^*}{\partial L_{y^*}^2} \left( \frac{\partial q_y^*}{\partial K_y^*} + \frac{\partial^2 q_y^*}{\partial K_y^* \partial K_y^*} \times K_y^* \right) \right] + \left[ \frac{1 + \left( \frac{\partial^2 q_y^*}{\partial L_{y^*} \partial K_y^*} \frac{\partial K_y^*}{\partial p^w} \frac{\partial p^w}{\partial M_x^*} \right)}{\eta^* - \left( \frac{\partial q_y^*}{\partial L_{y^*} \partial K_y^*} \frac{\partial p^w}{\partial M_x^*} \right)} \right]
\]

it follows that the solution to the domestic country planner’s problem can be implemented in a perfectly competitive market economy with a tariff \( \tau \) on imported services, a nondiscriminatory sales tax \( t \) on domestically produced and imported services, and a discriminatory wage subsidy \( \chi \) offered to foreign service providers that hire local labor, set at the levels

\[
\tau = [\theta(s_y) - \theta(s_y^*)] + [1 - \kappa^*(s_y^*, K_I)] \times P_y^q \times \left[ \frac{1 + \left( \frac{\partial^2 q_y^*}{\partial L_{y^*} \partial K_y^*} \frac{\partial K_y^*}{\partial p^w} \frac{\partial p^w}{\partial M_x^*} \right)}{\eta^* - \left( \frac{\partial q_y^*}{\partial L_{y^*} \partial K_y^*} \frac{\partial p^w}{\partial M_x^*} \right)} \right], \quad (A12)
\]

\[
t = \theta(s_y)
\]

\[
\chi = (\tau - [\theta(s_y^*) - \theta(s_y)]) \times \frac{\partial q_y^*}{\partial L_{y^*}},
\]

and standards \( s_y \) and \( s_y^* \) and a level of compliance-cost reducing investment \( K_I \) that satisfy

\[
-q_y \times \theta'(s_y) = - \left[ P_y^c \times \frac{\partial Q_y^c}{\partial s_y} + P_x \frac{\partial Q_x^c}{\partial s_y} \right], \quad -q_y^* \times \theta'(s_y^*) = - \left[ P_y^c \times \frac{\partial Q_y^c}{\partial s_y^*} + P_x \frac{\partial Q_x^c}{\partial s_y^*} \right], \quad (A13)
\]

where all prices are evaluated under the unilaterally optimal taxes and where the wage subsidy is expressed in specific terms and where we have again expressed the Pigouvian sales tax and import tariff in specific terms assessed per unit of raw service, where \( \eta^* \) is the elasticity of foreign export supply with respect to the world price, and where in writing (A13) we have used the fact that \( \frac{\partial Q_y^c}{\partial s_y^*} = \frac{\partial Q_y^c}{\partial s_y} \) and \( \frac{\partial Q_x^c}{\partial K_I} = \frac{\partial Q_x^c}{\partial K_I} \).

To see that this yields the domestic country planner’s solution, note first that with \( \phi = P_x \), \( \mu = P_y^c \) and \( \psi = r \), the government choices of \( s_y, s_y^* \) and \( K_I \) characterized in (A13) conform directly to the conditions in (A10). And under the tariff/tax/subsidy policies in (A12), and with \( \omega = w \), utility maximizing consumers consume to satisfy the condition \( \frac{\partial Q_y^c}{\partial s_y^*} = \frac{P_y^c}{P_y^c} \), and profit maximizing firms hire and produce to satisfy the conditions \( P_x \frac{\partial Q_x^c}{\partial L_x} = w, P_x \frac{\partial Q_x^c}{\partial K_x} = r \),
\[ P_y^q \times [1 - \kappa(s_y)] \frac{\partial q_y}{\partial L_y} = w, \quad P_y^q \times [1 - \kappa^*(s_y^*, K_y)] \frac{\partial q_y^*}{\partial L_y^*} = w - \chi \quad \text{and} \quad P_y^q \times [1 - \kappa(s_y)] \frac{\partial q_y}{\partial K_y} = \tau, \]

which using (A11) and \( P_y^c = P_y^q + t = P_y^q + t + \tau \), can be shown to conform to the remaining conditions in (A10).

Finally, to see that the unilateral tariff collapses to the efficient level when \( \eta^* \rightarrow \infty \) as stated in the text, it is helpful to first write the unilateral tariff in the equivalent form

\[
\tau = [\theta(s_y^*) - \theta(s_y)] + [1 - \kappa^*(s_y^*, K_y)] \times P_y^q \times \left[ \frac{M_y^*}{\frac{\partial M_y^*}{\partial p^m} + \frac{\partial^2 q_y^*}{\partial L_y^* \partial K_y^*} \times L_y^*} - \left( \frac{\partial q_y^*}{\partial K_y^*} - \frac{\partial^2 q_y^*}{\partial L_y^* \partial K_y^*} \times K_y^* \right) - \frac{\partial^2 q_y^*}{\partial L_y^* \partial K_y^*} \times L_y^* \right].
\]

