

# Trade Imbalances, International Investment, and A Limitation of Lerner's Symmetry Theorem

Emily J. Blanchard\*

July 19, 2005

## Abstract

This paper sounds a caution to international trade economists, demonstrating that the equilibrium trade imbalances implied by most models of international investment disturb the symmetry between import tariffs and export taxes found by Lerner (1936). When trade is unbalanced, Lerner's equivalence result holds only when (i) trade tax revenue is redistributed among consumers, (ii) neither the import tariff nor the export tax would be prohibitive, and (iii) the value of trade imbalance at world prices is invariant to instrument choice. The last condition implies that Lerner symmetry generally will not obtain in many otherwise standard trade models with international investment, since remittances to foreign investors- a source of permanent trade imbalances- typically depend on both relative and absolute local prices, and thus on the government's choice of trade tax instrument. Endogenizing trade policy only exacerbates the asymmetry, since international investment influences government preferences over trade policy *instruments* as well as levels. Notably, Lerner symmetry can be resurrected by introducing a third policy tool in the form of a direct a tax on international investment returns. Future work therefore should either reinstate Lerner symmetry by adopting investment taxes, or at very the least, acknowledge the trade tax asymmetry inherent to models with international investment.

**JEL Codes:** F11, F15, F21

**Keywords:** Lerner Symmetry, Tariffs, Investment Tax, International Investment, FDI

---

\*Contact: Department of Economics, University of Virginia, P.O. Box 400182, Charlottesville, VA 22904-4182; ph. 434.924.3607; fax. 434.982.2904; blanchard@virginia.edu. I am very grateful to Robert Staiger and Chia-Hui Lu for constructive conversations and helpful comments about this paper. This research program is supported in part by the Bankard Fund for Political Economy.

# 1 Overview

Few results in international economics are as sacrosanct as Lerner's (1936) symmetry theorem, which establishes that for any non-prohibitive import tariff, there exists an equivalent export tax,<sup>1</sup> or in other words, that only relative goods prices matter for the real economy. Yet the proof of this theorem adopts a balanced trade condition— an assumption clearly at odds with international factor flows and cross-border firm ownership. When one country holds claims to a share of another country's production— for instance because of foreign direct investment or international portfolio diversification— it can run a permanent trade deficit according to its national balanced budget condition, while the investment-host country must similarly run a trade surplus to pay remittances to its foreign investors.

This paper demonstrates that three additional assumptions are required to maintain Lerner symmetry in the presence of permanent trade imbalances: (i) trade tax revenue must be redistributed to consumers or spent by the government in exactly the same way that consumers would have, (ii) neither the import tariff nor its equivalent ad-valorem equivalent export tax would be prohibitive, and (iii) the value of the trade imbalance at world prices is itself independent of the choice of instrument. Even when conditions (i)–(iii) deliver Lerner symmetry, real trade tax revenue may differ depending on the instrument used.

Conditions (i) and (ii) represent relatively minor restrictions on the class of models in which one can invoke the Lerner symmetry theorem. Condition (i) is necessary because import tariff revenues will differ from export tax revenues when trade is unbalanced, even if everything else in the economy (relative goods prices, production, and real income (measured at world prices)) is the same. As long as the government redistributes revenue back to consumers or spends the revenue exactly as consumers would have, however, this revenue difference will have no impact on the real economy and Lerner symmetry will hold. (This assumption is not required in either Lerner's or McKinnon's framework because real trade

---

<sup>1</sup>Formally, in any two-good general equilibrium model, for any non-prohibitive ad-valorem import tariff applied to the world price of the import good there exists an equivalent ad-valorem export tax applied to the local price of the export good that delivers the same equilibrium production and consumption levels, relative prices, and pattern of trade (McKinnon (1966) p.586).

tax revenue is the same for either instrument.)

Condition (ii) is perhaps the least restrictive of the three. It simply recognizes that in an environment with unbalanced trade, the assumption that trade taxes are non-prohibitive is an asymmetric requirement since the export tax equivalent to a given non-prohibitive import tariff may itself be prohibitive, and vice versa.

In contrast, the third condition constitutes a severe restriction, and implies that Lerner symmetry will not obtain in many standard models upon the introduction of international ownership. With international investment or cross-border capital flows, both relative goods prices and the absolute domestic price level<sup>2</sup> affect the real value of remittances paid by the investment-host country to its foreign investors, and thus the real economy. For example, when foreign owned factors of production are paid the local marginal revenue product (as in Bhagwati and Brecher (1980) or Neary and Ruane (1988), for example), the host-country's remittances to foreign owners are a function of both relative and absolute local prices;<sup>3</sup> the same is true if international ownership is interpreted as a claim on domestic revenue rather than factor returns. Since it is well known that a given non-prohibitive ad-valorem import tariff,  $t$ , delivers an absolute local price level that is a factor  $(1 + t)$  higher than the price level induced by the same ad-valorem export tax,<sup>4</sup> the real value of foreign remittances— and therefore real income— necessarily depends on the choice of instrument. Thus, if the return on international investment depends on local prices as typically would seem appropriate, Lerner symmetry cannot obtain.<sup>5</sup>

Though this result may surprise trade economists, a parallel finding has been long understood in international finance. A series of work extending back to Meade (1955) argues

---

<sup>2</sup>Hereafter, the *relative* price is taken to be the relative goods price (i.e. with goods  $x$  and  $y$ ,  $p \equiv \frac{p_x}{p_y}$ ), and the *absolute* price is defined as the domestic price relative to world price level for a good (i.e.  $\frac{p_x}{p^w}$  and  $\frac{p_y}{p^w}$ ).

<sup>3</sup>Recall that total factor returns are homogeneous of degree one in output prices.

<sup>4</sup>See McKinnon (1966) p. 592, or Dixit and Norman (1980) p. 240.

