Reevaluating the Role of Trade Agreements: Does Investment Globalization Make the WTO Obsolete?

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Abstract

This paper demonstrates that international ownership – whether due to foreign direct investment, international portfolio diversification, cross-country mergers, or multinational firms – alters the role of multilateral trade institutions by redefining pecuniary externalities among trading partners. International ownership can mitigate the incentives that lead large countries to set inefficiently high tariffs, but simultaneously introduces the potential for expropriation by investment-host countries, which can extract rents from foreign investors by manipulating local prices. Regardless of the pattern of ownership, the basic principle of reciprocity continues to serve as an important guide to efficiency, but its formal definition must be modified to account for the pattern of international ownership in addition to traditional measures of physical trade flows.

JEL Codes: F13, F15, F21

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1 Overview

A common caveat overshadows the current debate over the role of negotiated tariff liberalization: standard models cannot address the potential for the pattern of international ownership to influence governments' preferences over trade policies. It seems likely that an us-versus-them mercantilist framework for understanding the institutions that govern international market access may be incomplete in an age when countries' commercial interests extend beyond their own borders and locally operated enterprises are not necessarily locally owned. To the extent that governments adjust commercial policy in response to changes in the interests of their constituent industries – which by now is surely beyond debate – evolution in the pattern of firm ownership and operations across the globe can be expected to induce a concomitant shift in governments' trade policy objectives.

The recent surge in gross private capital flows suggests that national commercial interests both depend increasingly on foreign markets, and at the same time may diverge from the pattern of domestic production when foreign interests are present in the local economy. The World Bank estimates that between 1990 and 2003, gross private capital flows (the sum of the absolute values of direct, portfolio, and other investment inflows and outflows recorded in the balance of payments) as a percentage of GDP rose from 2.8 to 4.6 in low-income countries, from 6.7 to 13.2 in middle-income countries, and from 11.1 to 26.6 in high-income countries.[1] For investors in large countries such as the United States, greater investment interests overseas mean increased internalization of the effect of domestic trade policies on world markets. At the same time, as foreigners hold a greater stake in a country's local economy– either through direct investment (a Honda plant in Ohio, for example) or portfolio holdings– the host-government will surely recognize the potential opportunities for local policy changes in the interest of its own constituents.

Anecdotal evidence suggests that international ownership may already influence governments' motives in drafting trade legislation. In a chapter dedicated to analyzing the increasing internationalization of production, the OECD's 2002 *Economic Outlook* emphasizes geographic trends in both the level and change in intra-industry trade (particularly in manufacturing) concentrated in certain areas.[2] Notably, all but one of the OECD's des-

[1] World Bank, World Development Indicators 2005, Section 6.1, Table 6.1.

[2] OECD (2002). At the outset of the report, the authors acknowledge that "Although there is considerable

ignated "high and increasing intra-industry trade" (from 1988-2000) countries – the Czech and Slovak Republics, Hungary, Poland, Germany, Mexico, the U.S., and Portugal – were key players in recent major expansions of regional trade agreements.[3] Of course, correlation does not imply causality – not least because trade policy surely influences the decisions of potential international investors – but as argued by Gruben (2001) in the case of NAFTA, it seems likely that causality runs both ways:

> This globalization process was not a creature of NAFTA. If anything NAFTA was a creature of this globalization process. If the reductions in transportation and communications costs that motivated globalization had not taken place, the political pressures that permitted NAFTA would not have been so strong. (p.6)

This paper formalizes how increasingly integrated patterns of international ownership can influence governments' incentives to manage global market access, and may thereby translate into an altered role for multilateral trade agreements such as the General Agreement on Tariffs and Trade and its successor institution, the World Trade Organization (GATT/WTO). Focusing on how the conventional understanding of pecuniary externalities among large countries must be updated in an environment with international investment, this paper combines a simple illustrative model of endogenous tariff determination with the Bagwell and Staiger (1999) (2002) politically augmented terms of trade framework to develop a unified platform for evaluating the implications of international ownership for the institutional agreements that govern international trade.

Fundamentally, international ownership restructures the relationship between national welfare and prices. Whereas traditional (national ownership) models admit a single pecuniary externality through which large countries may extract rents from foreign trading partners – world relative prices – models with international ownership permit *three* poten-

anecdotal evidence concerning the phenomenon [growing internationalization of production systems], there is surprisingly little in the way of data at the aggregate level to gauge its overall performance, and measurement problems attach to available macro data." They conclude that measures of intra-industry and intra-firm trade provide the best evidence in light of the data limitations.

[3]The first four were major recipients of investment from Germany and joined the European Union in 2004, while Mexico has been a major recipient of export-platform investment from the U.S. since the creation of its maquiladora program in the mid 1960s, and signed NAFTA in 1993. Portugal has been a member of the EU since 1986.

tial cost-shifting margins. In addition to potentially severing the traditionally understood link between a country's terms of trade and its welfare, cross-border ownership introduces two additional potential cost-shifting margins: the absolute (local relative to world) price level, which can be used to shift rents from local producers (which may be partially foreign owned) to local consumer-constituents, and the local relative price, which may be manipulated to shift rents across sectors – away from those with a relatively high degree of foreign ownership and toward those that are more provincially owned. By formally defining and disentangling these price to welfare mappings, this paper yields a complete taxonomy of the channels through which the pattern of global equity holdings influences government objectives and thus the role of negotiated trade agreements.

To capture the policy implications of the broadest possible range of international investment mechanisms in a single framework, the paper restricts attention to the ownership effects of cross-border equity holdings.[4] The common trait across virtually all forms of cross-border investment – whether due to the acquisition of domestic firms by foreign interests, foreign direct investment (FDI), multinationals' foreign affiliate activities, international portfolio diversification, or cross-country mergers – is that the international pattern of ownership is divorced from countries' domestic production portfolios. The critical implication is that international investment – however broadly defined – allows countries' gross domestic product (GDP) to differ in both level and composition from gross national product (GNP). Since it is generally held that countries' welfare is tied more closely to GNP than to GDP, this simple observation carries considerable importance for governments' trade policy objectives.

The caveat imposed by this generality is that ownership must be taken as exogenous. It would be ideal, of course, to endogenize the structure of global investment positions, but that would require first assuming the process through which ownership is achieved, itself a substantial and restrictive assumption.[5] Modeling foreign ownership as an exogenous claim

[4]This generality comes at cost, of course, since any economic effects of investment beyond the impact on the pattern of international ownership are necessarily overlooked. At the same time, modeling investment as ownership may be viewed as a reduced form treatment for be broadest possible definition of international holdings.

[5]For instance, one might assume that ownership is due to physical capital flows by atomistic investors (as in Kemp (1966), Jones (1967), Neary (1995), or Blanchard (2007)) or as risk diversification (as in Stockman and Dellas (1986) or Devereux and Lee (1999)), but then the model would not admit bidirectional

on overseas production seems the most reasonable approach to developing a generalized model. And indeed, though taking international ownership as exogenous constitutes rather a heroic simplification of the model, it is well precedented. For example, Bhagwati and Brecher (1981) assume fixed supplies of foreign inputs, but argue convincingly that their model nonetheless provides a meaningful caution to nationally oriented policy makers not to automatically adopt the standard welfare conclusions about trade policies in an environment with international investment.

In a pedagogical first step, the first part of the paper develops a simple two-country, two-good general equilibrium model to demonstrate how the pattern of international ownership enters a national income maximizing government's optimal tariff function, and in so doing generalizes and combines insights from existing theoretical work (discussed shortly). First, assuming that the pattern of international ownership is industry-neutral (equal ownership shares across sectors), the model identifies two distinct channels through which cross border ownership affects governments' optimal tariffs. The first, termed the *internal effect*, encompasses earlier findings from trade literature, that a government's optimal tariff decreases with its recognition of the degree of foreign ownership of local industry. The second, the *external effect*, generalizes an earlier finding by Devereux and Lee (1999), that the government has less incentive to manipulate the terms of trade when its constituents hold a stake in the foreign economy.

A brief extension to the basic model then introduces the potential for *compositional effects* by allowing the intersectoral composition of foreign ownership to vary from the industry-neutral benchmark. The thought experiment highlights the potential for sectoral bias in ownership patterns to induce governments to manipulate local prices in favor of industries with a relatively higher proportion of national ownership. For instance, foreign ownership bias towards the import-competing sector would strengthen the internal effect in the host country, while weakening the external effect for the foreign (source) country. A practical implication is that in a world with many goods, the tariff liberalizing potential of cross-border investment may be limited to those industries in which foreign investors hold a meaningful stake. One thus might expect that sectors such as agriculture or basic textiles, which are predominantly nationally owned, will continue to be contentious issues

capital flows in a single sector which are both observed in practice and (as demonstrated later in the paper) important for the structure of trade agreements.

at the multilateral negotiating table, while industries with more international investment and multinational firm activity, such electronics, may enjoy a relatively smooth path to liberalized market access.

The basic version of the model implies that given any equilibrium pattern of production, trade, and prices, both governments' optimal tariffs decline with their recognition of the degree of (industry-neutral) international equity integration. Indeed, there may exist sufficiently integrated patterns of international investment that lead both countries to choose internationally efficient tariffs (or even free trade) unilaterally. Crucially, the efficiency inducing pattern of international cross-ownership falls short of complete portfolio diversification;[6] when the pattern of international ownership is free of Home- (or Foreign-) bias, the external effect of overseas equity holdings exactly outweighs governments' incentives to manipulate the terms of trade, but the internal effect – temptation to extract rents from foreign investors in the local economy – will drive governments to distort trade policies away from globally efficient levels.

Findings from the basic version of the model suggest more generally that the conventional understanding of pecuniary externalities among trading parters must be updated in an environment with internationally integrated equity markets. The model implies that (*i*) large countries' ownership interests overseas may mitigate (or even reverse) the conventionally understood link between terms of trade and welfare that would otherwise lead the government to set inefficiently high tariffs (the external effect), but (*ii*) foreign ownership in the local economy introduces an internal cost-shifting externality through which governments can extract rents from foreign investors by manipulating the absolute (local relative to world) price level (the internal effect), and (*iii*) sectoral bias in the pattern of ownership presents an incentive for governments to further manipulate prices in favor of nationally owned industries (the compositional effect), which may temper or strengthen the internal and external effects depending on the intersectoral distribution of ownership locally and abroad. Although these three effects of international ownership are first identified under the narrow assumption that governments are national income maximizers, it can be demonstrated that they extend to a broad class of political economy models.

[6]This finding is contrary to the result found by Devereux and Lee (1999), and highlights the important but potentially surprising role of the internal effect, which in their model is implicitly ruled out by the assumption that foreign claims on domestic production are effectively independent of local prices.