Next note that \( \eta^* \rightarrow \infty \) as \( \frac{\partial^2 q_y^*}{\partial K_y^*} \rightarrow 0 \) implying \( \frac{\partial K_y^*}{\partial p^m} \rightarrow \infty \), which in turn implies \( \frac{\partial^2 q_y^*}{\partial K_y^*} \rightarrow 0 \) as well. With \( \eta^* \rightarrow \infty \) therefore implying \( \frac{\partial K_y^*}{\partial p^m} \rightarrow -\infty \), \( \frac{\partial^2 q_y^*}{\partial L_y^* \partial K_y^*} \rightarrow 0 \) and \( \frac{\partial^2 q_y^*}{\partial L_y^* \partial K_y^*} \rightarrow 0 \), it follows from the expression above that \( \tau \rightarrow [\theta(s_y^*) - \theta(s_y)] \) as \( \eta^* \rightarrow \infty \).

QED

2. Proof of Proposition 2

**Proposition 2.** When the domestic country’s service imports are delivered through a combination of mode 3 (commercial presence) and mode 4 (movement of natural persons) with no hiring of local labor, the domestic government’s unilateral policy choices are characterized by an import tariff that is inefficiently high: but conditional on domestic prices, all other policies – the nondiscriminatory sales tax, the standards imposed on domestic and foreign service providers, and the level of compliance-cost reducing investment – remain at their efficient levels.

**Proof:** To prove this proposition, we extend the model developed in section 3 of the body of the paper to consider mode 3 service imports that involve the hiring of foreign labor (mode 4 as well). We consider the opposite extreme to the pure mode 3 services considered in the body of the paper: we assume that, rather than hiring only local (domestic) labor, mode 3 service providers hire only foreign labor. Hence, production of the raw service by foreign service providers is now given by \( q_y^* (L_y^*, K_y^*) \), with \( L_y^* \) the amount of foreign labor devoted to producing services for mode-3 (and mode-4) delivery to the domestic country. Again we first characterize the efficient policies that a global planner would choose in this setting, and then characterize the unilaterally optimal policies that a domestic country planner would choose.
The global planner chooses \([y, y^*, C, C^*, L_x, L_y, K_x, K_y, K^*_I, C^*_x, L^*_x, L^*_y, K^*_x, K^*_y]\) to solve:

\[
\max \ U(C_x, C_y) - Z(y, y^*, q_y(L_y, K_y), q^*_y(L^*_y, K^*_y)) \tag{A14}
\]

s.t. \(W^*(C^*_x) \geq \tilde{W}^*\)

\[
C_x \leq Q_x(y, y^*, L_x, K_x) - [C^*_x - Q^*_x(L^*_x, K^*_x)]
\]

\[
C_y \leq Q_y(y, L_y, K_y) + Q^*_y(y^*, K^*_I, L^*_y, K^*_y)
\]

\[
L_x + L_y \leq \tilde{L}; \quad K_x + K_y \leq \tilde{K}; \quad L^*_x + L^*_y \leq \tilde{L}^*; \quad K^*_x + K^*_y \leq \tilde{K}^*.
\]

Writing down the associated Lagrangean, it is direct to show that the first-order necessary conditions for an (interior) optimum are given by

\[
\frac{\partial U}{\partial C_x} = \frac{\phi}{\mu},
\]

\[
\phi \frac{\partial Q_x}{\partial L_x} = \omega = [\mu \times [1 - \kappa(s_y)] - \theta(s_y)] \frac{\partial q_y}{\partial L_y};
\]

\[
\phi \frac{\partial Q_x}{\partial K_x} = \psi = [\mu \times [1 - \kappa(s_y)] - \theta(s_y)] \frac{\partial q_y}{\partial K_y} = \mu \frac{\partial Q^*_y}{\partial K^*_I}
\]

\[
\phi \frac{\partial Q_x}{\partial L^*_x} = \omega^* = [\mu \times [1 - \kappa^*(s^*_y, K^*_I)] - \theta(s^*_y)] \frac{\partial q^*_y}{\partial L^*_y}
\]

\[
\phi \frac{\partial Q_x}{\partial K^*_x} = \psi^* = [\mu \times [1 - \kappa^*(s^*_y, K^*_I)] - \theta(s^*_y)] \frac{\partial q^*_y}{\partial K^*_y}
\]

\[
-q_y \times \theta'(s_y) = -\left[\mu \times \frac{\partial Q_y}{\partial s_y} + \phi \frac{\partial Q_x}{\partial s_y}\right], \quad -q^*_y \times \theta'(s^*_y) = -\left[\mu \times \frac{\partial Q^*_y}{\partial s^*_y} + \phi \frac{\partial Q_x}{\partial s^*_y}\right],
\]