<sup>5</sup>A caveat: if the pattern of international investment is such that trade is balanced in equilibrium (for instance if two identical countries hold claims to an equal share of each other's output), Lerner symmetry will hold. But this observation is of limited value, since a national income maximizing government would nonetheless optimally elect to impose a strictly a positive export tax or *negative* import tariff (holding any large country terms of trade effects constant). This issue is addressed in Section 3.

that to maintain balance of payments equilibrium in a 2-good monetary economy, a  $t$  percent tariff can be replaced with a  $t$  percent export tax only if the latter is accompanied by a  $t$  percent depreciation of the currency. Yet this is precisely what condition (*iii*) implies; an investment host-country will owe the same real value of foreign remittances under an export tax as it would under the equivalent ad-valorem import tariff if and only if the ad-valorem export tax is accompanied by a commensurate increase in the local absolute price level. In their seminal text, Dixit and Norman (1980) point again to this link between absolute price level and trade taxes, showing that in a two-good model (with balanced trade), a government can substitute for an exchange rate devaluation by instead imposing an import tariff plus the equivalent export subsidy.<sup>6</sup>

The critical difference between the typical international macro framework and trade economists' more recent approach to modelling international investment, is that a country's lifetime trade balance assumed to be zero in the case of the former, but not in the latter. The monetary approach to the balance of payments allows intertemporal borrowing and saving (or currency hoarding, as in Anderson and Takayama (1983)) through temporary trade imbalances, but nonetheless assumes that a country's lifetime gross national product (GNP) must equal its lifetime gross domestic product (GDP). Thus, in long-run equilibrium, Lerner symmetry (for real variables) holds. For an elegant reconciliation of Lerner's symmetry theorem in an intertemporal model with temporary trade imbalances, see Razin and Svensson (1983).

Conversely, many papers in the trade literature allow a country's lifetime gross domestic product to differ from its lifetime gross national product, where the difference represents the value of international transfers or investment returns. There are a number of economically interesting and realistic scenarios that give rise to lifetime unbalanced trade under time consistent behavior. For instance, residents of one country may own *ex-ante* claims on another country's production due to historical circumstance such as colonialism, immigration, war, or redrawn national borders (i.e. exogenous shocks to the international pattern of ownership). Alternatively, foreign investors may earn excess returns due to imperfect

---

<sup>6</sup>See Chapter 8, pp.240-242.

competition or capital market frictions.<sup>7</sup>

Fortunately, relaxing the assumption of lifetime balanced trade does not necessarily require abandoning Lerner symmetry. Condition (*iii*) indicates that Lerner symmetry can be recovered by ensuring that real foreign remittances are invariant to local trade tax policies. Perhaps the most obvious means to achieve this is by indexing foreign investment returns to world prices, either directly, by exempting foreign investors from local trade tax policies, or indirectly, by introducing a tax on foreign remittances. The direct approach seems insufficiently realistic in the context of international investment and FDI to warrant further discussion here, but the second tactic is more intriguing.

It turns out that Lerner symmetry can be reinstated by introducing a tax on international remittances. The balance of payments approach to trade tax symmetry theorems set forth by Kaempfer and Tower (1982) establishes that a country can maintain symmetry by replacing a given ad-valorem tax on *all* balance of payments credits with the equivalent ad-valorem tax on *all* balance of payments debits. Thus, in the context of international investment, a  $t$  percent tax on the local price of a country's exports is equivalent to a  $t$  percent tariff on the world price of its imports *plus* a  $t$  percent tax on foreign investors' returns. Intuitively, pairing a tax on foreign remittances with a given ad-valorem import tariff allows the government to recapture the net industry gains to foreigners that arise under the tariff but would not be present under the same ad-valorem export tax. In practice, however, this would require governments to adjust trade policy in tandem with investment policy— which seems unlikely— and so begs the question of whether and to what extent the current international policy structure admits potential for expropriative arbitrage across trade and investment policies.

Before continuing, it should be noted that this paper is not the first to identify a limitation of Lerner symmetry. Ray (1975) demonstrates that Lerner symmetry may not hold in

---

<sup>7</sup>One may challenge the plausibility of permanent trade imbalances on the grounds that international investment may be viewed as “trade” (in capital, entrepreneurship, etc.), and therefore that no country would be willing to be a lifetime net lender. Yet as a practical matter, governments' radically different treatment of international trade and investment— both in policy and accounting methods— suggests that economic models should at the very least take care to distinguish the two.

the presence of imperfect competition in output or input markets.<sup>8</sup> Ray's finding reduces to the observation that if import tariffs and export taxes have asymmetric effects on the degree of monopoly distortion, factor prices need no longer be homogeneous of degree one in final goods prices, so that the allocation of resources may depend on instrument choice. Thus, this paper adds to Ray's cautionary advice to take care when comparing various forms of trade policy intervention.

The next section extends the Lerner symmetry theorem to the case of unbalanced trade, demonstrating first that Lerner symmetry holds under conditions (i) – (iii) outlined above, then arguing that if the trade imbalance is due to international investment, condition (iii) does not hold and Lerner symmetry cannot obtain. Section 3 briefly discusses the implications for optimal trade policy, and Section 4 states explicitly the conditions under which Lerner symmetry can be restored under both exogenous and endogenous policy frameworks. Section 5 concludes.

## 2 Trade Imbalances and Lerner Symmetry

For the convenience of readers familiar with earlier work, this section follows the notation and expositional strategy set forth by McKinnon (1966). Consider a small<sup>9</sup> Home country that produces and consumes two goods,  $x$  and  $y$ , and faces fixed world prices,  $p_x^w$  and  $p_y^w$ , measured in a single global currency. Denote the local prices  $p_x$  and  $p_y$ , and assume that Home's natural import good is  $x$ . Relative world and domestic goods prices are defined respectively  $p^w \equiv \frac{p_x^w}{p_y^w}$  and  $p \equiv \frac{p_x}{p_y}$ . Government revenue is collected through trade taxes only and is redistributed to a representative consumer with non-satiated preferences.