Using Bagwell and Staiger's (1999, 2002) politically augmented terms of trade framework, the second half of the paper articulates three caveats to the prevailing economic theory of the GATT/WTO in an environment with cross-border ownership. First, by eroding large countries' external terms of trade cost-shifting motives, international ownership potentially could release countries from the terms of trade driven prisoners' dilemma that would otherwise necessitate negotiated tariff reductions. This finding carries the implication that increasingly integrated patterns of international ownership could – at least in theory – substitute for negotiated tariff liberalization in inducing efficient tariff regimes, and thereby supplant completely the *current* role of the GATT/WTO.

Second, since foreign ownership introduces an internal cost-shifting opportunity for expropriative policy manipulation that may induce countries to set inefficiently low tariffs, sufficient cross-border ownership could in fact *reverse* the role of negotiated trade agreements – requiring an institutional shift from the current structure designed to facilitate reciprocal tariff liberalization to one that helps countries cooperatively *restrict* market access to reach globally efficient levels.

Finally, while the basic principle of reciprocity still serves as an important guide to efficient tariff negotiations, the formal definition of reciprocal tariff liberalization must be updated in the presence of international ownership. To remain an efficient mechanism in an increasingly integrated world, the current WTO definition of reciprocal tariff concessions as the symmetric exchange of market access should be recast as an adjustment process that balances internal external and internal pecuniary externalities through the reciprocal exchange of market access based on investment remittances in addition to physical trade flows. Regardless of whether unilaterally optimal tariffs are above or below globally efficient levels, countries can achieve Pareto welfare gains by adjusting tariffs in lock-step as long as *ownership-defined market access* remains balanced.

This paper draws on, and relates to, a number of important earlier papers in the international trade, finance, and political economy literatures. As noted earlier, many of the key elements of existing work are qualitatively consistent with the model to be presented here, and some (notably Kemp (1966), Jones (1967), and Devereux and Lee (1999)) may be seen as developing special cases of the basic model presented in Section 2. In effect, this paper brings together the disparate elements of earlier research under a unified framework

(in Section 2) to address the central question of how the pattern of international ownership influences the role and structure of multilateral trade agreements (in Section 3).

First, this paper is not the first to argue that the pattern of industry ownership can shape tariff policy in a profound way. A political scientist, Schonhardt-Bailey (2006) argues convincingly that shifting investment portfolios among the landed gentry were responsible in large part for Britain's repeal of the Corn Laws in 1846. Compiling a wealth of historical evidence, the author presents a compelling case that as British landowners (and parliamentarians) increased their investment positions in exportable manufactures and trade-related infrastructure such as railroads, their opposition to trade reform declined. Although the key mechanism for liberalization in this instance was the diversification of ownership across industries rather than countries, the case nonetheless offers early evidence that ownership does indeed matter for trade policy in practice as well as theory.

The majority of related work within the international trade literature focuses on the welfare and policy implications of international investment (typically modeled as FDI) from the investment-host country perspective, effectively restricting attention to the local – or *internal* – effects of international ownership. Though these papers cluster around several distinct issues: the welfare effects of foreign capital inflows taking tariff policies as fixed,[7] the potential for "tariff jumping" direct investment,[8] and the political economy implications of foreign-owned local enterprises,[9] they share a common implication: whether or not explicitly derived, each study implies that a government's optimal tariff (which provides a net transfer from consumers to producers) should decrease with the level of foreign ownership in the host country; intuitively, the local government has less incentive to protect local industry that is owned in part by foreigners.

Conversely, a pair of innovative articles from the international finance literature examine the policy implications of international equity integration through the lens of asset

[7]See, for example, Uzawa (1969), Brecher and Diaz-Alejandro (1977), Bhagwati and Brecher (1980) (1981), and Brecher and Findlay (1983).

[8]The foundational paper is Bhagwati, Brecher, Dinopoulos, and Srinivasan (1987); a nice review of subsequent research may be found in Bhagwati, Dinopoulos, and Wong (1992). An interesting recent extension in Konishi, Saggi, and Weber (1999) uses the notion of quid pro quo FDI to explain the use of VERs.

[9]Grossman and Helpman (1996), Olarreaga (1999), Neto (2006), and Blanchard (2002), examine the implications of local foreign ownership on a host government's optimal trade policy using various incarnations of the Grossman and Helpman (1994) 'Protection for Sale' model.

markets. By focussing on the effect of a country's overseas asset holdings as a part of national ownership, these papers evaluate the *external* effect of international portfolio diversification. Stockman and Dellas (1986) and Devereux and Lee (1999) explore the welfare and tariff policy implications of internationally integrated asset markets in the presence of risk.[10] Both papers highlight the potential for international ownership to break the link between terms of trade and welfare, but modeling restrictions in each paper prohibit simultaneous consideration of the *internal* effects of ownership, resulting in some potentially misleading (or at least significantly qualified) policy predictions.

The exception to the single-sided results of the aforementioned is the pioneering work of Kemp (1966) and Jones (1967), who developed a "Neo-Hecksher-Ohlin" approach to study optimal taxation in the canonical 2x2x2 framework with simultaneous movement of both goods and capital. Their results offer specific examples of both the internal and external effects identified in Section 2, and also highlight the potential interplay between endogenous cross-border capital flows and optimal tariffs. The authors do not, however, generalize their results to an environment with bidirectional capital flows (which are necessarily prohibited under the structure of their model) and do not in any way address the implications for multilateral trade agreements, which is the central thesis of this paper.

Finally, this paper is most closely related to the literature on international trade agreements and the role of negotiated trade liberalization in reaching globally efficient levels of market access and trade. The results derived here build on the work of Johnson (1951-52), who first formally identified the terms of trade cost shifting externality among large trading partners, Mayer (1981), who extended the principle to a game-theoretic setting, and Grossman and Helpman (1995), Bagwell and Staiger (1999), Bagwell and Staiger (2002), and most recently Maggi and Rodriguez-Clare (2007), which together lay the foundational theory of the role and structure of multilateral trade agreements. But while this existing work allows for a rich set of political economy motivations, none of the existing theory allows for international ownership, cross-border factor flows, or multinational firm activity.[11] As

[10]The former explores the effect of exogenous political risk on optimal asset allocation and ex-post national welfare under various (exogenous) tariff policy outcomes, while the latter examines the impact of diversified asset markets on the outcome of a Nash tariff war between two large countries.

[11]Intriguingly, Maggi and Rodriguez-Clare (2007) come quite close, highlighting the importance of *intersectoral* factor mobility in trade policy. This paper argues that *international* factor mobility may play an

demonstrated in Section 3, retracing this oversight yields subtle but important implications for how and why trade agreements should be structured in an increasingly integrated world.

The paper proceeds as follows. The next section develops a model to identify the internal, external, and compositional effects of international ownership on national income maximizing governments' optimal tariffs and argues that there may exist patterns of international investment that are sufficiently integrated to induce countries to choose internationally efficient tariffs (or even free trade) unilaterally. Section 3 then explores the implications of international portfolio integration for the GATT/WTO under a spectrum of government political economy objectives by formalizing first how cross-ownership redefines pecuniary externalities among large countries and then how these changes are manifest in the Bagwell-Staiger politically augmented terms of trade framework. Section 4 concludes.

2 Cost-shifting and International Investment

This section develops a simple two-country two-good general equilibrium model with exogenous international cross-ownership. Governments are assumed to be apolitical national income maximizers; this simplification offers a clear characterization of the optimal tariff as the sum of the standard large country terms of trade cost-shifting externality, an internal effect (how foreign ownership of local production influences tariff choice), an external effect (how domestic ownership of overseas production affects the optimal tariff decision), and a potential compositional effect (how industry-bias in the distribution of domestic and foreign ownership enters the optimal tariff structure). Later, Section 3 argues that the results from this section extend qualitatively to a broad class of (potentially politically motivated) government objectives.

2.1 The Model

Two large countries, *Home* and *Foreign*, may produce and trade 2 goods, x and y, with constant returns to scale technologies and under the assumption of increasing opportunity costs. Preferences are assumed to be identical and homothetic (the assumptions on preferences are necessary only for the discussion of reciprocity in Appendix 5.4).

equally (if not more) important role, though the mechanisms at work are quite different.

International ownership is modeled as non-resident claims on domestic production, which is paid the local output price.[12] Defining international ownership as a claim on output rather than on the return to a given factor of production simplifies analysis considerably, since the rate of return to foreign owners is then homogenous of degree one in the local price.[13] The pattern of international ownership is taken to be exogenous so that the model can remain agnostic regarding the mechanism through which such bilateral cross-holdings arise – whether via international capital flows, acquisition of domestic firms by foreigners, international portfolio diversification, or some other means.

Denote the percentage of Home production of good $i \in \{x, y\}$ held in Foreign claims by ϕ_i. Similarly, use ϕ_i^* to represent the percentage of claims on Foreign located industry i production held by Home residents. Attention is restricted to *industry neutral* patterns of international ownership, for which $\phi_x = \phi_y \equiv \phi$ and $\phi_x^* = \phi_y^* \equiv \phi^*$. (This assumption is relaxed later in the section to explore the compositional effects of industry bias in ownership patterns.) So defined, ϕ and ϕ^* measure international equity integration; the higher is ϕ (ϕ^*), the greater the proportion of Home (Foreign) production owned by non-residents. From the perspective of the Home government, ϕ designates *internal* foreign ownership, and ϕ^* *external* ownership of production overseas.

[12]The assumption that the return to overseas investment depends on the foreign local price is consistent with Bhagwati and Brecher (1980) and Neary (1995) for example, and reflects that trade taxes are levied on goods based on location of production rather than ownership.

[13]If instead international ownership was modeled as non-resident claims on the return to one of several factors of production (such as capital), the net effect of a change in the local price on foreign remittances would depend on the proportion of the price change absorbed by complementary factors of production, which would determine the *magnitude* of the effect of a price change, and the relative factor-intensity across goods, which would determine the *direction* of the effect. An increase in the relative price of a particular good would increase the rate of return to the factor(s) of production used intensively in production of that good and reduce the return to all remaining factor(s) of production. The smaller the relative change in payments to complementary factors of production (i.e. any factor for which the price effect has the same sign – for instance intersectorally mobile labor in a specific factors model), the greater the magnitude of the effect of the price change on the return to the factor of production in question. Though the precise relationship between goods and factor prices can be made quite complex, the mapping between goods and factor prices remains; modeling foreign ownership as a claim on output therefore may be understood as a reduced form of modeling foreign factor ownership. For models in which investment is modeled as claims on output rather than production, see for example Kemp (1966), Jones (1967), Bhagwati and Brecher (1980), Neary (1995), and Blanchard (2007).