where \(\phi, \mu, \omega, \omega^*, \psi, \psi^*\) are Lagrange multipliers. According to (A15), the solution to the global planner’s problem can be implemented in a perfectly competitive market economy where the foreign country maintains a policy of free trade, and where the domestic country implements a Pigouvian tariff on imported services \(\tau\) and a nondiscriminatory Pigouvian sales tax on domestically produced and imported services \(t\), set at the levels

\[
\tau = [\theta(s^*_y) - \theta(s_y)], \quad t = \theta(s_y), \tag{A16}
\]

and standards \(y\) and \(y^*\) and a level of compliance-cost reducing investment \(K_I\) that satisfy

\[
-q_y \times \theta'(s_y) = -\left[P_y^c \times \frac{\partial Q_y}{\partial s_y} + P_x \frac{\partial Q_x}{\partial s_y}\right], \quad -q^*_y \times \theta'(s^*_y) = -\left[P^c_y \times \frac{\partial Q^*_y}{\partial s^*_y} + P^*_x \frac{\partial Q_x}{\partial s^*_y}\right] \tag{A17}
\]

\[
P^c_y \frac{\partial Q^*_y}{\partial K^*_I} = \tau,
\]
where as before we have expressed the Pigouvian sales tax and import tariff in specific terms assessed per unit of raw service. The efficient policies described in (A16)-(A17) are identical to those in (A3)-(A4), and the reasoning is identical to that in the proof of Proposition 1.

We next characterize the optimal unilateral policies. We assume that the foreign country maintains a policy of laissez faire (which as we have demonstrated above is consistent with efficiency) and focus on the domestic country’s unilaterally optimal policies. These policies can be characterized as the solution to the domestic country planner’s problem, once the appropriate international constraints faced by the planner are introduced.

A first international constraint faced by the domestic country planner is the foreign country inverse import demand curve for $x$. To derive this constraint, we begin with the foreign country balanced trade condition

$$P^w M^*_x = Q_y^*(s_{y^*}, K_1, L^*_y, K^*_y),$$

(A18)

where $P^w$ is the world relative price of $x$ to $y$ at which the two countries trade and $M^*_x$ is the level of foreign country import demand for $x$, and where we have used the fact that all foreign service production is for export. Recalling that $Q_y^*(s_{y^*}, K_1, L^*_y, K^*_y) \equiv [1 - \kappa^*(s_{y^*}, K_1)] \times q_y^*(L^*_y, K^*_y)$, we can equivalently write the foreign country balanced trade condition in terms of its implied exports of raw services, given by

$$p^w M^*_x = q_y^*(L^*(p^w), K^*_y(p^w)),$$

(A19)

where $p^w \equiv P^w/\left[1 - \kappa^*(s_{y^*}, K_1)\right]$ is the raw world relative price of $x$ to $y$ at which the two countries trade. The expressions $L^*_y(p^w)$ and $K^*_y(p^w)$ in (A19), which are each decreasing in $p^w$, are defined implicitly by the labor and capital hiring conditions in the foreign country which can be expressed in terms of raw services as

$$p^w = \frac{\partial q_y^*(L^*_y, K^*_y)}{\partial L^*_y} / \frac{\partial Q_y^*(L^*_y, K^*_y)}{\partial L^*_y} \quad \text{and} \quad p^w = \frac{\partial q_y^*(L^*_y, K^*_y)}{\partial K^*_y} / \frac{\partial Q_y^*(L^*_y, K^*_y)}{\partial K^*_y}.$$

Condition (A19) defines $p^w(M^*_x)$, the foreign country inverse import demand curve for $x$, and implicit differentiation yields

$$\frac{\partial p^w(M^*_x)}{\partial M^*_x} = \left[\frac{[-p^w]}{M^*_x - \frac{\partial q_y^*(L^*_y, K^*_y)}{\partial L^*_y} \frac{\partial Q_y^*(L^*_y, K^*_y)}{\partial L^*_y} - \frac{\partial q_y^*(L^*_y, K^*_y)}{\partial K^*_y} \frac{\partial Q_y^*(L^*_y, K^*_y)}{\partial K^*_y}}\right] < 0.$$

(A20)

As (A20) indicates, the foreign country inverse import demand curve slopes downward.

Using (A19) we may then define $\tilde{q}_y^*(M^*_x) \equiv p^w(M^*_x) \times M^*_x$, and also $\tilde{Q}_y^*(s_{y^*}, K_1, M^*_x) \equiv [1 - \kappa^*(s_{y^*}, K_1)] \tilde{q}_y^*(M^*_x)$. A second international constraint faced by the planner is the international market clearing condition $E_x = M^*_x$, where we use $E_x$ to denote the home country export supply of $x$. 