Production depends on the local relative price only and is given by  $q_i(p)$  for each good  $i \in \{x, y\}$ . Demand is a function of income measured in local prices ( $I$ ) and local prices, according to  $d_i(p_x, p_y, I)$  for each good  $i \in \{x, y\}$ . Home's nominal income measured in the

---

<sup>8</sup>For the extension of the result to monopsony power, see Ray (1983). For qualification of Ray's findings see Kaempfer and Tower (1982), and Eaton, Grossman, Kaempfer, and Tower (1983).

<sup>9</sup>The small country assumption can be abandoned, but doing so makes the analysis considerably more cumbersome while providing relatively little additional insight.

single world currency is defined implicitly by:

$$I = p_x q_x + p_y q_y + R - \Phi, \quad (2.1)$$

where  $R \equiv R(p_x, p_y, p_x^*, p_y^*, I)$  is trade tax revenue and  $\Phi$  represents the trade imbalance measured in the single global currency, which may be interpreted as a transfer from Home to the rest of the world. For the time being, assume that  $\Phi$  is fixed and exogenous.

Home is assumed to satisfy its balanced budget constraint:

$$p_x^w M_x = p_y^w E_y - \Phi, \quad (2.2)$$

where  $M_x \equiv d_x - q_x$  is Home's import volume of  $x$  and  $E_y \equiv q_y - d_y$  is its export volume of  $y$ . Assume that before and after any change in trade tax policy, the economy is able to reach a stable, unique equilibrium at which (2.2) is satisfied.

**Proposition 2.1** *Lerner symmetry with Unbalanced Trade. Compare 2 economies,  $T$  and  $S$ , each of which must remit a fixed transfer,  $\Phi^t$  ( $\Phi^s$ ) in economy  $T(S)$ , to the rest of the world. The  $T$  economy applies an ad-valorem tariff of rate  $t$  on imports as a percentage of their world price. The  $S$  economy leaves imports untaxed and unsubsidized, but imposes an ad-valorem export tax  $s$  on exports as a percentage of their domestic price. Economies  $T$  and  $S$  face the same world prices and are in all other ways identical. If  $s = t$  and neither the import tariff nor the export tax would be prohibitive, the allocation of resources and flow of trade across the two economies will be identical if and only if  $\Phi^t = \Phi^s$ . Or, interpreting this as a single economy,  $t$  and  $s$  constitute equivalent policies if and only if the trade imbalance is invariant to instrument choice.*

**Proof.** Equilibrium variables in economy  $T$  ( $S$ ) are superscripted  ${}^t({}^s)$ . Equilibrium values are denoted by a tilde.

- (1) Assuming that neither  $t$  nor  $s$  is prohibitive, the equilibrium prices in each economy are:

$$\begin{array}{cc} \underline{T \text{ Economy}} & \underline{S \text{ Economy}} \\ \tilde{p}_x^t = (1+t)p_x^w & \tilde{p}_x^s = p_x^w \\ \tilde{p}_y^t = p_y^w & \tilde{p}_y^s = \frac{p_y^w}{(1+s)} \end{array} \quad (2.3)$$

Notice that the relative prices in the two economies are identical when  $t = s$ , but that the  $T$  economy's absolute price level is  $(1 + t) = (1 + s)$  times that of the  $S$  economy.

- (2) Since production depends on the local relative price only, it must hold that in equilibrium when  $t = s$ :

$$\begin{aligned}\tilde{q}_x^t &= \tilde{q}_x^s \\ \tilde{q}_y^t &= \tilde{q}_y^s.\end{aligned}\tag{2.4}$$

- (3) The value of output measured at world prices is therefore the same for economies  $T$  and  $S$  when  $t = s$ :

$$Z \equiv p_x^w \tilde{q}_x^t + p_y^w \tilde{q}_y^t = p_x^w \tilde{q}_x^s + p_y^w \tilde{q}_y^s.\tag{2.5}$$

- (4) To determine whether demand is the same across the two economies when  $s = t$ , one must compare the price and income levels in  $T$  and  $S$ . Since demand is homogeneous of degree zero in prices and income, and the price level is factor  $(1 + t)$  higher in the  $T$  economy than in the  $S$  economy according to (2.3), the two economies will deliver the same level of demand if the nominal income level in  $T$  is  $(1 + t)$  times that of the  $S$  economy.

In economy  $T$ , import tariff revenue is  $R^t = tp_x^w M_x$ . Substituting into (2.1) and rearranging yields:

$$I^t = Z - \Phi^t + tp_x^w d_x^t.\tag{2.6}$$

The export tax revenue in  $S$  is  $R^s = sp_y E_y$ , which together with (2.1) and the balanced budget condition in (2.2) yields:<sup>10</sup>

$$(1 + s)I^s = Z - \Phi^s + sp_x^w d_x^s.\tag{2.7}$$

Notice that these income expressions are implicitly defined since they include demand, which depends on income. To establish that the  $T$  and  $S$  economies will deliver the

---

<sup>10</sup>The algebra for this one is somewhat trickier:  $I^s = p_x q_x + p_y q_y + sp_y E_y^s - \Phi^s \rightarrow (1 + s)I^s = (1 + s)p_x q_x + p_y q_y + s(p_y^w E_y^s) - (1 + s)\Phi^s = Z + sp_x^w q_x + s(p_x^w M_x^s + \Phi^s) - (1 + s)\Phi^s = Z - \Phi^s + sp_x^w d_x^s$ .