Governments are restricted to a single trade policy instrument in the form of import tariffs.[14] Letting good y act as numeraire, $p \equiv \frac{p_x}{p_y}$ then Home's local price ratio. Using an asterisk (*) to denote foreign country variables, the foreign local price ratio is $p^* \equiv \frac{p_x^*}{p_y^*}$. Assuming that Home's natural import good is x, the world ratio of offshore export prices is $p^w \equiv \frac{p_x^*}{p_y}$, and the Home (Foreign) terms of trade is $\frac{1}{p^w}$ (p^w). Using t (t^*) to represent the Home (Foreign) ad valorem import tariff, each country's domestic relative price may then be written a function of the world price and the local tariff, $p = \tau p^w \equiv p(\tau, p^w)$ and $p^* = \frac{p^w}{\tau^*} \equiv p^*(\tau^*, p^w)$ where $\tau \equiv (1+t)$ and $\tau^* \equiv (1+t^*)$.

Production occurs at the point on each country's production possibilities frontier where the marginal rate of technical substitution equals the domestic price ratio; it follows that Home (Foreign) production of each good i may be written as a function of the local relative price only, $q_i(p)$ ($q_i^*(p^*)$) for $i \in \{x, y\}$. Assuming Gorman form preferences ensures that aggregate Home (Foreign) demand for each good depends on only local prices and national income, I (I^*), so that $d_i \equiv d_i(p, I)$ and $d_i^* \equiv d_i^*(p^*, I^*)$ for $i \in \{x, y\}$.

Expressed in units of the local export good measured at the world price, the Home and Foreign income levels $I(p, p^w, p^*)$ and $I^*(p, p^w, p^*)$ are determined implicitly by the respective equations:

$$\begin{aligned} I = (1-\phi)[pq_x(p) + q_y(p)] &+ \phi^*\tau^*[p^*q_x^*(p^*) + q_y^*(p^*)] \\ &+ (p - p^w)[d_x(p, I) - q_x(p)] \end{aligned} \tag{2.1}$$

and,

$$\begin{aligned} I^* = (1-\phi^*)\left[q_x^*(p^*) + \frac{1}{p^*}q_y^*(p^*)\right] &+ \phi\tau\left[q_x(p) + \frac{1}{p}q_y(p)\right] \\ &+ \left(\frac{1}{p^*} - \frac{1}{p^w}\right)[d_y^*(p^*, I^*) - q_y^*(p^*)]. \end{aligned} \tag{2.2}$$

[14] In standard models without international ownership this is simply a privilege afforded by Lerner symmetry. Here, however, this constitutes an explicit assumption since import tariffs and export taxes may have asymmetric effects on the real economy in the presence of cross-border asset holdings. As demonstrated in Blanchard (2005), tariffs increase the local absolute (home relative to world) price level, which shifts rents from consumers to producers, whereas export taxes cause the absolute price level to fall, benefitting consumers at the expense of producers. Since this paper's focus is to explore the implications of international ownership for the GATT/WTO – an institution designed explicitly for the cooperative reduction of *tariffs* – the restricted instrument set seems most appropriate.

The first term in each income expression represents the domestically owned component of local GDP; the second term represents the real returns from ownership interests abroad; and the third term captures tariff revenue. Notice that these income expressions represent gross national product (GNP) rather than gross domestic product (GDP) since they incorporate remittances from abroad and payments to foreigners.

Both countries are assumed to satisfy their respective balanced budget conditions:[15]

$$p^w M_x = E_y + \Phi, \text{ and} \tag{2.3}$$

$$M_y^* = p^w E_x^* - \Phi, \tag{2.4}$$

where $\Phi \equiv \phi^* \tau^* [p^* q_x^* + q_y^*] - \phi[pq_x + q_y]$ represents net remittances paid by Foreign to Home measured in units of good y at the world price;[16] $M_x(p, I) \equiv d_x(p, I) - q_x(p)$ denotes Home's imports of good x; $E_y(p, I) \equiv q_y(p) - d_y(p, I)$ is Home's exports of y; $M_y^*(p^*, I^*) \equiv d_y^*(p^*, I^*) - q_y^*(p^*)$ is Foreign imports of y; and $E_x^*(p^*, I^*) \equiv q_x^*(p^*) - d_x^*(p^*, I^*)$ is Foreign exports of x.

The equilibrium world price, $\tilde{p}^w \equiv \tilde{p}^w(\tau, \tau^*)$, is determined by the goods market clearing condition:

$$E_x^*(p(\tau, \tilde{p}^w), \tilde{p}^w, p^*(\tau^*, \tilde{p}^w)) = M_x(p(\tau, \tilde{p}^w), \tilde{p}^w, p^*(\tau^*, \tilde{p}^w)). \tag{2.5}$$

By Walras' law, the market for y must also clear if the preceding holds and countries abide by their budget constraints. Finally, assuming the absence the Metzler and Lerner paradoxes rules out the possibility of perverse price responses to tariff changes.[17] Under

[15]The balanced budget conditions in (2.3) and (2.4) are found by setting the value of each country's consumption at local prices equal to its money income (i.e. $p_x d_x + p_y d_y = I^m$ for Home and $p_x^* d_x + p_y^* d_y = I^{m*}$ for Foreign), rearranging, and dividing by p_y.

[16]Virtually all international trade models impose balanced trade ($\Phi \equiv 0$). Yet the assumption of balanced trade constitutes a strong (and often inappropriate) restriction in the presence of international investment; when foreign remittances depend on local prices, the value of Φ depends on τ and τ^*. Indeed, the assumption of balanced trade is doubly restrictive when trade policy is endogenous, since national income maximizing governments have an incentive to manipulate domestic prices to engineer trade deficits at the expense of foreign investors, as first shown by Blanchard (2005).

[17]The conditions under which the Metzler or Lerner paradoxes may arise are somewhat complicated by international ownership due to the potential income effect of changes in the value of foreign remittances following a change in the tariff. For an example of how these changes are manifest in a specific factors framework with cross-border capital flows, see Neary (1995).

well behaved prices:

$$\frac{dp(\tau,\tilde{p}^w(\tau,\tau^*))}{d\tau} > 0 > \frac{\partial\tilde{p}^w(\tau,\tau^*)}{\partial\tau}, \qquad \text{and} \tag{2.6}$$

$$\frac{dp^*(\tau^*,\tilde{p}^w(\tau,\tau^*))}{d\tau^*} < 0 < \frac{\partial\tilde{p}^w(\tau,\tau^*)}{\partial\tau^*}. \tag{2.7}$$

2.2 Optimal Tariffs and the Pattern of International Ownership

Home's Optimal Tariff. The Home government chooses its tariff to maximize the indirect utility of a representative consumer subject to the market clearing condition (2.5), where indirect utility, $v(p, I)$, is a function of the domestic price at which goods may be purchased and income:[18]

$$\tau^o = \arg\max_{\tau} \quad v(p(\tau,p^w), I(p(\tau,p^w),p^w,p^*(\tau^*,p^w))), \tag{2.8}$$
$$\text{s.t.} \qquad p^w = \tilde{p}^w(\tau,\tau^*).$$

Forming the Lagrangian restates the government's problem:

$$\max L = v(p(\tau,p^w), I(p(\tau,p^w),p^w,p^*(\tau^*,p^w))) - \gamma(p^w - \tilde{p}^w(\tau,\tau^*)), \tag{2.9}$$

where $\gamma > 0$ is the Lagrangian multiplier. After straightforward algebraic manipulation, the first order condition may be written as:[19]

$$V_\tau = v_I\Big[\underbrace{t\tilde{p}^w\frac{dE_x^*}{d\tau} - E_x^*\frac{\partial\tilde{p}^w}{\partial\tau}}_{\textit{standard TOT motive}} + \underbrace{\overset{(-)}{\phi^* q_x^*\frac{\partial\tilde{p}^w}{\partial\tau}}}_{\textit{external effect}} + \underbrace{\overset{(-)}{-\phi q_x\frac{dp}{d\tau}}}_{\textit{internal effect}}\Big] = 0. \tag{2.10}$$

[18] Care must be taken to evaluate the derivative of Home's income expression, since fixing any two of the five variables $p, \tilde{p}^w, p^*, \tau$, and τ^* determines uniquely the equilibrium values of the remaining three. For instance, since p^* is determined uniquely by p and $\tilde{p}^w$, the effect of a marginal change in p^* on income holding p and p^w fixed $\left(\frac{\partial I^*(p,p^w,p^*)}{\partial p^*}\right)$ can be evaluated only by allowing p^w to differ from its market clearing value, $\tilde{p}^w$. See Section 3 for a more detailed discussion of the equilibrium relationships among prices and tariffs.

[19] The expression in (2.10) uses an envelope condition consistent with the assumption that the government places the same weight on producers in the x and y sectors. In a more general political economy context (as considered in Section 3), these weights may differ. The resulting *compositional effect* – that price changes influence the distribution of rents across sectors – is evident in the optimal tariff expression in (2.12).

The expression in (2.10) reveals that there are three competing influences on the government's optimal tariff decision: the standard large country terms of trade motive to set a positive tariff, the effect of Home's *external* ownership of Foreign production, and the influence of *internal* Foreign ownership of Home's local production. Notice that the external effect is driven by Home's ownership in the Foreign *export* sector, whereas the internal effect depends on the degree of Foreign ownership in Home's *import* sector. To the extent that Home constituents hold equity interests the Foreign export sector, their government will be less inclined to levy an import tariff at their expense; the greater the proportion of the foreign export sector that Home recognizes as its own, ϕ^*, the lower its optimal tariff. Similarly, since a tariff acts as a subsidy to the domestic import sector at the expense of local consumers, the Home government will have less motive to provide protection to the import competing industry, the greater is ϕ.

Solving the first order condition in (2.10) yields the implicit form of Home's optimal tariff:

$$\tau^o = 1 + \frac{1}{\hat{\epsilon}_x^*}\left(1 - \frac{\phi^* q_x^*}{E_x^*} + \frac{\phi q_x}{M_x \lambda}\right), \tag{2.11}$$

where $\lambda \equiv \frac{\frac{\partial p^w}{\partial \tau}}{\frac{dp}{d\tau}}$, which is < 0 by (2.6), and $\hat{\epsilon}_x^* \equiv \epsilon_x^* + \frac{\partial E_x^*(p^*, I^*)}{\partial I^*}\frac{\partial I^*(p, p^w, p^*)}{\partial p}\frac{p^w}{E_x^*}\frac{1}{\lambda}$, where $\epsilon_x^* \equiv \frac{dE_x^*}{dp^w}\frac{p^w}{E_x^*}$ is Foreign export supply elasticity. Note that in the absence of international ownership, (2.17) reduces to the familiar Johnson (1951-52) terms of trade cost-shifting tariff, $\tau = 1 + \frac{1}{\epsilon_x^*}$.[20] This optimal tariff expression reinforces the earlier intuition, since it is again clear that the internal and external effects of international ownership work in tandem to counter Home's 'standard' large-country terms of trade motivation for manipulating the world price. And indeed, as long as the direct effect of increasing the degree of cross-ownership (how ϕ and ϕ^* enter (2.17) explicitly) outweighs any possible indirect effects of changing the pattern of international ownership[21] (which are generally ambiguous in sign), an increase in industry-neutral cross-ownership will cause Home's optimal tariff to fall.