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Armed with these two international constraints, we can state the domestic country planner’s problem. This planner chooses $[s_y, s_y^*, C_x, C_y, E_x, M_x^*, L_x, L_y, K_x, K_y, K_I]$ to solve

$$\begin{align*}
\text{Max} \quad & U(C_x, C_y) - Z(s_y, s_y^*, q_y(L_y, K_y), \tilde{q}_y(M_x^*)) \\
\text{s.t.} \quad & C_x \leq Q_x(s_y, s_y^*, L_x, K_x) - E_x \\
& C_y \leq Q_y(s_y, L_y, K_y) + \tilde{Q}_y^*(s_y^*, K_I, M_x^*) \\
& L_x + L_y \leq \bar{L}; \quad K_x + K_y \leq \bar{K} \\
& E_x = M_x^*.
\end{align*}$$

(A21)

Writing down the associated Lagrangean, it is direct to show that the first-order necessary conditions for an (interior) optimum are given by

$$\begin{align*}
\frac{\partial U}{\partial C_x} &= \frac{\phi}{\mu}; \\
\omega &= [\mu \times [1 - \kappa(s_y)] - \theta(s_y)] \frac{\partial q_y}{\partial L_y}; \\
\psi &= [\mu \times [1 - \kappa(s_y)] - \theta(s_y)] \frac{\partial q_y}{\partial K_y} = \mu \frac{\partial Q_y^*}{\partial K_I} \\
\phi &= [\mu \times [1 - \kappa^*(s_y^*, K_I)] - \theta(s_y^*)] \frac{\partial \tilde{q}_y^*}{\partial M_x^*} \\
-q_y \times \theta'(s_y) &= - \left[ \mu \times \frac{\partial Q_y}{\partial s_y} + \phi \frac{\partial Q_x}{\partial s_y} \right], \quad - q_y^* \times \theta'(s_y^*) = - \left[ \mu \times \frac{\partial Q_y^*}{\partial s_y^*} + \phi \frac{\partial Q_x^*}{\partial s_y^*} \right].
\end{align*}$$

(A22)

It follows that the solution to the domestic country planner’s problem can be implemented in a perfectly competitive market economy with a tariff $\tau$ on imported services and a nondiscriminatory sales tax $t$ on domestically produced and imported services, set at the levels

$$\begin{align*}
\tau &= [\theta(s_y^*) - \theta(s_y)] + [1 - \kappa^*(s_y^*, K_I)] \times P_{y^*}^q \times \frac{1}{\eta^*}, \\
t &= \theta(s_y),
\end{align*}$$

(A23)

and standards $s_y$ and $s_y^*$ and a level of compliance-cost reducing investment $K_I$ that satisfy

$$\begin{align*}
-q_y \times \theta'(s_y) &= - \left[ P_y^c \times \frac{\partial Q_y}{\partial s_y^*} + P_x \frac{\partial Q_x}{\partial s_y^*} \right], \quad - q_y^* \times \theta'(s_y^*) = - \left[ P_y^c \times \frac{\partial Q_y^*}{\partial s_y^*} + P_x \frac{\partial Q_x^*}{\partial s_y^*} \right], \\
P_y^c \times \frac{\partial Q_y^*}{\partial K_I} &= \tau.
\end{align*}$$

(A24)
where all prices are evaluated under the unilaterally optimal taxes and where we have again expressed the Pigouvian sales tax and import tariff in specific terms assessed per unit of raw service, where \( \eta^* \) is the elasticity of foreign export supply with respect to the world price, and where in writing (A24) we have used the fact that \( \frac{\partial \tilde{Q}_y}{\partial s_y} = \frac{\partial Q_y}{\partial s_y} \) and \( \frac{\partial \tilde{Q}_y}{\partial K_I} = \frac{\partial Q_y}{\partial K_I} \).

To see that this yields the domestic country planner’s solution, note first that with \( \phi = P_x \), \( \mu = P^c_y \) and \( \psi = r \), the government choices of \( s_y, s_y^* \) and \( K_I \) characterized in (A24) conform directly to the conditions in (A22). And under the tariff/tax policies in (A23), and with \( \omega = w \), utility maximizing consumers consume to satisfy the condition \( \frac{\partial U}{\partial C_x} = \frac{P_x}{P^c_y} \), and profit maximizing firms hire and produce to satisfy the conditions \( P_x \frac{\partial Q_x}{\partial L_x} = w \), \( P_x \frac{\partial Q_x}{\partial K_x} = r \), \( P^q_y \times [1 - \kappa(s_y)] \frac{\partial w}{\partial L_y} = w \), and \( P^q_y \times [1 - \kappa(s_y)] \frac{\partial w}{\partial K_y} = r \), which using \( P^c_y = P^q_y + t = P^q_y + t + r \), can be shown to conform to the remaining conditions in (A10).

QED

3. Proof of Proposition 3

Proposition 3. When the domestic government lacks a tariff-equivalent policy that can be applied to mode-3 foreign service providers, its unilateral policy choices are characterized by a nondiscriminatory sales tax on services above the Pigouvian level, a lower-than-efficient standard on domestic service providers and a higher-than-efficient standard on foreign service providers, and a smaller-than-efficient compliance-cost-reducing investments in the design and implementation of the standard applied to foreign service providers.