same level of demand in equilibrium, then, it is sufficient to establish that  $I^t = (1+t)I^s$  for any given level of demand.<sup>11</sup> Suppose then, that  $d_x^t = d_x^s$ , and use this to substitute (2.6) into (2.7). Rearranging yields:

$$I^t = (1+t)I^s - (\Phi^t - \Phi^s). \quad (2.8)$$

Thus, when  $d_x^t = d_x^s$ :

$$I^t = (1+t)I^s \iff \Phi^t = \Phi^s. \quad (2.9)$$

That is, the same level of demand delivers a nominal income level that is factor  $(1+t)$  higher in the  $T$  economy than in the  $S$  economy if and only if  $\Phi^t = \Phi^s$ . Thus, equilibrium demand in the  $T$  economy is equivalent to equilibrium demand in the  $S$  economy if and only if  $\Phi^t = \Phi^s$ .<sup>12</sup>

- (6) Together with (2.3) and (2.4), this establishes that equilibrium relative prices, real income, production, and consumption are equivalent across the two economies if and only if  $\Phi^t = \Phi^s$ . Since production and consumption levels uniquely determine the trade flows, this completes the proof.  $\diamond$

**Corollary 2.2** *If a country's permanent trade imbalance is due to international investment, and the real remittances paid to overseas investors depend on local prices, then Lerner symmetry does not obtain.*

The corollary follows directly from Proposition 2.1. Step (1) of the preceding proof establishes that the domestic price level (the ratio of local to world prices) would be a factor  $(1+t)$  higher under an ad-valorem import tariff of  $t$ , than it would be under the equivalent ad-valorem export tax. Thus, if the magnitude of the trade imbalance (measured at world prices) depends on the local price level,  $\Phi^s \neq \Phi^t$ , and Lerner symmetry cannot

---

<sup>11</sup>The assumption of non-satiated preferences ensures that this is also a necessary condition.

<sup>12</sup>If  $\Phi^t \neq \Phi^s$ , then for any  $d_x^t = d_x^s$ ,  $I^t \neq (1+t)I^s$  by (2.9), so that the equilibrium demand cannot coincide across the  $t$  and  $s$  economies. (If demand for  $x$  is strictly normal, this is obvious. If, however, demand for  $x$  is not strictly normal (for instance because preferences are quasi-linear), then the equilibrium demand for  $y$  would differ across economies.)

hold. So when the trade imbalance is caused by international investment and the returns to foreign investors depend on sales revenue, residual profits, or the local value marginal product of the investment as is typically assumed,  $\Phi$  depends on local prices and Lerner symmetry does not obtain.

Perhaps the easiest way to demonstrate the point is by graphical example. Suppose that foreign (world) investors hold an exogenous claim to a fixed share  $\phi \in [0, 1]$  of Home production in each sector.<sup>13</sup> Consider two cases. Let scenario A serve as a benchmark in which foreign owned production in the Home economy is sold at *world* prices. Here:

$$\Phi_A \equiv \phi(p_x^w q_x + p_y^w q_y). \quad (2.10)$$

It is clear that the value of Home's remittances to its foreign investors is independent of the absolute local price level in this scenario, and thus invariant to the government's choice of trade tax instrument. Since a given ad-valorem import tax,  $t$ , and its equivalent ad-valorem export subsidy,  $s = t$ , would both deliver the same local relative price, the production levels are independent of instrument choice ( $\tilde{q}_x^t = \tilde{q}_x^s$  and  $\tilde{q}_y^t = \tilde{q}_y^s$ ), so that  $\Phi_A^t = \Phi_A^s$ .

Figure 1 illustrates. The difference between the value of Home's production measured in units of good  $y$  at the world price ( $p^w q_x + q_y$ )– its GDP– and its national budget constraint ( $p^w q_x + q_y - \frac{\Phi_A}{p_y^w} = (1 - \phi)(p^w q_x + q_y)$ )– its GNP– are the same under the tariff or the equivalent export tax.

---

<sup>13</sup>The analysis with different shares of foreign ownership in each sector is analogous but notationally more cumbersome. The assumption that  $\phi \geq 0$  (the rest of the world may hold claims on Home production, but Home does not hold claims on production overseas), implies that trade is balanced only in the absence of international investment. More generally, trade may be balanced with international investment as long as each country's remittances to foreign investors equals the return from its investments abroad (i.e. net remittances are zero). Although Lerner symmetry holds in the presence of international investment when trade is balanced, it is important to recognize that this is a razor's edge case; a marginal change in the trade tax would lead to a trade imbalance, upsetting symmetry.

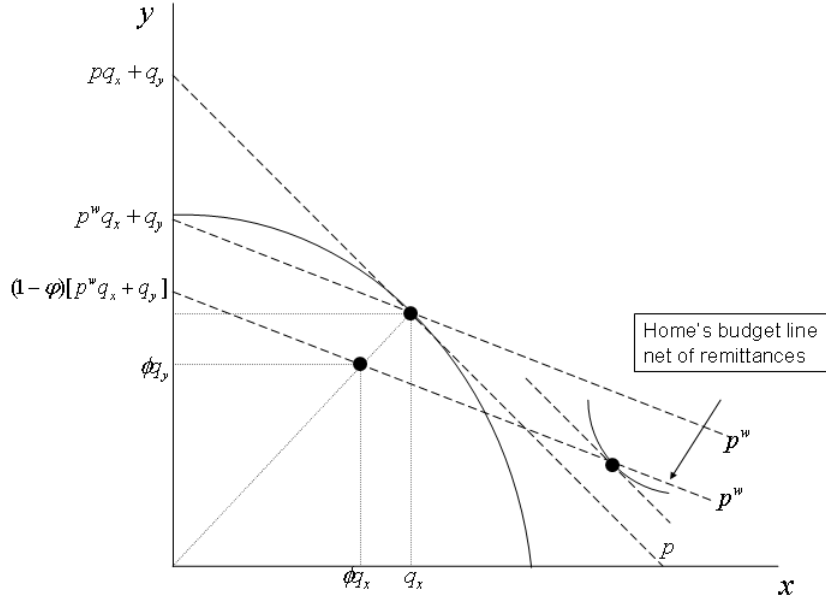


Figure 1: The Home Economy with a Fixed Money Transfer,  $\Phi_A \equiv \phi(p_x^w q_x + p_y^w q_y)$ .