At the same time, it is clear that the tariff liberalizing potential of international ownership depends crucially on the trade orientation of those sectors with foreign stakeholders.

[20] From the implicit definition of Foreign income in (2.1), $\frac{\partial I^*(p, p^w, p^*)}{\partial p} = \frac{\phi q_x}{1 + t^* p^* \frac{\partial d_x^*(p^*, I^*)}{\partial I^*}}$. Thus, $\phi = 0 \rightarrow \hat{\epsilon}_x^* = \epsilon_x^*$.

[21] Changing ϕ and ϕ^* may affect equilibrium trade volume and foreign export supply elasticity via income effects.

Temporarily removing the restriction of industry neutrality yields the modified optimal tariff expression:

$$\tau^o = 1 + \frac{1}{\hat{\epsilon}_x^*}\left(1 - \frac{\phi_x^* q_x^*}{E_x^*} + \frac{\phi_x q_x}{M_x \lambda} + \underbrace{\frac{(\phi_x^* - \phi_y^*) p^* q_x'^*(p^*)}{E_x^*} + \frac{(\phi_x - \phi_y) p q_x'(p)}{M_x \lambda}}_{\textit{compositional effects}}\right). \tag{2.12}$$

The compositional effects identified above describe the potential for industry-bias in the pattern of international ownership to further influence Home's optimal tariff. Export-sector bias in Home's overseas ownership ($\phi_x^* > \phi_y^*$), would further reduce Home's incentive to manipulate the terms of trade, while ownership bias towards the foreign import-competing sector ($\phi_y^* > \phi_x^*$) would counter the 'direct' influence of the external effect. Similarly, while a Foreign ownership bias towards Home's import-competing sector ($\phi_x > \phi_y$) would strengthen the internal effect on Home's tariff, disproportionate Foreign ownership in Home's export sector would enter the Home optimal tariff function with the opposite sign.

Intuitively, any change in local relative prices, which causes the pattern of domestic output to shift along a country's production possibilities frontier, redistributes returns between industries. To the extent that there exists industry-bias in the pattern of ownership, this implies a net redistribution between domestic and foreign producers. Thus, as demonstrated by (2.12), any industry bias in the pattern of ownership will either moderate or further strengthen the 'direct' internal and external effects depending on the direction of bias. In the context of this model, the internal and external effects of international ownership will swamp any potential compositional effects as long as the pattern of ownership is not too heavily biased towards sector y. Only to simplify exposition and notation, the remainder of this section again invokes the assumption of industry-neutral ownership.

The Foreign Optimal Tariff. The Foreign economy mirrors that of Home, where y is the Foreign import sector and the Home country's export sector. Formal characterization of the Foreign government's optimization problem is reserved for the appendix, since it exactly parallels that for Home. Jumping directly to the result, it is clear that the implicit expression for the Foreign optimal tariff is analogous to (2.17):

$$\tau^{*o} = 1 + \frac{1}{\hat{\epsilon}_y}\left(1 - \frac{\phi q_y}{E_y} + \frac{\phi^* q_y^*}{M_y^*}\frac{1}{\lambda^*}\right), \tag{2.13}$$

where $\lambda^* \equiv \frac{\frac{\partial \frac{1}{p^w}}{\partial \tau^*}}{\frac{d\frac{1}{p^*}}{d\tau^*}} < 0$ by (2.7) and $\hat{\epsilon}_y \equiv \epsilon_y + \frac{\partial E_y(p,I)}{\partial I}\frac{\partial I(p,p^w,p^*)}{\partial p^*}\frac{1}{p^w}\frac{1}{E_y}\frac{1}{\lambda^*}$, where $\epsilon_y \equiv \frac{dE_y}{d\frac{1}{p^w}}\frac{1}{p^w}\frac{1}{E_y}$ is Home's elasticity of export supply. Again, in the absence of cross ownership this reduces to the standard Johnson cost-shifting tariff.

Just as in the Home country case, both internal (ϕ^*) and external (ϕ) cross-holdings enter the Foreign optimal tariff expression negatively. All else equal, the Foreign government's incentive to impose a tariff decreases both with the fraction of the local import-competing sector owned by Home constituents, $\phi^* q_y^*$, and with the share of Home's export sector owned by Foreigners, ϕq_y. Thus, given any equilibrium pattern of production, trade volume, and Foreign export supply elasticity, the Foreign country's optimal tariff is lower, the greater the degree of international integration.

The tariff liberalizing potential of international ownership carries a number of policy implications. For instance, the external effect of overseas ownership introduces the possibility that by welcoming investment from a trading partner in export oriented sectors, a country may be able to induce the investing country to reduce its import tariffs unilaterally. This is a previously unidentified benefit of attracting overseas investors; in addition to conventionally cited gains such as capital growth, employment, or technology transfer, foreign investment in the local export sector can improve existing domestic exporters' market access in the investment-source country.[22] Moreover, the potential for industry bias in the pattern of foreign ownership to strengthen or weaken this tariff liberalizing influence may help explain the sharply different negotiating positions across industries that are adopted by many countries (the U.S. and Europe chief among them). The compositional effect identified in suggests that industries with a high degree of FDI or intra-firm imports, such as electronics or oil, should see lower tariff barriers than industries that have few foreign investors, such as basic textiles or agriculture.

At the same time, the internal effect of international investment admits an intriguing reinterpretation of Bhagwati, Brecher, Dinopoulos, and Srinivasan (1987), which argues that foreign export-oriented firms may establish import-competing subsidiaries in a target country in an effort to jump an existing tariff or to defuse a protectionist threat. The

[22] Blanchard (2007) explores this possibility further by asking whether potential investment-host countries should in fact subsidize foreign direct investment to gain such preferential tariff treatment.

authors posit that such tariff-jumping foreign investment may reduce the host country's tariff due to "political goodwill" on the part of local politicians who appreciate the job creation that follows from subsidiary investment. This model justifies their assumption that an increase in local foreign investment causes the host-country tariff to decline, but it is not political goodwill that reduces the host-country tariff. Quite the opposite, the investment host government has an incentive to decrease its tariff to extract rents from foreign investors in the local import competing sector. More generally, if foreign investors earn excess returns, there exists an internal cost-shifting opportunity whereby the local government can manipulate local prices through tariff reductions to extract rents from foreign interests in the local import sector.

2.3 Efficiency Inducing Cross-Ownership with Apolitical Governments

Perhaps the model's most provocative suggestion is that by leading governments to liberalize their tariffs unilaterally, international integration may be able to substitute partially (or in some instances completely) for negotiated tariff reductions. Just as in any standard (no-FDI) model with national income maximizing governments, the set of efficient tariffs is characterized by the Mayer (1981) condition:

$$\tau = \frac{1}{\tau^*}. \tag{2.14}$$

(Proof in appendix 5.2) Substituting the optimal tariff expressions (2.17) and (2.13) into the efficiency condition (2.14) defines implicitly a set of (ϕ, ϕ^*) pairs for which the outcome of a Nash tariff war between Home and Foreign would be internationally efficient. It is not surprising given the model's generality that, when solved, the resulting general efficiency condition yields so little economic insight that it deserves omission here.

Analytically simpler than the general characterization of efficiency, the free trade case (sufficient but not necessary for (2.14)) yields better insight without the algebraic gymnastics. Setting Home's optimal tariff expression in (2.17) to unity and rearranging defines implicitly the set of (ϕ, ϕ^*) pairs that would induce Home to set a zero tariff unilaterally:

$$\phi^* = \frac{E_x^*}{q_x^*}\left(1 + \frac{\phi q_x}{M_x}\frac{1}{\lambda}\right). \tag{2.15}$$

Likewise, Foreign's optimal unilateral tariff policy is free trade when:

$$\phi = \frac{E_y}{q_y}\left(1 + \frac{\phi^* q_y^*}{M_y^*}\frac{1}{\lambda^*}\right). \tag{2.16}$$

Together, this pair of expressions yields a free trade inducing pattern of international ownership (ϕ^{ft}, ϕ^{*ft}) that counters exactly the Home and Foreign countries' standard terms-of-trade motive to manipulate the world price.[23]

Though derived under the special case of free trade, these expressions yield several key insights. First, (i) by itself, external ownership is sufficient to neutralize the standard terms of trade externality completely when the ownership position abroad is large relative to *trade*; a country's remittances from abroad therefore may be small relative GDP, but nonetheless crucial in determining optimal trade policy. Second, (ii) because *either* internal or external ownership may be sufficient to induce either government to choose free trade unilaterally, there is no sense in which the pattern of ownership must be symmetric across countries to ensure efficiency. This observation suggests that even the predominantly unidirectional investment flows from industrialized countries to developing countries may lead to mutual, unilateral tariff reductions. Finally, and perhaps most surprisingly, (iii) complete international portfolio diversification between countries does not imply that non-cooperative (unilaterally set) tariffs will be efficient. Quite the opposite, it is demonstrated that perfect portfolio diversification across countries necessarily would lead to inefficiently *low* tariffs and too much trade.

The first point enumerated above, that overseas ownership is important for trade policy when it is large relative to the volume of trade, is readily apparent from (2.15) - (2.16). Notice, for instance, that in the absence of internal ownership, Home's external investment position would counter its terms-of-trade motive exactly when its total claim in the Foreign export sector is equal to the volume of trade; i.e. if $\phi = 0$, $\tau^o = 1$ when $q_x^* \phi^* = E_x^*$. Intuitively, when Home owns overseas exactly as much x it imports from Foreign (and owns all of its local production), the marginal gain from an improvement in its terms of trade following a marginal increase in the local tariff would be countered exactly by the concomitant decline in the proceeds from its foreign owned production. Notice that this result holds *regardless of the size of remittances relative to Home's gross national product*; the importance of a country's international ownership position for trade policy therefore depends on the *ratio* of the country's net external position to trade volume, not on the absolute magnitude of its overseas holdings.

[23] Of course, there is no reason to expect existence or uniqueness of such a free trade inducing pattern of ownership in general due to the implicit nature of the problem.

The second result, that efficiency does not require symmetry in the pattern of bilateral ownership, is also evident from (2.15) and (2.16), and may be demonstrated quickly by example. Consider again the case of dramatic asymmetry in which Home owns a portion of the Foreign Economy, but Foreign owns nothing in Home so that $\phi = 0$ but that $\phi^* > 0$. Home's ownership of the Foreign export sector will induce both countries to liberalize their tariffs unilaterally – potentially even to the point of choosing free trade– in Home via the external effect, and in Foreign though the internal effect.[24] The practical implication is, again, that the extent of countries' offshore equity holdings need not be symmetric across countries to induce ubiquitous (but unilateral) tariff liberalization and mutual welfare gains.