Proof: We begin by showing that domestic and foreign welfare can be written as \( W(s_y, s_y^*, K_I, \hat{P}^c_y, \hat{P}^q_y, \hat{P}^w_y) \) and \( W^*(\hat{P}^q_y, \hat{P}^w_y) \), respectively, as stated in the text. The welfare level in the domestic country is calculated by subtracting from the usual partial equilibrium measure of consumer surplus plus producer surplus plus tax revenue the disutility from the eyesore externality and the cost of investments in design and implementation of the standards. The producer surplus accruing to the domestic country is limited to that associated with domestic service suppliers: the producer surplus generated by foreign service suppliers in the domestic market accrues to the foreign country. Domestic consumer surplus (CS) and producer surplus (PS) are given by

\[
CS = \int_{P^q_y}^{\infty} D(P) dP \equiv CS(\hat{P}^c_y), \quad \text{and} \quad PS = \int_{\kappa(s_y)}^{\hat{P}^q_y} S_y(q - \kappa(s_y)) dq \equiv PS(s_y, \hat{P}^q_y).
\]
Using the pricing relationships and the definition of $\hat{p}_y^w$ provided in the body of the paper, the tax revenue collected by the domestic government ($TR$) can be written as

$$TR = [\hat{p}_y^c - \hat{p}_y^q] \cdot S_y(\hat{p}_y^q - \kappa(s_y)) + [\hat{p}_y^c - \hat{p}_y^w - \kappa^*(s_y^*, K_I)] \cdot [D(\hat{p}_y^c) - S_y(\hat{p}_y^q - \kappa(s_y))]$$

$$\equiv TR(s_y, s_y^*, K_I, \hat{p}_y^c, \hat{p}_y^q, \hat{p}_y^w).$$

And the utility cost of the domestic externality ($Z$) is given by

$$Z = \theta(s_y) \cdot S_y(\hat{p}_y^q - \kappa(s_y)) + \theta(s_y^*) \cdot [D(\hat{p}_y^c) - S_y(\hat{p}_y^q - \kappa(s_y))]$$

$$\equiv Z(s_y, s_y^*, \hat{p}_y^c, \hat{p}_y^q).$$

With these definitions, domestic welfare may now be expressed as

$$W = CS(\hat{p}_y^c) + PS(s_y, \hat{p}_y^q) + TR(s_y, s_y^*, K_I, \hat{p}_y^c, \hat{p}_y^q, \hat{p}_y^w) - Z(s_y, s_y^*, \hat{p}_y^c, \hat{p}_y^q) - r \cdot K_I \quad (A25)$$

$$\equiv W(s_y, s_y^*, K_I, \hat{p}_y^c, \hat{p}_y^q, \hat{p}_y^w).$$

Notice that by the definition of $TR(s_y, s_y^*, K_I, \hat{p}_y^c, \hat{p}_y^q, \hat{p}_y^w)$ and market clearing, it follows from (A25) that $W_{\hat{p}_y^w} = -[D(\hat{p}_y^c) - S_y(\hat{p}_y^q - \kappa(s_y))] = -S_y^*(\hat{p}_y^q) < 0$ where $\hat{p}_y^q \equiv \hat{p}_y^q - \kappa^*(s_y^*, K_I)$ (and where a function subscripted with a variable denotes the partial derivative of the function with respect to the variable). This reflects the domestic welfare loss associated with a terms-of-trade movement against the domestic country (i.e., a rise in $\hat{p}_y^w$) holding fixed all regulatory standards, associated investments and domestic local prices. This loss is simply the income effect of the terms-of-trade deterioration for the domestic country, which amounts to the domestic sales volume of the foreign service providers.

Given the absence of foreign demand for the service under consideration and the absence of an externality experienced by the foreign country as well, the welfare level in the foreign country is composed of just two components: the producer surplus accruing to foreign service providers operating in the domestic market, and tax revenue. More specifically, using the pricing relationships above and the definitions of $\hat{p}_y^q$ and $\hat{p}_y^w$, foreign producer surplus ($PS^*$) and trade tax revenue ($TR^*$) can be defined as

$$PS^* = \int_{\kappa^*(s_y^*, K_I)}^{\hat{p}_y^q + \kappa^*(s_y^*, K_I)} S_y^*(q - \kappa^*(s_y^*, K_I)) dq = \int_{0}^{\hat{p}_y^q} S_y^*(q) dq \equiv PS^*(\hat{p}_y^q),$$

$$TR^* = [\hat{p}_y^w - \hat{p}_y^q] \cdot S_y^*(\hat{p}_y^q) \equiv TR^*(\hat{p}_y^q).$$
With these definitions, foreign welfare may now be expressed as

\[
W^* = PS^*(\hat{p}_y^q, \hat{p}_y^w) + TR^*(\hat{p}_y^q, \hat{p}_y^w)
\]

\[
\equiv W^*(\hat{p}_y^q, \hat{p}_y^w).
\] (A26)