Although Lerner symmetry holds in this scenario, the assumption that  $\Phi$  is independent of the local price level carries with it the unnatural implication that foreign owned production in the Home country is exempt from export taxation, and must pay the same import tariff levied on goods produced outside of the Home country (precluding tariff jumping FDI, among other things). Scenario A thus demonstrates that Lerner symmetry can be maintained by assuming that production is taxed based on ownership rather than location, but in the context of international trade policy this is tantamount to the unrealistic assumption that international investment is exempt from local trade policies.<sup>14</sup>

Scenario B adopts the more realistic assumption that foreign owned production in the Home economy is exempt from import tariffs and faces the same export taxes as Home owned production. The value of remittances from Home to its foreign investors is then

<sup>14</sup>Interestingly, it seems that NAFTA's Chapter 11 clauses protect foreign investors' returns from changes in local ordinances that would decrease investment returns. Foreign owned enterprises are still subject to pre-existing local laws, however, suggesting that the Chapter 11 legislation is designed more to dampen expropriative motives than to skirt existing local laws.

given by:<sup>15</sup>

$$\Phi_B \equiv \phi(p_x q_x + p_y q_y), \quad (2.11)$$

so that Home's nominal income is now:

$$I = (1 - \phi)(p_x q_x + p_y q_y) + R. \quad (2.12)$$

The balanced budget condition is exactly as in (2.2).

As in Proposition 2.1, one can conduct the intellectual experiment of comparing an economy with a hypothetical tariff,  $t$ , with the otherwise identical economy under the equivalent ad-valorem export tax,  $s(= t)$ . It is again clear that as long as neither trade tax is prohibitive, relative goods prices— and hence the equilibrium pattern of production— will be the same in under either the tariff or its equivalent export tax, but that the absolute price level in the tariff economy will be  $(1+t)$  times that of the export-tax economy, by (2.3). The value of the transfer to foreign investors therefore will be  $(1 + t)$  higher in the tariff economy than in the export tax economy, since:

$$\Phi_B^s \equiv \phi(p_x^s q_x + p_y^s q_y) = \phi(p_x^w q_x + \frac{p_y^w}{1+s} q_y), \text{ and} \quad (2.13)$$

$$\begin{aligned} \Phi_B^t &\equiv \phi(p_x^t q_x + p_y^t q_y) = \phi((1+t)p_x^w q_x + p_y^w q_y) \\ &= (1+t)\Phi_B^s, \text{ when } s = t. \end{aligned} \quad (2.14)$$

The following figures illustrate. Figure 2 depicts the economy under an ad-valorem tariff,  $t$ . The economy produces at the tangency between the local price ratio,  $p$ , and the country's production possibilities frontier. Home's national budget constraint (GNP) measured in units of good  $y$  at the world price is given by  $p^w q_x + q_y - \frac{\Phi^t}{p_y^w} = (1 - \phi)(p^w q_x + q_y) - t p^w \phi q_x$ . Note that Home's budget line now lies below the Home country's budget constraint in Figure 1. The difference between the two,  $(p - p^w)\phi q_x$ , is exactly the protection premium enjoyed

---

<sup>15</sup>The result extends easily to the case of foreign claims on domestically located factors of production, since total factor returns are homogenous of degree one in *local* goods prices. For instance, in a standard 2-good 3-factor Ricardo-Viner model, the nominal rate of return on  $x$ -sector specific capital ( $r$ ) is sensitive to the local price level (holding the relative goods prices and the world price fixed) according to  $\frac{dr}{dp_x} \Big|_{\Delta \frac{p_x}{p_y} = 0} = q_x - \frac{\partial w}{\partial p_x} \Big|_{\Delta \frac{p_x}{p_y} = 0} L_x = q_x$ , where  $w$  denotes the wage to labor and  $L_x$  denotes the equilibrium allocation of labor in the  $x$  sector.

by foreign investors (at the expense of the Home government's revenue) on its Home-located  $x$  production,  $\phi q_x$ .

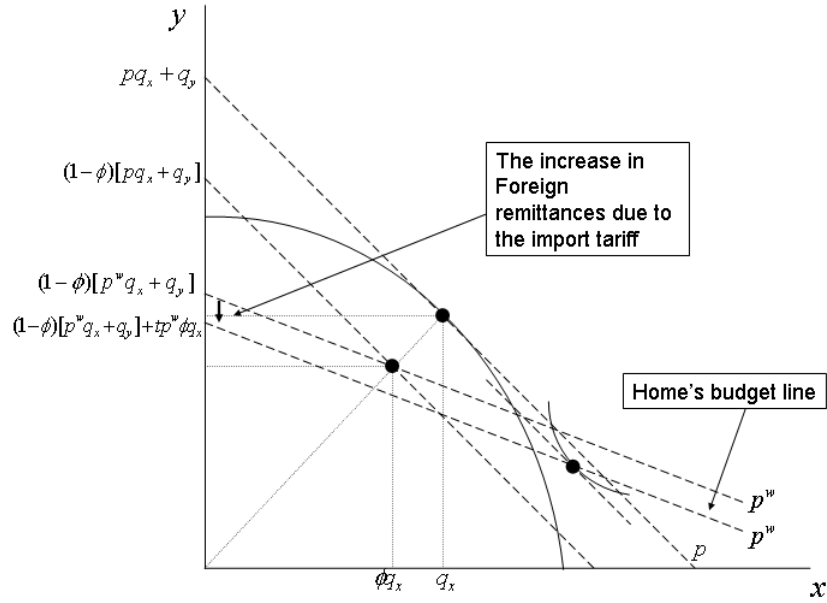


Figure 2: The Home Economy with an Import Tariff and  $\Phi_B \equiv \phi(p_x q_x + p_y q_y)$ .