The final observation, that complete international portfolio diversification would induce governments to set inefficiently low tariffs unilaterally, is more striking than the first two, particularly because it appears to contradict an earlier finding by Devereux and Lee (1999), who found free trade is a Nash equilibrium of a tariff war when international financial markets are fully diversified. The contradiction derives from a critical difference in modeling assumptions. Devereux and Lee's framework implicity rules out the possibility of internal cost shifting by assuming that returns to offshore holdings depend on world prices and thus are unaffected by local tariffs; this leaves only terms of trade motives to drive trade policy.[25]

Under their framework, Devereux and Lee observed that in a symmetric two country model with complete portfolio diversification, neither government would have incentive to manipulate the world price, because neither country would be a net buyer nor a net seller of either good. (Under free trade and complete ownership diversification, each country would own and consume half of the total world supply of each good in equilibrium.) Under a symmetric global pattern of portfolio holdings, then, each country's net ownership position would counter exactly its terms of trade incentive to restrict trade via tariffs, so that free trade will be the equilibrium outcome of a non-cooperative tariff war.

[24] The serendipitous (but razor's edge) free trade outcome would occur if $\phi^* = \frac{E_x^*}{q_x^*}\Big|_{\tau=1} = |\lambda^*|\frac{M_y^*}{q_y}\Big|_{\tau=1}$.

[25] Specifically, Devereux and Lee develop a two-period model in which two symmetric countries with Cobb-Douglas preferences trade state contingent contracts in the first period for second period delivery and consumption. There is no production and second period endowments follow a stochastic process that is ex-ante symmetric across countries (so that countries' ex-ante budget constraints are identical). Critically, the authors assume that second period deliveries exempt from stage two tariffs, which eliminates the internal cost-shifting motive identified in this paper.

The same phenomenon is present in the model presented here, but the ownership effect identified by Devereux and Lee constitutes only part of story. While cross-border ownership counters each country's terms of trade motive to restrict trade, it also introduces the potential for *internal* cost shifting through the manipulation of local prices. Thus, any pattern of global equity holdings that exactly neutralizes the possibility of terms of trade cost shifting would at the same time excite local governments' expropriative motive. Rewriting the optimal tariff expression from (2.17) reveals clearly the distinction between the net effect of (internal and external) ownership apart from the expropriative influence presented by internal ownership by Foreign:

$$\tau^o = 1 + \frac{1}{\hat{\epsilon}_x^*}\Bigg(1 - \overbrace{\underbrace{\frac{\phi^* q_x^* - \phi q_x}{E_x^*}}_{\text{net ownership effect}}}^{(+/-)} + \overbrace{\underbrace{\frac{\phi q_x \tilde{p}^w}{M_x \frac{\partial p^w}{\partial \tau}}}_{\text{expropriative influence}}}^{(-)}\Bigg). \tag{2.17}$$

When the pattern of international ownership is completely diversified and countries are symmetric, as in Devereux and Lee (1999), the net ownership effect is exactly one,[26] so that in the absence of the expropriative influence of foreign ownership, the optimal policy would be free trade ($\tau = 1$). Recognizing the potential for internal cost shifting that is presented by internal ownership, then, it is clear that under complete portfolio diversification, the result will be unilaterally imposed import *subsidies* and inefficiently too much trade. More generally, any free trade inducing pattern of industry-neutral ownership (with apolitical governments) must necessarily fall short of complete portfolio diversification.

This said, were more direct means by which to capture foreign investors rents available, an investment host government's first best policy instead would be non-distortionary taxes targeted to foreign remittances, removing the internal and compositional cost-shifting effects from the optimal tariff decision and restoring Devereux and Lee's result. In practice, however, explicit expropriation from foreign investors is ruled out by ubiquitous bilateral investment treaties (BITs) and the increasingly prevalent "Trade and Investment Framework Agreements" (TIFAs) designed to prohibit such practices.[27] To the extent that such

[26] With complete diversification, and starting from free trade, each country will consume exactly as much as it owns in the world, by the assumption of identical and homothetic preferences. Thus, for Home, $\phi^* q_x^* + (1-\phi) q_x = c_x$. Rewriting, yields $\phi^* q_x^* - \phi q_x = E_x^*$. Notice that this is exactly the *definition* of complete diversification offered by Devereux and Lee (p 44).

[27] Under the current structure of the WTO, investment protections enter WTO jurisdiction only under the

investment treaties are at all effective in eliminating the use of more direct instruments for extracting rent from foreign investors, then tariffs will – via the internal and compositional effects – allow for back-door means by which to "cheat" on these investment agreements.[28]

Building on the finding that international equity integration fundamentally alters the relationship between prices and welfare in a model with apolitical national income maximizing governments, the next section argues that this observation extends to a broad class of government objectives and discusses the implications for the prevailing economic interpretation of the GATT/WTO in an environment with international ownership.

3 Achieving Efficiency: Negotiation vs. Integration

Multilateral trade forums are understood increasingly to be a solution to a terms of trade driven prisoners' dilemma among large economies;[29] sufficiently large countries can engineer their local trade policies to manipulate world prices in their favor, but when every country follows a unilaterally optimal policy of using tariffs to achieve terms of trade gains, their competing efforts to influence the world price will cancel one another (given sufficient symmetry) leaving only the local distortionary effects of protectionism. Although every country could be made better off under universally lower tariffs, none will liberalize unilaterally for fear of the consequent damage to its terms of trade.

limited auspices of the Trade Related Investment Measures (TRIMs), which do not provide internationally standardized legal protection to foreign investors. As is clear in this paper, however, all investment protection should perhaps be viewed as "trade related" since trade policies influence prices, which in turn affect the value of remittances paid to foreign investors.

[28] Chisik and Davies (2004) find evidence that rent-seeking ("income-shifting") is an empirically relevant motive in government decisions to tax foreign investors, using a bargaining framework to analyze the endogenous formation of tax treaties. (See Davies (2003) for a comprehensive review of the literature on international tax treaties.) For formal theoretical treatment of tariffs as a second best instrument for expropriating foreign investors' returns, see also Blanchard (2005).

[29] Alternative justifications for multilateral institutions, for instance as a commitment device for time-inconsistent governments (i.e. Maggi and Rodriguez-Clare (1998), Ornelas (2005), or Maggi and Rodriguez-Clare (2007)), are set aside in this paper. Evaluating whether international investment can substitute for multilateral agreements as a time-consistent commitment mechanism calls for a dynamic framework, and so remains a topic for future work.

Bagwell and Staiger (1999) (2002) construct a theoretical framework to formalize this insight, and in so doing articulate a comprehensive economic interpretation the role of the GATT/WTO and its rules. A key innovation of their work is the observation that virtually any government policy objectives may be characterized as function of the local price and the equilibrium terms of trade. Thus, they show that in a two country model, government objectives may be written:

$$W \equiv W(p, \tilde{p}^w), \tag{3.1}$$

$$W^* \equiv W^*(p^*, \tilde{p}^w). \tag{3.2}$$

Bagwell and Staiger argue that representing government preferences in this way admits a ready interpretation of the GATT/WTO while maintaining great latitude governments' redistributional concerns or ideological preferences.[30] They impose a single restriction on the objective functions: that holding the local price fixed, government welfare increases with the country's terms of trade (i.e. $W_{\tilde{p}^w} < 0$ and $W^*_{\tilde{p}^w} > 0$ where Home exports the numeraire good), so that regardless of domestic political objectives, any country sufficiently large to manipulate the world price has an incentive to do so.

Noting that the Home and Foreign governments' unilaterally optimal tariffs, τ^o and τ^{*o}, satisfy the respective first order conditions:

$$\frac{dW}{d\tau} = W_p + \lambda W_{\tilde{p}^w} = 0 \tag{3.3}$$

$$\frac{dW^*}{d\tau^*} = W^*_{p^*} + \lambda^* W^*_{\tilde{p}^w} = 0. \tag{3.4}$$

where $\lambda \equiv \frac{\frac{\partial p^w}{\partial \tau}}{\frac{dp}{d\tau}} < 0$ and $\lambda^* \equiv \frac{\frac{\partial p^w}{\partial \tau^*}}{\frac{dp^*}{d\tau^*}} < 0$ by (2.6)-(2.7), then since $\lambda < 0$, it must be true that at the unilaterally optimal tariff $W_p < 0$. That is, the Home government's unilaterally optimal tariff is higher than it would be in the absence of terms of trade concerns. (Given the symmetry of the problem, the same is true for the foreign counterpart.) From these first order conditions, Bagwell and Staiger make three observations concerning the efficiency of countries' unilaterally optimal (Nash) tariffs.[31] They prove that (i) Nash equilibrium

[30] Since it imposes no restrictions on government preferences over the local price (holding the terms of trade fixed), this politically augmented terms of trade framework admits a broad class of political economy models in addition to the traditional case of national income maximizing governments. See Bagwell and Staiger (1999) or (2002) for further discussion.

[31] See Bagwell and Staiger (2002) pp. 23-25, or Propositions 1-3 in Bagwell and Staiger (1999).

tariffs are inefficient, (*ii*) Pareto improving trade negotiations must imply mutual tariff liberalization (Nash equilibrium tariffs are higher than is efficient), and (*iii*) the terms of trade externality is the only source of international inefficiency (politically optimal tariffs are efficient[32]).

Together, (*i*) and (*ii*) imply that value of a trade agreement lies in governments' ability to achieve mutual welfare gains via reciprocal trade liberalization. That is, holding the world price fixed, each country can improve its welfare from at least a marginal reduction in its tariff. The third observation implies that eliminating terms of trade externalities among large countries (either by making big countries "act small" by simply ignoring the outside effects of their tariff decisions or via synchronized tariff reductions in accordance with the GATT/WTO principle of reciprocity *defined as the symmetric exchange of market access*) is sufficient to ensure efficiency.

Yet these observations depend crucially on the nature of pecuniary externalities, while the findings from the first part of this paper suggest that the pattern of international ownership can restructure dramatically the relationships between prices and welfare. International equity integration may mitigate (or even reverse) terms of trade externalities, while simultaneously introducing internal and compositional cost-shifting externalities through which governments can extract rents from foreign investors by manipulating domestic prices. The next paragraphs identify the internal, compositional, and external effects of international ownership within the Bagwell-Staiger framework to formalize how international investment recharacterizes potential price externalities between trading partners, demonstrating the applicability of the observations from Section 2 to a broad class of political economy models.