We next develop an expression for the joint (sum of) domestic and foreign welfare. When we characterize efficient policies, we look for policy choices that maximize this joint welfare. Using the market-clearing condition that the domestic demand for services \(D(P_y^c)\) must be satisfied by supply from domestic and foreign service providers \([S_y(\hat{P}_y^q - \kappa(s_y)) + S_y^*(\hat{p}_y^q)]\), observe that the world price \(\hat{p}_y^w\) cancels from the sum of domestic and foreign tax revenue:

\[
TR(s_y, s_y^*, K_1, \hat{P}_y^c, \hat{p}_y^q, \hat{p}_y^w) + TR^*(\hat{p}_y^q, \hat{p}_y^w) = [\hat{P}_y^c - \hat{P}_y] \cdot S_y(\hat{P}_y - \kappa(s_y))
\]

\[
+ [\hat{P}_y^c - \hat{p}_y - \kappa^*(s_y^*, K_1)] \cdot [D(P_y) - S_y(\hat{P}_y^q - \kappa(s_y))]
\]

\[
\equiv g(s_y, s_y^*, K_1, \hat{P}_y^c, \hat{p}_y^q, \hat{p}_y^w).
\]

This allows us to write

\[
W + W^* = W(s_y, s_y^*, K_1, \hat{P}_y^c, \hat{p}_y^q, \hat{p}_y^w) + W^*(\hat{p}_y^q, \hat{p}_y^w)
\]

\[
= CS(\hat{P}_y^c) + PS(s_y, \hat{P}_y^q) + PS^*(\hat{p}_y^q) + g(s_y, s_y^*, K_1, \hat{P}_y^c, \hat{p}_y^q) - Z(s_y, s_y^*, \hat{P}_y^c, \hat{p}_y^q) - r \cdot K_1
\]

\[
\equiv G(s_y, s_y^*, K_1, \hat{P}_y^c, \hat{p}_y^q, \hat{p}_y^w).
\] (A27)

Hence, while the world price \(\hat{p}_y^w\) enters into each country’s welfare function, it is absent from the expression for joint welfare. This is because \(W_{\hat{p}_y^w} = -S_y^*(\hat{p}_y^q)\) and \(W_{\hat{p}_y^w}^* = S_y^*(\hat{p}_y^q)\) and hence \(W_{\hat{p}_y^w} + W_{\hat{p}_y^w}^* = 0\), so that movements in the world price represent pure (lump-sum) international transfers.

We are now ready to characterize the efficient policies. To characterize efficient policies, recall that only local prices are relevant for joint welfare, as (A27) indicates. But it is easily confirmed that, while world prices \(\hat{p}_y^w\) depend on the individual levels of both domestic and foreign tariffs \(\tau\) and \(\tau^*\), each of the local prices \(\hat{P}_y^c, \hat{p}_y^q\) and \(\hat{p}_y^w\) depend on \(\tau\) and \(\tau^*\) only through their sum. Therefore, in addition to the choices of \(t, s_y, s_y^*, K_1\), efficiency ties down only the sum of \(\tau\) and \(\tau^*\), not their individual levels. With reference to the expression for joint welfare given in (A27), there are then five first-order conditions that the efficient

\[
\text{implicit, we are assuming that lump sum transfers are available to distribute surplus across the two countries as desired.}
\]

\[\text{12}\]
policy choices must satisfy. Evaluating these first-order conditions using the expression for joint welfare given in (A27) and the above expressions for each of its component parts yields the following conditions which must be satisfied by the efficient policy levels:

\[ \tau + \tau^* = 0, \quad t = \theta(s_y) \tag{A28} \]

\[ \left[ -\theta'(s_y) \right] - \kappa'(s_y) \quad = \quad 0 = \left[ -\theta'(s_y^*) \right] - \kappa'(s_y^*) \tag{A29} \]

\[ S_y^* \times \left[ -\varphi'(K_I) \right] - r \quad = \quad 0. \]

With the efficient policies characterized by (A28)-(A29), we complete the proof of Proposition 3 by introducing

\[ \tau \equiv 0 \equiv \tau^*, \tag{Assumption 1} \]

noting that Assumption 1 does not alter the characterization of efficient policies in (A28)-(A29) – because by (A28) efficiency requires \( \tau + \tau^* = 0 \) in any event – and characterizing the domestic country’s unilaterally optimal policies when it lacks a tariff-equivalent policy instrument as implied by Assumption 1. With its tariff missing, the unilaterally optimal policies of the domestic government amount to the choices of \( t, s_y, s_y^* \) and \( K_I \) that maximize the expression for domestic welfare given in (A25). Simplifying the four associated first-order conditions yields

\[ t - \theta(s_y) = \left[ \frac{\Theta}{S_y' + S_{y^*}'} \right] > 0 \tag{A30} \]

\[ \left[ -\theta'(s_y) \right] - \kappa'(s_y) \quad = \quad \left[ \frac{\Theta}{S_y' + S_{y^*}'} \right] \times \left[ S_y' \times \kappa'(s_y) \right] > 0 \tag{A31} \]