Figure 3 represents the economy under the export tax, rather than the equivalent import tariff. Home's budget line lies further out under the export tax, allowing Home a larger budget set than in either Figure 1 or 2. The difference between the national budget line in the benchmark case shown by Figure 1 and Home's GNP under the export tax is  $\frac{s}{1+s}\phi q_y$ , which represents the additional revenue generated by taxing foreign investors in the local export sector.

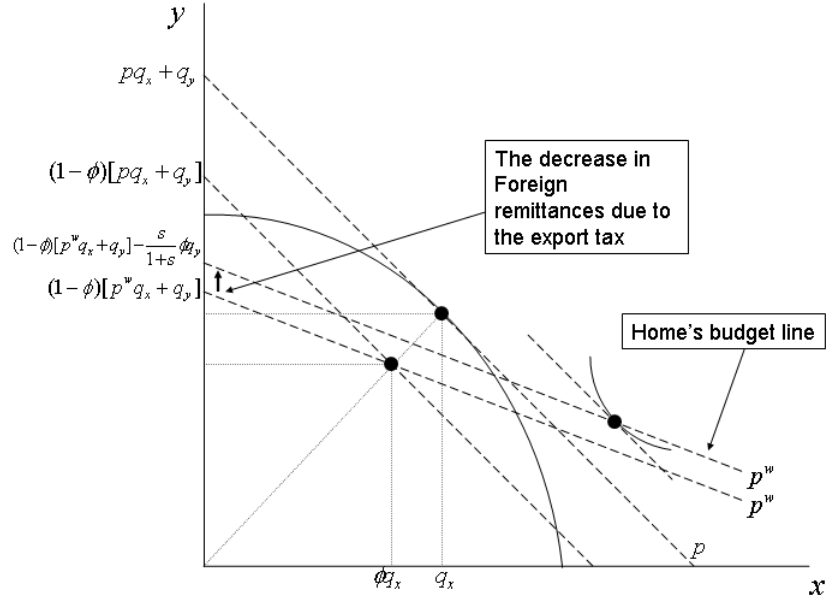


Figure 3: The Home Economy with an Export Tax and  $\Phi \equiv \phi(p_x q_x + p_y q_y)$ .

The intuition is simple. Import tariffs subsidize local industry at the expense of consumers, while export taxes benefit local consumers at the expense of industry.<sup>16</sup> To the extent that industry returns are claimed in part by foreign investors while all local consumers are domestic nationals, a country's constituency as a whole is better served by shifting surplus from industry to consumers through export taxes, than by taxing consumers to subsidize industry via import tariffs. Indeed, it is clear that governments should have asymmetric preferences over trade tax *instruments* as well as levels, in the presence of international investment.

<sup>16</sup>Recall that starting from free trade, a small import tariff leads to import-competing industry gains that are only partly offset by export sector losses; the net industry gain represents a net loss of consumer surplus. Similarly, under a (small) export tax, export sector losses exceed import sector gains, and the net industry losses are captured as an increase in consumer surplus. It is simple to confirm that if the percentage of industry ownership differs across industries, the government will have incentive to shift rents across industries by manipulating absolute *and* relative prices; in the next section the assumption of an industry neutral pattern of foreign ownership thus proves a more meaningful simplification.

### 3 Optimal Instrument Choice with International Investment

The importance of international investment for optimal trade policy is readily apparent from a quick comparison of Figures 1-3. If, as in Figure 1, a country's trade imbalance is due to a fixed value transfer, Lerner symmetry holds so that a national income maximizing government will be indifferent between a given ad-valorem import tariff or its equivalent export tax.<sup>17</sup> If the country is sufficiently small relative to the rest of the world that it cannot influence world prices, its optimal policy will be free trade.

If the returns to international investment depend on local prices, however, the same national income maximizing government's optimal trade policy will depend on whether it has a rent seeking opportunity. If foreign investors earn excess returns in the Home country, the Home government may be able to capture some or all of those rents by manipulating domestic prices. Of course, if foreign investors do not earn excess rents in the Home country, then any rent seeking attempts by the Home country may induce the foreign investors to leave.<sup>18</sup>

Formally, starting from free trade, consider whether Home has an incentive to change its trade policy, conditional on the requirement that the policy maintain the same level of foreign investment. Using the model from the previous section, denote Home's remittances to the rest of the world under free trade by:

$$\Phi^{ft} = \phi(p_x^w q_x^{ft} + p_y^w q_y^{ft}). \quad (3.1)$$

Suppose first that foreign investors require a return of at least  $\Phi^{ft}$  to stay in the Home country (i.e. foreign investors earn no excess returns). The Home government's national

---

<sup>17</sup>The import tariff revenue will be strictly less (greater) than the real revenue generated by the equivalent export tax if the country is running a trade surplus (deficit). If the government is revenue seeking, it therefore may have asymmetric preferences over trade policy instruments.

<sup>18</sup>Home may not necessarily want the foreign investment in the first place (or it may want more), but this much deeper question depends on the type and source of the international investment and is therefore purposely set aside. The goal here is simply to understand how Home's optimal trade policy depends on the level of foreign investment, given that the particular investment level is possible in equilibrium.

income maximizing import tariff,  $t^o$ , solves:

$$t^o = \arg \max_t \quad V \equiv v(p_x, p_y, I(p_x, p_y, p_x^w, p_y^w, \Phi)) \quad (3.2)$$

s.t.  $\Phi \geq \Phi^{ft}$ ,

where nominal income is defined in (2.12). The first order condition reveals that Home's optimal import tariff is zero:

$$V_t = v_I \left\{ t p^w \frac{dM_x}{dp} \frac{dp}{dt} \right\} = 0, \quad (3.3)$$

since  $\frac{dM_x}{dp} < 0$  and  $\frac{dp}{dt} = p^w > 0$ . This makes sense; in the absence of a rent seeking opportunity, the value of Home's remittances to the rest of the world is bound from below so that the trade imbalance is effectively a fixed transfer. Since the Home government cannot reduce foreign investors' returns, its optimal policy is free trade. It is obvious that the optimal export tax is also zero since Lerner symmetry obtains under any fixed trade imbalance by Proposition 2.1.