Returning to the bilateral model from the previous section, relax only the assumption that governments are national income maximizers; leave everything else unchanged. It is pedagogically useful to define the government objective functions in two stages. Though somewhat unorthodox, this two-step technique introduces an intermediate welfare function that proves notationally useful in disentangling the welfare effects of price changes. In step one, define government welfare as a function of tariffs and the world price, absent the market clearing condition. Then in step two, impose market clearing, $p^w = \tilde{p}^w(\tau, \tau^*)$, to

[32]Politically optimal tariffs τ^{PO} and τ^{*PO} are defined implicitly by $W_p = 0$ and $W_{p^*}^* = 0$ respectively.

define the "equilibrium" government objective functions that parallel Bagwell and Staiger's (3.1) - (3.2).[33] That is, first let

$$w(p, p^w, p^*) \equiv w(p(\tau, p^w), p^w, p^*(\tau^*, p^w)), \tag{3.5}$$

and

$$w^*(p, p^w, p^*) \equiv w^*(p^*(\tau^*, p^w), p^w, p(\tau, p^w)), \tag{3.6}$$

represent Home and Foreign welfare respectively, where p^w is unrestricted, but arbitrage conditions maintain that $p = \tau p^w$ and $\tau^* p^* = p^w$. (Note that if Home and Foreign were small countries, the preceding expressions would also represent the governments' (equilibrium) objective functions for any given (exogenous) world price.) Since Home and Foreign are large countries, the equilibrium welfare functions – the governments' objective functions – must incorporate that each government's tariff choice affects the world price. Thus, the equilibrium government objective functions are given by:

$$W(p, \tilde{p}^w) \equiv w(p, p^w, p^*)\Big|_{p^w = \tilde{p}^w(\tau, \tau^*)} \tag{3.7}$$

and

$$W^*(p^*, \tilde{p}^w) \equiv w^*(p^*, p^w, p)\Big|_{p^w = \tilde{p}^w(\tau, \tau^*)}. \tag{3.8}$$

Notice that imposing the market clearing constraint reduces the number of arguments in the objective functions in (3.7)-(3.8). This is because the market clearing and balanced budget conditions in (2.3)-(2.5), together with the arbitrage conditions, imply that fixing any two of the five variables $p, \tilde{p}^w, p^*, \tau$, and τ^* determines the equilibrium values of the remaining three when both countries are large.[34] For example, choosing any (τ, τ^*) pair determines equilibrium prices according to $\tilde{p}^w(\tau, \tau^*), p(\tau, \tilde{p}^w(\tau, \tau^*))$, and $p^*(\tau^*, \tilde{p}^w(\tau, \tau^*))$. Likewise, any $(p, \tilde{p}^w)$ pair uniquely determines the equilibrium values of τ, τ^*, and p^*. Figure 1 illustrates, where the three depicted iso-price loci $pp, p^w p^w$, and $p^* p^*$ represent respectively the set of tariff pairs that deliver a given Home, world, and Foreign price level.

[33] Note that this is the same technique used in Section 2.2, in which the government maximizes indirect utility $v(p(\tau, p^w), I(p(\tau, p^w), p^w, p^*(\tau^*, p^w)))$ subject to the constraint the market clearing constraint, $p^w = \tilde{p}^w(\tau, \tau^*)$.

[34] A possible exception is that a (p, p^*) pair may not determine the other variables uniquely. Under some (quite specialized) model conditions, the iso-p and iso-p^* loci in Figure 1 may coincide such that a given (p, p^*) combination may support a locus of Home-Foreign tariff pairs.

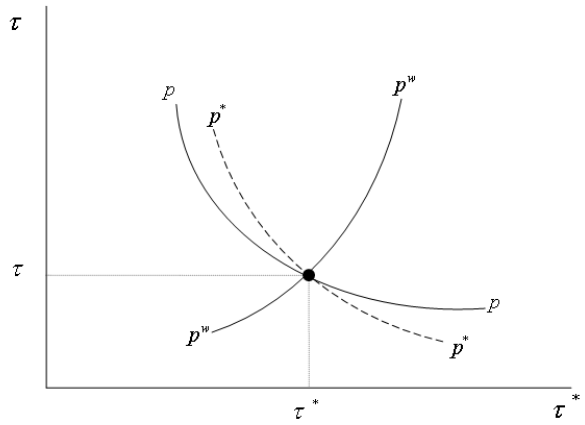

Figure 1: The Bagwell-Staiger Representation of Tariff-Price Relationship.

Bagwell and Staiger (1999) exploit these equilibrium price relationships to establish that any government welfare function that may be written as a function of τ and τ^* may be recharacterized as a function of equilibrium local and world prices. It is clear that the Home and Foreign government objectives still may be written this way in the presence of international cross-ownership. *The influence of international integration lies not in how the government objective functions are written, but in the structure that reasonably may be imposed on them.*

Since any pair of the five tariff/price variables pins down the remaining three in equilibrium, it must be true that any pair of Home and world prices pins down the Foreign local price according to the market clearing and balanced budget conditions according to $p^* \equiv p^*(p, \tilde{p}^w)$.[35] Hence, a change in τ would cause the foreign price to change according to $\frac{dp^*}{d\tau} = \frac{\partial p^*(p,\tilde{p}^w)}{\partial \tilde{p}^w}\frac{\partial \tilde{p}^w}{\partial \tau} + \frac{\partial p^*(p,\tilde{p}^w)}{\partial p}\frac{dp}{d\tau} = \frac{1}{\tau^*}\frac{\partial \tilde{p}^w}{\partial \tau}$. Figure 2 illustrates: increasing τ while holding p fixed implies changes in both the world price (from $p^w p^w$ to $p^w p^{w\prime}$) and the foreign local price (from $p^* p^*$ to $p^* p^{*\prime}$). Similarly, the change in τ holding $\tilde{p}^w$ fixed implies movements in both the Home and Foreign prices (from pp to pp' and from $p^* p^{*\prime}$ to $p^* p^{*\prime\prime}$, respectively).

[35] By the same argument, any pair of Foreign and world prices determines the equilibrium Home price according to $p \equiv (p^*, \tilde{p}^w)$.

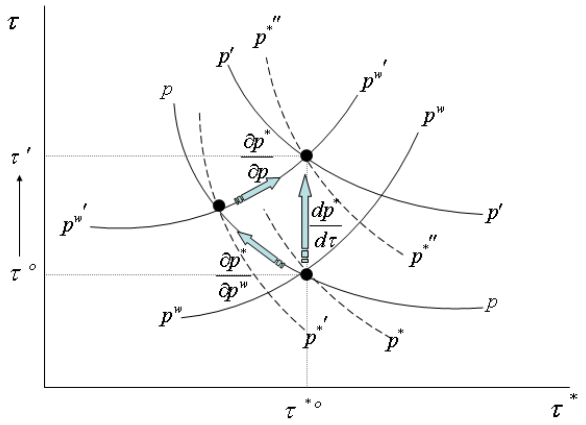

Figure 2: Price Effects of a Tariff Change.

While these changes in the foreign price are of peripheral interest in the Bagwell-Staiger framework, they are of central concern in an environment with international ownership. When a country's constituents hold claims on overseas production, national welfare is affected not only by changes in the domestic and world prices, but also by changes in the foreign local price. Decomposing the welfare impact of a tariff change into the three implied price effects clarifies.

$$\frac{dW}{d\tau} = \underbrace{\left(\frac{\partial w}{\partial p} + \frac{\partial w}{\partial p^*}\frac{\partial p^*(p,p^w)}{\partial p}\right)}_{W_p}\frac{dp}{d\tau} + \underbrace{\left(\frac{\partial w}{\partial \tilde{p}^w} + \frac{\partial w}{\partial p^*}\frac{\partial p^*(p,p^w)}{\partial p^w}\right)}_{W_{\tilde{p}^w}}\frac{\partial \tilde{p}^w}{\partial \tau} \tag{3.9}$$

$$\frac{dW^*}{d\tau^*} = \underbrace{\left(\frac{\partial w^*}{\partial p^*} + \frac{\partial w^*}{\partial p}\frac{\partial p(p^*,\tilde{p}^w)}{\partial p^*}\right)}_{W^*_{p^*}}\frac{dp^*}{d\tau^*} + \underbrace{\left(\frac{\partial w^*}{\partial p^w} + \frac{\partial w^*}{\partial p}\frac{\partial p(p^*,\tilde{p}^w)}{\partial p^w}\right)}_{W^*_{\tilde{p}^w}}\frac{\partial \tilde{p}^w}{\partial \tau^*} \tag{3.10}$$

In the absence of international ownership, there is no reason for a government to care about its trading partner's tariff or local price level apart from its effect on the world price, so that $\frac{\partial w}{\partial p^*}\Big|_{\phi,\phi^*=0} = \frac{\partial w^*}{\partial p}\Big|_{\phi,\phi^*=0} = 0$. Thus, the assumption that holding the local price fixed, both governments benefit from an increase in the terms of trade (i.e. $W_{\tilde{p}^w} < 0$ and $W^*_{\tilde{p}^w} > 0$) constitutes an innocuous (and indeed, the appropriate) assumption for the class of models that Bagwell and Staiger consider. But when countries hold claims on overseas production

it is clear that $W_{\tilde{p}^w}$ and $W^*_{\tilde{p}^w}$ may be positive, negative, or zero depending on the pattern of international equity holdings, since changes in the world price (holding the domestic price fixed) affect each country through both the standard terms of trade mechanism and the effect on the returns to foreign investment.

Returning to Bagwell and Staiger's first two observations, it is apparent that if the pattern of international ownership is such that $W_{\tilde{p}^w} = W^*_{\tilde{p}^w} = 0$, international integration releases the two countries from the terms of trade driven prisoners' dilemma, so that Nash equilibrium tariffs will be efficient (proof in Appendix 5.3). More generally, to the extent that international integration induces tariff liberalization by reducing the absolute value of $W_{\tilde{p}^w}$ and $W^*_{\tilde{p}^w}$, it can serve as a partial substitute for negotiated tariff reductions. Finally, if the pattern of international investment is such that $W_{\tilde{p}^w} > 0$ and $W^*_{\tilde{p}^w} < 0$, Nash equilibrium tariffs will be inefficiently low, so that the Pareto improving tariff negotiations would allow countries to cooperatively *raise* their tariffs.