\[ \left[ -\theta'(s_y^*) \right] - \kappa'(s_y^*) \quad = \quad \left[ \frac{\Theta}{S_y' + S_{y^*}'} \right] \times \left[ S_y' \times \kappa'(s_y^*) \right] < 0 \]

\[ S_y^* \times \left[ -\varphi'(K_I) \right] - r \quad = \quad \left[ \frac{\Theta}{S_y' + S_{y^*}'} \right] \times S_y' \times \left[ -\varphi'(K_I) \right] > 0, \]

where \( \Theta \equiv (S_y^* - S_{y^*} \times \left[ \theta(s_y) - \theta(s_y^*) \right]) \), and where under the unilaterally optimal domestic policies \( \Theta > 0 \). Evidently, without its tariff-equivalent policy instrument, the domestic country must turn to its other policies as second-best means to manipulate the terms of trade. And as a comparison of (A30)-(A31) with (A28)-(A29) reveals, to this end the domestic country will
set its nondiscriminatory sales tax above the Pigouvian level \((t > \theta(s_y))\), impose a lower-than-efficient standard on domestic service providers \((|-\theta'(s_y)| > \kappa'(s_y))\) and a higher-than-efficient standard on foreign service providers \((|-\theta'(s_y^*)| < \kappa'(s_y^*))\), and make smaller-than-efficient compliance-cost-reducing investments in the design and implementation of the standard applied to foreign service providers \((S_{y^*} \times [-\varphi'(K_I)] > r)\).

QED

4. Proof of Proposition 4

**Proposition 4.** When the domestic government lacks a tariff-equivalent policy that can be applied to mode-3 foreign service providers, it exerts its power over the terms of services trade in the noncooperative equilibrium by distorting all of its (behind-the-border) policies; the purpose of a trade-in-services agreement is to remove the terms-of-trade driven distortions from all of the domestic policies and raise trade volumes, and a deep-integration approach therefore seems natural. Nevertheless, a GATT-like shallow integration approach to services trade liberalization, which relies on across-the-board NT, TBT and NV rules combined with market access negotiations to bind the levels of taxation of services, could in principle be used by governments to negotiate from inefficient noncooperative policies to the efficiency frontier.

**Proof:** In the proof of Proposition 3, we established that when the domestic government lacks a tariff-equivalent policy that can be applied to mode-3 foreign service providers, it distorts all of its remaining (behind-the-border) policies. Here we establish that the underlying purpose of a trade-in-services agreement is then to remove the terms-of-trade driven distortions from all of the domestic policies. And we establish that, with the NT, TBT and NV rules in place, market access negotiations that bind the levels of taxation of services can allow governments to reach the efficiency frontier.

We first establish that the underlying purpose of a trade-in-services agreement is to remove the terms-of-trade driven distortions from all of the domestic policies. To this end, we now follow Bagwell and Staiger (1999, 2001) and define *politically optimal* policies as those policies that would hypothetically be chosen by governments unilaterally if they did not value the terms-of-trade implications of their policy choices. In the absence of tariff-equivalent policies (our Assumption 1 in the body of the paper), the foreign government has no policy that can impact the service industry and so it is passive, and our assumption of politically optimal policies then
translates into the domestic government choosing its policies unilaterally as if it did not value the terms-of-trade implications of its policy choices. We then ask whether politically optimal policies so defined are efficient when evaluated in light of the governments’ actual objectives, and thereby consider whether the inefficiencies in the noncooperative (unilateral) policies of the domestic government characterized in Proposition 3 can in fact be given the terms-of-trade interpretation that we claim.

Formally, to characterize politically optimal policies we suppose hypothetically that the domestic government acts as if $W^p_{wy} = 0$ when choosing unilaterally its policies, and we solve for the noncooperative (unilaterally optimal) policy choices of the domestic government that would emerge with these hypothetical objectives. It is easy to show that the politically optimal policies of the domestic government, which satisfy the four first-order conditions associated with the choices of $t, s_y, s_y^*$ and $K_I$ that maximize the expression for domestic welfare given in (A25) with the added condition that $W^p_{wy} = 0$, yield

$$t = \theta(s_y)$$

$$[-\theta'(s_y)] - \kappa'(s_y) = 0 = [-\theta'(s_y^*)] - \kappa'(s_y^*)$$

$$S_{y^*} \times [-\varphi'(K_I)] - r = 0,$$

which with $\tau \equiv 0 \equiv \tau^*$ under Assumption 1 are efficient according to (A28)-(A29). Evidently, if governments could be induced to make service sector policy choices free from motives reflecting terms-of-trade manipulation, there would be nothing left for a trade-in-services agreement to do. Hence, the underlying purpose of a trade-in-services agreement is to remove these terms-of-trade driven distortions from all policy choices where these motives were operative.