Now suppose instead that under free trade, foreign investors earn excess returns in the Home country and will maintain the free trade level of investment as long as total remittances exceed some exogenous hurdle value  $\Phi^w < \Phi^{ft}$ . The Home government's optimal trade policy is then:

$$t^o = \arg \max_t \quad V \equiv v(p_x, p_y, I(p_x, p_y, p_x^w, p_y^w, \Phi)) \quad (3.4)$$

s.t.  $\Phi \geq \Phi^w$ .

The first order condition reveals that at least a small import subsidy will be optimal:

$$V_t = v_I \left\{ t p^w \frac{dM_x}{dp} - \phi q_x \frac{dp}{dt} \right\} = 0. \quad (3.5)$$

The Home government will optimally appropriate at least a small part of foreign investors' rents by decreasing the local price level, since starting from free trade there is no distortionary cost from a small change in  $p$ .<sup>19</sup> The same logic applies to the case of an export tax,

---

<sup>19</sup>If the pattern of foreign ownership was not industry neutral, the first order condition would include an additional term— a residual of the envelope condition,  $v_I(\phi_x - \phi_y)pq'_x(p)$ — representing the government's motive to manipulate the relative goods price in favor of the relatively more domestic industry.

but in that case Home must set a strictly *positive* export tax to engineer the same decrease in the local price level.<sup>20</sup>

If restricted to a single policy instrument, Home's optimal rent seeking trade tax thus would be either a negative tariff or a positive export tax.<sup>21</sup> Figures 2 and 3 illustrate the point; starting from free trade, a small import subsidy or export tax would afford Home a first order increase its national budget set by decreasing the real value of foreign remittances at the cost of a second order distortion in the local relative price (which would fall under an import subsidy or rise under an export tax). Yet if allowed, Home clearly would prefer to use both trade taxes simultaneously. By combining an import subsidy (applied to the local price of the import good) with the same ad-valorem export tax, Home could engineer a decrease in the absolute local price level at no distortionary cost, and thereby appropriate the entirety of foreign investors' excess returns. Together, an import tariff and the equivalent export tax thus constitute a direct means by which a local government can expropriate foreign investors' excess returns.

Interestingly, this twin import subsidy-export tax policy is *not* tantamount to a local currency appreciation in the presence of international investment, contrary to findings in the context of balanced trade, suggested by Dixit and Norman (1980) and Meade (1955). Trade taxes carry real implications for the value of Home located production at world prices— and hence the real value of the trade imbalance— while changes in the exchange rate do not. No-arbitrage conditions in goods markets ensure that the value of home produced goods *measured in the world currency* is unaffected by exchange rate changes. Thus, while a  $t$  percent appreciation of the local currency would cause the local nominal

---

<sup>20</sup>The first order condition for Home's optimal export tax problem (also given by (3.4), but substituting  $s$  for  $t$  to distinguish notationally the export tax from the import tariff) confirms that at least a small positive export tax is optimal:

$$V_s = v_I - sp^w \frac{dE_y}{dp} + \frac{1}{1+s} \phi q_y = 0. \quad (3.6)$$

<sup>21</sup>Recall that Home is small in this model. A large country's government would weigh the (first order) terms of trade effect of the trade policy against the (first order) appropriative motive. Thus, a large country would prefer the export tax (which yields a terms of trade gain) over an otherwise commensurate import subsidy (which would worsen the terms of trade).

prices to fall by  $t$ , that  $t$  percent loss in nominal returns to foreign investors would be exactly outweighed by the  $t$  percent appreciation enjoyed by foreign investors upon converting their nominal (Home currency) returns back into the world currency.<sup>22</sup> This suggests that in the presence of international investment (and excess returns), endogenous trade policy models with both export taxes and import tariffs may warrant consideration of an explicit tax on foreign investment returns to distinguish this form of foreign-investor rent seeking from governments' more conventional political economy motives for trade taxes. Thus, there is a fundamental difference in the real implications of trade taxes and exchange rates in the presence of international investments that is not apparent from earlier models that assume balanced trade.

## 4 Recovering Lerner Symmetry

As important as recognizing that trade tax asymmetry is inherent to models of international investment, is understanding when and how Lerner symmetry can be resurrected. First, it is obvious that if the value of remittances to foreign investors is indexed to world rather than local prices, Lerner symmetry will obtain by Proposition 2.1. Yet such an assumption seems wildly unrealistic, since it would mean that goods produced locally in part or in full by foreign interests would be simultaneously exempt from export taxes, while also subject to import tariffs. Not only would such a policy be virtually unenforceable from a practical perspective, but it would also violate “national treatment” clauses of most bilateral investment treaties.