International integration also implies, contrary to observation (*iii*), that terms of trade externalities are no longer the sole source of international inefficiency in governments' unilateral tariff choices in the presence of foreign investment. To see this, note that a marginal change in the Home (Foreign) tariff imposes an externality if $W^*_\tau(\tau, \tau^*) \neq 0$ ($W_{\tau^*}(\tau, \tau^*) \neq 0$), where:

$$\frac{dW}{d\tau^*} = \frac{\partial w}{\partial p^*}\frac{dp^*}{d\tau^*} + \left(\frac{\partial w}{\partial p}\tau + \frac{\partial w}{\partial p^w}\right)\frac{\partial \tilde{p}^w}{\partial \tau^*} \tag{3.11}$$

$$\frac{dW^*}{d\tau} = \frac{\partial w^*}{\partial p}\frac{dp}{d\tau} + \left(\frac{\partial w^*}{\partial p^*}\frac{1}{\tau^*} + \frac{\partial w^*}{\partial p^w}\right)\frac{\partial \tilde{p}^w}{\partial \tau}. \tag{3.12}$$

In the absence of international cross-ownership, the only effect of a change in τ (τ^*) on Foreign (Home) welfare is through the world price. With international cross-ownership, however, the local government can extract rents from foreign investors by manipulating the *domestic* price since international investors' returns are subject to local prices; i.e. $\frac{\partial w^*}{\partial p}, \frac{\partial w}{\partial p^*} \neq 0$. This internal (and potentially compositional) cost shifting opportunity adds a second source of international inefficiency to countries' unilateral tariff decisions. Thus, simply making large governments "act small" by ignoring all external price effects of tariff changes[36] cannot ensure efficient tariffs in the presence of international investment.

[36] In the Bagwell-Staiger framework, a government is said to "act small" if it makes its optimal tariff decision under the assumption that $\frac{\partial \tilde{p}^w(\tau,\tau^*)}{\partial \tau} = 0$. Here, "acting small" is taken to mean that neither the

Notice also that the internal and compositional cost shifting externalities are not unique to large countries. This contrasts the predominant (theoretical) view that small countries' unilaterally optimal tariffs are internationally efficient so that they need not be a party to multilateral trade negotiations. In a world with international ownership, a country that is too small in goods markets to influence the world price is nonetheless capable of imposing price-driven externalities on trading partners that have a stake in the local economy (e.g. through foreign direct investment) and should, as a result, have a seat at the multilateral negotiating table.

Notably, the basic principle of reciprocity – that both countries can gain from mutual tariff changes that hold the world price fixed – still serves as a guide towards efficiency in an environment with international investment. Starting from inefficiently high (low) Nash tariffs, a small mutual tariff reduction (increase) that leaves the world price unchanged provides a Pareto improvement.[37] Moreover, if Home and Foreign are symmetric, reciprocal tariff changes will lead them all the way to the efficient politically optimal tariffs which balance countries' internal and external interests.

At the same time, however, the formal definition of a reciprocal tariff change must be modified in an environment with international investment. In the Bagwell-Staiger framework, a reciprocal tariff change holds the world price fixed if it implies that the change of each country's import volume equals the value of the change in its export volume. But with international investment, a mutual tariff change will leave the world price unchanged only if the implied shift in each country's import volume is equal to the value of the change in its export volume *prorated by any effect of the reciprocal tariff change on net remittances.*[38] Intuitively, this modification is required to avoid potential income effects that would otherwise follow mutual tariff changes via international remittances.

When the GATT was first written in the middle of last century, the degree of inter-

world price, *nor* the foreign local price is affected by the government's tariff choice. That is, here the Home government would act small by choosing it's tariff so that $\frac{\partial w}{\partial p} = 0$, which is not efficient for a large country with holdings overseas. (Recall that $W_p = \frac{\partial w}{\partial p} + \frac{\partial w}{\partial p^*}\frac{\partial p^*}{\partial p} = 0$ is efficient.)

[37]Inefficiently high tariffs are characterized by $W_{\tilde{p}^w} < 0, W^*_{\tilde{p}^w} > 0$, which by (3.9)-(3.10) implies that at Nash equilibrium, $W_p < 0$ and $W^*_{p^*} > 0$. Thus, a small reduction in τ and τ^* that holds $\tilde{p}^w$ fixed raises both W and W^*. A parallel argument establishes that a small increase in τ and τ^* (which holds $\tilde{p}^w$ fixed) from inefficiently low Nash tariffs is also Pareto improving.

[38]The technical elements of this discussion are reserved for the appendix.

national integration was much less, so that defining reciprocity as the exchange of simple market access may indeed have been indeed the best rule for ensuring the efficient tariff reductions, as demonstrated so convincingly by Bagwell and Staiger (1999). Now and increasingly, however, complicated patterns of international ownership, investment, and multinational firm activity call for a more sophisticated approach to reciprocal tariff adjustments, one that recognizes the divergence between the pattern of physical trade flows and countries' national economic interests. In practice, reconciling the notion of ownership-based market access with current accounting practices calls for developing new measures of countries' terms of trade and trade balances based on ownership, rather than physical trade flows, to ensure the Pareto efficiency of reciprocal concessions.

4 Closing Remarks

This paper identifies the trade liberalizing potential of international equity integration: an ownership interest in a trading partner's export sector may counter a (large) country's terms of trade incentive to manipulate world prices, while foreign ownership in a (small or large) country's local import-competing sector can erode the local government's willingness to maintain tariffs at the expense of its consumer-constituents. Indeed, a sufficiently integrated pattern of international cross-ownership may lead governments to reduce trade barriers to (or even below) globally efficient levels unilaterally.

So does investment globalization make the WTO obsolete? Clearly not. Though the model presented here paper identifies the theoretical possibility that a particular pattern of international ownership could induce globally efficient tariffs and thus exactly supplant the WTO, this razor's edge outcome seems exceedingly unlikely in practice. Rather, this paper suggests careful reevaluation of the prevailing economic interpretation of the WTO in light of substantial (and increasing) international investment flows and the concomitant changes in the pattern of global ownership; while overseas ownership may decrease (or even eliminate) the terms of trade driven impetus for negotiated tariff reductions, the potential for internal and compositional cost shifting by local governments may further complicate the rules and structure that should guide Pareto improving tariff negotiations. Perhaps most conspicuously, cross-border ownership introduces a strong rationale for the inclusion of small countries at the negotiating table and calls for a more careful interpretation of

reciprocal market access concessions.

Finally, to the extent that international investment is unevenly distributed across sectors or trading partners, the tariff liberalizing potential of cross-border ownership will be limited to those sectors and country pairs with substantial foreign equity holdings. One might therefore expect tariffs to remain inefficiently high (and trade negotiations particularly contentious) between countries with little bilateral investment, and for industries that are predominantly nationally owned– notably agriculture or basic textiles. This leads to the important empirical question of how (if at all) the pattern of international ownership influences governments' trade policy incentives and negotiating positions in practice. Whether and to what extent bilateral investment positions, multinational firm activity, and the distribution of foreign equity across industries and countries can be used to predict negotiated trade policies seems the most important avenue for future research.

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5 Appendices

5.1 Derivation of the Foreign Optimal Tariff

The Foreign government chooses its optimal tariff to solve:

$$\tau^{*o} = \arg\max_{\tau^*} \quad v(p^*, I^*(p, p^w, p^*)), \tag{5.1}$$

$$\text{s.t.} \qquad p^w = \tilde{p}^w(\tau, \tau^*). \tag{5.2}$$

where Foreign income, $I^*(p, p^w, p^*)$, is defined implicitly by (2.2).

The first order condition is analogous to that for the Home country in (2.10):

$$V^*_{\tau^*} = v^*_I \Bigg[\underbrace{t^* \frac{1}{p^w} \frac{dE_y}{d\tau^*} - E_y \frac{\partial \frac{1}{\tilde{p}^w}}{\partial \tau^*}}_{\textit{terms of trade effect}} + \underbrace{\overset{(-)}{-\phi^* q^*_y \frac{d\frac{1}{p^*}}{d\tau^*}}}_{\textit{internal effect}} + \underbrace{\overset{(-)}{\phi q_y \frac{\partial \frac{1}{\tilde{p}^w}}{\partial \tau^*}}}_{\textit{external effect}} \Bigg] = 0. \tag{5.3}$$

Solving yields the implicit form of the Foreign optimal tariff expression:

$$\tau^{*o} = 1 + \frac{1}{\hat{\epsilon}_y} \left[1 - \frac{\phi q_y}{E_y} + \frac{\phi^* q^*_y}{E_y} \frac{1}{\lambda^*} \right], \tag{5.4}$$

where $\lambda^* \equiv \frac{\frac{\partial \frac{1}{p^w}}{\partial \tau^*}}{\frac{d\frac{1}{p^*}}{d\tau^*}} < 0$ by (2.7) and $\hat{\epsilon}_y \equiv \epsilon_y + \frac{\partial E_y(p,I)}{\partial I} \frac{\partial I(p,p^w,p^*)}{\partial p^*} \frac{1}{p^w} \frac{1}{E_y} \frac{1}{\lambda^*}$, where $\epsilon_y \equiv \frac{dE_y}{d\frac{1}{p^w}} \frac{1}{p^w} \frac{1}{E_y}$ is Home's elasticity of export supply.

5.2 Efficient Tariffs

The set of efficient tariff pairs is defined implicitly by the following tangency condition:

$$\left. \frac{d\tau}{d\tau^*} \right|_{dV=0} = \left. \frac{d\tau}{d\tau^*} \right|_{dV^*=0}. \tag{5.5}$$

From the definition of Home and Foreign indirect utility levels, $V \equiv V(\tau, \tau^*)$ and $V^* \equiv V^*(\tau, \tau^*)$, this may be rewritten:

$$\frac{V_{\tau^*}}{V_\tau} = \frac{V^*_{\tau^*}}{V^*_\tau}. \tag{5.6}$$

Expanding yields:[39]

$$\frac{(tp^w \frac{dE^*_x}{d\tau^*} - E^*_x \frac{\partial p^w}{\partial \tau^*} + \frac{d\Phi}{d\tau^*})}{(tp^w \frac{dE^*_x}{d\tau} - E^*_x \frac{\partial p^w}{\partial \tau} + \frac{d\Phi}{d\tau})} = \frac{(t^* p^* \frac{dE^*_x}{d\tau^*} - E^*_x \frac{\partial p^w}{\partial \tau^*} - \frac{d\Phi}{d\tau^*})}{(t^* p^* \frac{dE^*_x}{d\tau} - E^*_x \frac{\partial p^w}{\partial \tau} - \frac{d\Phi}{d\tau})}, \tag{5.7}$$

where,

$$\Phi \equiv \tau^* \phi^* (p^* q^*_x + q^*_y) - \phi(p q_x + q_y). \tag{5.8}$$

[39] To facilitate algebraic manipulation, it is useful to rewrite the Foreign income expression in (2.2) in units of y measured at the Foreign local price, using the Foreign balanced budget condition in (2.4): $I^{*\prime} = p^* q^*_x + q^*_y - \Phi + t^* p^* E^*_x$. It is then straightforward to confirm that this yields the expressions for $V^*_{\tau^*}$ and V^*_τ in (5.7).

Cross multiplying and combining terms reveals that the set of Pareto efficient (τ, τ^*) pairs with cross-ownership is the familiar Mayer (1981) locus:

$$tp^w = -t^* p^* \Leftrightarrow p = p^* \Leftrightarrow \tau = \frac{1}{\tau^*}. \tag{5.9}$$

This is just as common sense would suggest, since the exchange of property rights should not affect the efficient allocation of resources given identical homothetic preferences.