We now establish that, with the NT, TBT and NV rules in place, market access negotiations that bind the levels of taxation of services can allow governments to reach the efficiency frontier. In the body of the paper we argued that if the trade-in-services agreement were to include an NT rule and a TBT rule as we have described these rules, then subsequent to the introduction of these rules but prior to any negotiated market access commitments, the unilaterally optimal policies of the domestic government are:

$$t - \theta(s_y) = \left[ \frac{S_{y^*} - S_y}{S_y^*} \right] > 0$$

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\[-\theta'(s_y) - \kappa'(s_y) = 0 = [-\theta'(s_{y^*}) - \kappa'(s_{y^*})] \quad (A35)\]

\[S_{y^*} \times [-\varphi'(K_I)] - r = 0.\]

But we also observed there that, without further rules, a market access agreement that constrained the domestic sales tax to its efficient level would induce the domestic government to raise its standard above the efficient level as a means of manipulating the terms of trade.

Suppose, then, that in addition to the NT and TBT rules, a non-violation (NV) doctrine is adopted, under which a service-exporting government could seek redress if some change in domestic policy by an importing government, even though not specifically prohibited by the trade-in-services agreement, nevertheless curtails trade in a manner that upsets the reasonable market access expectations associated with sales-tax commitments. As we note in the body of the paper, if we use the phrase “market access” to denote the domestic import volume at a given terms of trade, then we can think of the NV rule as implying that, once the domestic government makes a market access commitment by binding its sales tax, it will be dissuaded from making any subsequent changes to its full set of policies that together would have the effect of reducing the volume of service imports it demands at a given terms of trade. Here we follow Staiger and Sykes (2011) and formalize the NV doctrine as a “market-access preservation” rule defined in terms of the raw (unregulated) service. A key observation is that, if the NV rule prevents the domestic government from making unilateral post-agreement changes in its policies in a way that would alter its demand for imported raw services at the terms of trade implied by its negotiated market access commitments, then the market-clearing output of foreign service providers in the domestic market and therefore the trade volume in mode 3 services \(S_{y^*}\) and the terms of trade \(\hat{p}_y^w\) cannot be altered by any post-agreement changes in domestic policies allowable under the NV rule either. And without the ability to manipulate the terms of trade with its remaining (unconstrained) policy instruments, the incentive for the domestic government to introduce distortions in these policy instruments once its sales tax is constrained in a market access agreement is removed.

Collecting these observations, we now suppose that the domestic and foreign governments negotiate a shallow integration services agreement, in which they agree to abide by the NT, TBT and NV rules, and where, beginning from the unilateral domestic policy choices which would then obtain as defined in (A34)-(A35) and which we now denote with a superscript “0,” the domestic government agrees in a market access negotiation to set its nondiscriminatory sales tax at a level \(\bar{t}\) defined by \(S_{y^*}(\hat{p}_y^w(0, \bar{t}, s_y^0, s_{y^*}^0, K_I^0)) = S_{y^*}^{SE}\), where \(S_{y^*}^{SE}\) denotes the efficient level
of mode-3 service imports and where we now express $\hat{p}_{y^*}^0$ as a function of policies. Notice from (A34)-(A35) that the unilateral domestic choice of standards sets $s_y = s_{y^*}$ at its efficient level; but with $S_{y^*} < S_{y^*}^E$ under the unilateral domestic policy choices and the TBT rule requiring only that $K_I$ be efficient conditional on prevailing domestic prices and hence conditional on the prevailing trade volume $S_{y^*}$, $K_I^0$ is below its efficient level, and hence $\bar{t} < \theta(s_y)$. With this market access commitment implying a volume of imported mode 3 services $S_{y^*}$ and a terms of services trade $\hat{p}_w^y$ which are then fixed at their efficient levels under the NV rule, it follows that, subsequent to their market access agreement, the domestic government will maintain its regulatory standards $s_y^0$, $s_{y^*}^0$ at their efficient levels while adjusting $K_I$ and $t$ up in accordance with the constraints implied by the market access preservation rule until the efficient levels of $K_I$ and $t$ are also reached. In this way, a ‘GATT-like’ shallow integration approach to services trade liberalization could in principle be used by governments to negotiate from inefficient noncooperative policies to the efficiency frontier.

QED

References


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4This follows by noting that the first-order conditions that define the efficient politically optimal policies in (A32)-(A33), in which the domestic government is assumed hypothetically to act as if it did not value movements in $\hat{p}_y^w$ (i.e., as if $W_{\hat{p}_y^w} = 0$) when making its unilateral choices, are the same first order conditions that the domestic government faces in its unilateral choices when instead, as a result of the NV rule and evaluated at efficient politically optimal trade volumes, it cannot alter $\hat{p}_y^w$. We also note that while the NV rule would be needed to prevent the domestic country from desiring to raise its nondiscriminatory standard $s_y$ subsequent to market access negotiations over $t$, the market-access preserving upward adjustment in $K_I$ and $t$ subsequent to market access negotiations over $t$ that we describe in the text and that would be necessary to arrive at the efficiency frontier would likely occur under an Article XXVIII renegotiation, along the lines suggested in Proposition 4 of Bagwell and Staiger (2001, see their note 27).