A more realistic mechanism for reinstating Lerner symmetry is the introduction of a tax on foreign investors' returns. Kaempfer and Tower (1982) show that a country can maintain symmetry by replacing a given ad-valorem tax on all balance of payments credits with the equivalent ad-valorem tax on all balance of payments debits. Here, this would require that

---

<sup>22</sup>This result differs from the provocative finding by Canzoneri (1989) that governments have an incentive to use expropriative seignorage as a means to extract rent from foreign owners of government debt. The critical difference is that a country's debt in Canzoneri's framework is a fixed transfer of local currency, whereas the nominal value of a country's “debt” in the context of international investment will vary with exchange rates due to arbitrage in goods markets.

a  $t$  percent tax on the local price of a country's exports be replaced by both a  $t$  percent tariff on the world price of its imports *plus* a  $t$  percent tax on foreign investors' net returns. The point is easily confirmed by noting that a country's national balanced budget condition would be the same under either the import tariff/investment tax policy or the export tax policy. Under an ad-valorem investment tax/import tariff of  $t$ :<sup>23</sup>

$$p_x^w M_x = p_y^w E_y - \Phi + t p_x^w \phi \left( q_x + \frac{p_y}{p_x} q_y \right), \text{ or,} \quad (4.1)$$

$$p^w M_x = E_y - \phi(p^w q_x + q_y) + \phi q_y \left( \frac{t}{1+t} \right). \quad (4.2)$$

Under an ad-valorem export tax of  $s$ , Home's balanced budget condition is:

$$p_x^w M_x = p_y^w E_y - \Phi, \text{ or,} \quad (4.3)$$

$$p^w M_x = E_y - \phi(p^w q_x + q_y) + \phi q_y \left( \frac{s}{1+s} \right). \quad (4.4)$$

Home's national budget constraint is therefore the same under either the import tariff/investment tax or export tax policy when  $s = t$ , so that Lerner Symmetry holds.<sup>24</sup> Moreover, this newly reinstated trade tax symmetry would hold under endogenous trade (and investment) policy. A direct tax on foreign remittances would allow the investment-host country to extract all excess returns (if there are any) from foreign investors (by setting the investment tax such that  $\left( \frac{t}{1+t} \right) \phi q_y = \Phi - \Phi^w$ ) without resorting to trade tax policies.

## 5 Closing Remarks

This paper demonstrates that international investment permits permanent trade imbalances that may disturb the symmetry between import tariffs and export taxes found by Lerner (1936). Lerner's symmetry theorem extends to models with trade imbalances if (i) trade tax revenue is redistributed among consumers, (ii) neither the import tariff nor the export

---

<sup>23</sup>Some care is needed in the accounting identities here, since foreign remittances need to be taxed at the same rate as imports; an easy way to do this is to convert net remittances to units of  $x$ , then charge the ad-valorem tax on the world price of  $x$ .

<sup>24</sup>By 2.3, the domestic price ratio— and thus the pattern of production— would be the same under either policy. Then, for any given level of demand, real national income (implicitly defined by 4.1 and 4.3) would be the same under both policies, so that 4.1 and 4.3 would be equivalent in equilibrium.

tax would be prohibitive, and (iii) the value of trade imbalance at world prices is fixed. Because many otherwise standard models with international investment violate this third condition, it is argued that Lerner symmetry does not generally hold in the presence of international investment.

The trade tax asymmetry is even more striking when trade tax policy is endogenous. When foreign interests hold claims on local production, the investment host-country has an incentive to extract any excess returns from foreign investors by manipulating local prices. Thus, an investment host country will strictly prefer an export tax over the equivalent ad-valorem import tariff, *ceteris paribus*, as the former allows the government to extract rent from foreign investors via local export sector losses, whereas the latter would subsidize foreign investors due to local import-competing sector gains.

Notably, Lerner symmetry can be restored by introducing an additional policy tool in the form of a tax on foreign remittances. Future work therefore should either acknowledge the trade tax asymmetry caused by the permanent trade imbalances inherent to models with international investment, or if appropriate, reinstate Lerner symmetry by adopting a framework with investment taxes.

## References

- ANDERSON, R. K., AND A. TAKAYAMA (1983): "Tariffs, Balance of Payments, and the Lerner Symmetry Relation in a Monetary Economy," *Zeitschrift fr die gestamte Staatswissenschaft (Journal of Institutional and Theoretical Economics)*, 139, 1–18.
- BHAGWATI, J. N., AND R. A. BRECHER (1980): "National Welfare in an Open Economy in the Presence of Foreign-Owned Factors of Production," *Journal of International Economics*, 10, 103–115.
- CANZONERI, M. B. (1989): "Adverse Incentives in the Taxation of Foreigners," *Journal of International Economics*, 27, 283–297.
- DIXIT, A. K., AND V. D. NORMAN (1980): *Theory of International Trade*. Cambridge University Press, Cambridge, UK.
- EATON, J., G. GROSSMAN, W. KAEMPFER, AND E. TOWER (1983): "The Impact of Monopoly Pricing on the Lerner Symmetry Theorem: A Comment," *Quarterly Journal of Economics*, 98(3), 529–533.
- KAEMPFER, W., AND E. TOWER (1982): "The Balance of Payments Approach to Trade Tax Symmetry Theorems," *Weltwirtschaftliches Archive*, 118(1), 148–165.
- LERNER, A. P. (1936): "The Symmetry between Import and Export Taxes," *Economica (New Series)*, 3(11), 306–313.
- MCKINNON, R. I. (1966): "Intermediate Products and Differential Tariffs: A Generalization of Lerner's Symmetry Theorem," *Quarterly Journal of Economics*, 80(4), 584–615.
- MEADE, J. E. (1955): *Trade and Welfare*. Oxford University Press, London.
- NEARY, J. P., AND F. RUANE (1988): "International Capital Mobility, Shadow Prices, and the Cost of Protection," *International Economic Review*, 29(4), 571–585.
- RAY, E. J. (1975): "The Impact of Monopoly Pricing on the Lerner Symmetry Theorem," *Quarterly Journal of Economics*, 89(4), 591–602.
- (1983): "The Impact of Monopoly Pricing on the Lerner Symmetry Theorem: Reply," *Quarterly Journal of Economics*, 93(3), 535–537.
- RAZIN, A., AND L. E. SVENSSON (1983): "Trade Taxes and the Current Account," *Economics Letters*, 13, 55–57.