5.3 Politically Optimal Tariffs are Efficient

This appendix proves that politically optimal tariffs (τ^{PO}, τ^{*PO}) (defined as the tariff pair satisfying $W_p = 0$ and $W^*_{p^*} = 0$) are efficient. (Note that this also implies that Nash equilibrium tariffs are efficient if $W_{\tilde{p}^w} = W^*_{\tilde{p}^w} = 0$, since if $W_{\tilde{p}^w} = W^*_{\tilde{p}^w} = 0$ Nash equilibrium tariffs are politically optimal.)

The following tangency condition defines implicitly the set of efficient tariffs:

$$\left.\frac{d\tau}{d\tau^*}\right|_{dW=0} = \left.\frac{d\tau}{d\tau^*}\right|_{dW^*=0}. \tag{5.10}$$

Or,

$$\frac{W_{\tau^*}}{W_\tau} = \frac{W^*_{\tau^*}}{W^*_\tau}. \tag{5.11}$$

The derivatives of the objective functions may be written:

$$W_\tau = \underbrace{\left(\frac{\partial w}{\partial p} + \frac{\partial w}{\partial p^*}\frac{\partial p^*(p,\tilde{p}^w)}{\partial p}\right)}_{W_p}\frac{dp}{d\tau} + \underbrace{\left(\frac{\partial w}{\partial p^w} + \frac{\partial w}{\partial p^*}\frac{\partial p^*(p,\tilde{p}^w)}{\partial p^w}\right)}_{W_{\tilde{p}^w}}\frac{\partial \tilde{p}^w}{\partial \tau} \tag{5.12}$$

$$W^*_{\tau^*} = \underbrace{\left(\frac{\partial w^*}{\partial p^*} + \frac{\partial w^*}{\partial p}\frac{\partial p(p^*,\tilde{p}^w)}{\partial p^*}\right)}_{W^*_{p^*}}\frac{dp^*}{d\tau^*} + \underbrace{\left(\frac{\partial w^*}{\partial p^w} + \frac{\partial w^*}{\partial p}\frac{\partial p(p^*,\tilde{p}^w)}{\partial p^w}\right)}_{W^*_{\tilde{p}^w}}\frac{\partial \tilde{p}^w}{\partial \tau^*} \tag{5.13}$$

$$W_{\tau^*} = \underbrace{\left(\frac{\partial w}{\partial p} + \frac{\partial w}{\partial p^*}\frac{\partial p^*(p,\tilde{p}^w)}{\partial p}\right)}_{W_p}\frac{dp}{d\tau^*} + \underbrace{\left(\frac{\partial w}{\partial p^w} + \frac{\partial w}{\partial p^*}\frac{\partial p^*(p,\tilde{p}^w)}{\partial p^w}\right)}_{W_{\tilde{p}^w}}\frac{\partial \tilde{p}^w}{\partial \tau^*} \tag{5.14}$$

$$W^*_\tau = \underbrace{\left(\frac{\partial w^*}{\partial p^*} + \frac{\partial w^*}{\partial p}\frac{\partial p(p^*,\tilde{p}^w)}{\partial p^*}\right)}_{W^*_{p^*}}\frac{dp^*}{d\tau} + \underbrace{\left(\frac{\partial w^*}{\partial p^w} + \frac{\partial w^*}{\partial p}\frac{\partial p(p^*,\tilde{p}^w)}{\partial p^w}\right)}_{W^*_{\tilde{p}^w}}\frac{\partial \tilde{p}^w}{\partial \tau} \tag{5.15}$$

At (τ^{PO}, τ^{*PO}), $W_p = 0$ and $W^*_{p^*} = 0$ so that:

$$W_\tau = W_{\tilde{p}^w}\frac{\partial \tilde{p}^w}{\partial \tau} \tag{5.16}$$

$$W^*_{\tau^*} = W^*_{\tilde{p}^w}\frac{\partial \tilde{p}^w}{\partial \tau^*} \tag{5.17}$$

$$W_{\tau^*} = W_{\tilde{p}^w}\frac{\partial \tilde{p}^w}{\partial \tau^*} \tag{5.18}$$

$$W^*_\tau = W^*_{\tilde{p}^w}\frac{\partial \tilde{p}^w}{\partial \tau} \tag{5.19}$$

Substituting (5.16)-(5.19) into (5.11) completes the proof. $\diamond$

5.4 Reciprocity

Bagwell and Staiger (1999) (2002) develop the following formal definition of the principle of reciprocity:

Definition 5.1 *A set of tariff changes* $\Delta\tau = (\tau^1 - \tau^0)$ *and* $\Delta\tau^* = (\tau^{*1} - \tau^{*0})$ *conforms to the* **principle of reciprocity** *if the resulting change in the volume of each country's imports is equal to the value of the change in the volume of its exports;*[40] *i.e.*

$$p^{w0}(M_x^1 - M_x^0) = E_y^1 - E_y^0, \tag{5.20}$$

where $p^{wi} = p^w(\tau^i, \tau^{*i}), M_x^i = M_x(p^i(\tau^i, p^{wi}), p^{wi})$ *and* $E_y^i = E_y(p^i(\tau^i, p^{wi}), p^{wi})$ *for* $i \in \{0, 1\}$.

From Home's balanced budget condition in (2.3): $p^{w0}M_x^0 = E_y^0 + \Phi^0$ and $p^{w1}M_x^1 = E_y^1 + \Phi^1$. Substituting into (5.20) and rearranging yields:

$$(p^{w1} - p^{w0})M_x^1 = \Phi^1 - \Phi^0 \text{ or,} \tag{5.21}$$

$$\Delta p^w M_x^1 = \Delta\Phi, \tag{5.22}$$

which implies that a reciprocal tariff change (one that offers equal market access concessions in each country, as defined above) leaves the world price unchanged if and only if it also leaves net remittances unchanged. Recall that the Bagwell-Staiger framework assumes balanced trade, so that $\Phi^0, \Phi^1 \equiv 0 \rightarrow \Delta\Phi = 0$, which implies that any reciprocal tariff change must leave the world price unchanged. But here net remittances depend on the world price (recall that $\Phi \equiv \phi^*(p^w q_x^* + \tau^* q_y^*) - \phi(\tau p^w q_x + q_y)$), so that $\Delta\Phi$ depends on Δp^w. It is therefore no longer obvious that a reciprocal tariff change will leave the world price fixed. And indeed, as demonstrated below, this will hold only under very special (and apparently arbitrary) conditions.

Starting from any inefficient tariff pair (for which $p \neq p^*$), a reciprocal tariff change will affect the world price only if it causes one country's budget set to increase more than the other's, since preferences are identical and homothetic. The national budget sets for Home and Foreign may be written respectively:

$$B \equiv p^w q_x + q_y + \Phi \tag{5.23}$$

$$B^* \equiv p^w q_x^* + q_y^* - \Phi. \tag{5.24}$$

Thus, starting from any inefficient tariff pair a reciprocal tariff change will leave p^w fixed if and only if $\Delta B - \Delta B^*\big|_{\Delta p^w = 0} = 0$, where:

$$\Delta B \equiv p^w \Delta q_x + \Delta q_y + \Delta\Phi \tag{5.25}$$

$$\Delta B^* \equiv p^w \Delta q_x^* + \Delta q_y^* - \Delta\Phi. \tag{5.26}$$

If $\Delta\Phi\big|_{\Delta p^w = 0} = 0$:

$$\Delta B - \Delta B^* = p^w \Delta q_x + \Delta q_y - p^w \Delta q_x^* + \Delta q_y^*, \tag{5.27}$$

which defines implicitly the relationship between $\Delta\tau$ and $\Delta\tau^*$ that would have to hold in order for $\Delta p^w = 0$. But since net remittances are endogenous, $\Delta\Phi\big|_{\Delta p^w = 0} = 0$ also defines implicitly the relationship between $\Delta\tau$ and $\Delta\tau^*$ that is required to leave net remittances unchanged given a fixed world price. In general there is no reason to expect the reciprocal tariff relationships implied by

[40] Note that (*i*) it does not matter whether imports are valued at p^{w0} or p^{w1}, and (*ii*) if (5.20) holds, the analogous condition holds for Foreign by market clearing.

$\Delta B - \Delta B^*\big|_{\Delta p^w=0} = 0$ and $\Delta\Phi\big|_{\Delta p^w=0} = 0$ to coincide. There is no reason to expect the current definition of reciprocity to fix the world price in the presence of international investment.

To see this more clearly, consider the effect of a marginal reciprocal tariff change on net remittances and the difference between the Home and Foreign budget sets, holding the world price fixed. It is quite clear that the implied reciprocal tariff relationship, $\frac{d\tau}{d\tau^*}\big|_{d\Phi,dp^w=0}$ will in general differ from $\frac{d\tau}{d\tau^*}\big|_{d(B-B^*),dp^w=0}$, since:

$$d\Phi\big|_{dp^w=0} = \phi^* q_y^* d\tau^* - \phi p^w q_x d\tau = 0 \tag{5.28}$$

$$d(B-B^*)\big|_{dp^w=0} = -t^* p^* \frac{dq_x^*}{dp^*}\frac{dp^*}{d\tau^*}d\tau^* - tp^w \frac{dq_x}{dp}\frac{dp}{d\tau}d\tau = 0. \tag{5.29}$$

A new definition of reciprocity is therefore needed to permit governments to change their tariffs reciprocally while holding the world price fixed. The following modified definition of reciprocity is designed to serve exactly such a role:

Definition 5.2 *A set of tariff changes $\Delta\tau = (\tau^1 - \tau^0)$ and $\Delta\tau^* = (\tau^{*1} - \tau^{*0})$ conforms to the* **modified principle of reciprocity** *if the resulting change in the volume of each country's imports is equal to the value of the change in the volume of its exports prorated by any induced change in net remittances; i.e.*

$$p^{w0}(M_x^1 - M_x^0) = (E_y^1 - E_y^0) + (\Phi^1 - \Phi^0). \tag{5.30}$$

It is clear that mutual changes in the Home and Foreign tariffs that conform to this modified principle of reciprocity leave the world price fixed, since together with Home's balanced budget condition, (5.30) requires:

$$\Delta p^w M_x^1 = 0 \Rightarrow \Delta p^w = 0. \tag{5.31}$$

Note that the pattern of international ownership is perfectly symmetric such that $\Delta\Phi\big|_{\Delta p^w=0} = 0$, the modified definition of reciprocity collapses to Definition 5.1. More generally, Definition (5.2) requires that any reciprocal tariff change that causes net Foreign to Home remittances to increase (decrease) by $\Delta\Phi$, must induce a change in the trade volume of x that is exactly $\Delta\Phi$ greater than (less than) the change in the trade volume of y.