Who Pays for Tariffs? Optimal Trade Policy under Foreign Ownership*

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PRELIMINARY AND INCOMPLETE

Abstract

This paper examines optimal trade policy in a small open economy where domestic firms are partially owned by foreign investors. Departing from the standard assumption of domestic ownership, we show that the presence of foreign shareholders may call for positive tariffs, even in perfectly competitive markets. When labor and imported inputs are Hicksian substitutes, imposing a tariff on imported inputs induces firms to substitute toward domestic labor, increasing wages and benefiting domestic households at the expense of foreign equity holders.

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1 Introduction

Standard international trade theory establishes that the optimal tariff is zero for small countries. The key argument is that, without market power in the international goods market, a tariff distorts consumption across goods without providing any benefits. A common assumption in the optimal trade policy literature is that firms are owned by domestic households. This paper departs from that assumption by allowing for foreign ownership and shows that this has profound implications for the normative analysis of trade policy. Specifically, we show that even in perfectly competitive markets, a small country may find it optimal to impose tariffs on imported inputs.

This departure from standard theory arises because trade policy can tilt factor utilization toward labor and improve households' income when foreign investors own a stake in domestic firms. The key channel is a general equilibrium effect on wages, as a tariff on imported inputs induces a substitution effect toward labor. While tariffs on inputs reduce firms' profits, part of this burden falls on foreign shareholders. Importantly, the benefits of tariffs persist even if they are revenue-neutral, meaning that firms receive the collected tariff as a lump-sum transfer.

In particular, we show that if labor and inputs are Hicksian substitutes, a positive tariff on imported inputs is desirable. A tariff generates two opposing effects: a scale effect, which reduces output and labor demand, and a substitution effect, which increases labor demand. When returns to scale are decreasing and the elasticity of substitution is sufficiently high, the substitution effect dominates, prompting firms to expand labor demand in response to tariffs. The increase in labor demand, in turn, leads to higher wages, which benefit households at the expense of foreign equity holders.

Literature. There are three classic arguments for optimal tariffs in the literature. One argument arises when a country is large in the international goods market (Johnson, 1953). Specifically, when a country has market power, it should should restrict imports to reduce the price at which it buys from abroad. Another argument arises in the strategic trade policy literature where imperfect competition gives rise to strategic interaction between domestic and foreign firms (Brander and Spencer, 1981). For example, when there are increasing returns to scale, a tariff can help domestic firms obtain a larger market share in the world market and increase profits. A third argument, dating back to Hamilton (1791), is that tariffs can promote an infant industry. When Marshallian externalities are sufficiently strong, the distortions induced by tariffs can be outweighed by the future productivity benefits (Harrison and Rodríguez-Clare, 2010). This paper provides an alternative rationale for tariffs that is operative in *perfectly competitive markets* when foreign investors own a share of domestic ones.

This paper belongs to the vast modern literature on optimal trade policy. This literature

mostly builds on the first strand of the literature mentioned above (see Bagwell and Staiger (2016); Caliendo and Parro (2022) for recent reviews of the literature). A few recent papers study the role of firms' ownership. Adão, Costinot, Donaldson and Sturm (2023) study the set of Pareto-optimal tariffs when there are heterogeneous holdings of domestic shares of firms.[1] Costinot and Werning (2019) discuss the failure of Lerner Symmetry under foreign ownership. Bianchi and der Ghote (2023) study optimal monetary policy under foreign equity ownership. To the best of my knowledge, this is the first study to examine optimal trade policy under foreign ownership.

2 Model

We present a simple static small open economy model where tariffs apply to intermediate goods.

2.1 Environment

The country produces a single final tradable good with an imported intermediate input and labor. We assume that the country is small with respect to both the production of the final good and the demand for intermediates, which implies that the relative price is exogenous. This assumption allows us to abstract from benefits from tariffs resulting from market power and the manipulation of the terms of trade.

Technology. There is a continuum of firms with production function $y = F(\ell, m)$ where ℓ is labor and m is an imported input. We assume that F is increasing in ℓ and m, strictly concave and exhibits decreasing returns to scale. Decreasing returns will ensure that there are profits in equilibrium.[2]

Preferences. There is a continuum of identical households with preferences represented by the utility function $u(c, \ell)$ where c, denotes consumption and ℓ hours worked. We assume that $u(\cdot)$ is strictly increasing in consumption, decreasing in hours, and strictly concave.

Ownership. Our key departure from standard optimal trade policy is to allow for foreign ownership of domestic firms. Households own a fraction θ of the shares of the domestic firms

[1] A seminal paper analyzing redistributive effects through labor income across sectors is Grossman and Helpman (1994).

[2] A standard justification for decreasing returns to scale is the presence of a fixed factor of production. In our case, an important underlying assumption is that the fixed factor is owned by the firms.

and the remaining $1-\theta$ is owned by foreign investors. The standard case is represented by $\theta = 1$.

Government. The government sets tariffs to imported inputs, τ, assumed to be proportional to the quantity of imports, and rebates the proceeds to households (T^h) and firms (T^f) in a lump-sum fashion. The government budget constraint is

$$\tau p m = T^h + T^f, \tag{1}$$

where p is the price of imported inputs in terms of consumption, which serves as the numeraire. We assume that transfers are non-negative, $T^h \geq 0$ and $T^f \geq 0$.

2.2 Competitive equilibrium

Profit maximization. Each firm chooses employment and imported inputs to solve

$$\pi = \max_{\ell,m} F(\ell, m) - w\ell - p(1+\tau)m + T^f \tag{2}$$

where w represents the wage and $p(1+\tau)$ is the price cum-tariff. We let $\pi(w, \tau, T^f)$ denote the value of profits associated to (2).

Necessary and sufficient conditions for a maximum are

$$F_\ell(\ell, m) = w \tag{3}$$
$$F_m(\ell, m) = p(1+\tau) \tag{4}$$

That is, firms equate the marginal product of labor and imported inputs to their marginal cost.

Household maximization. Households choose consumption and hours worked to maximize their utility subject to the budget constraint.

$$\max_{c,\ell} u(c, \ell) \tag{5}$$

subject to

$$c = wh + \theta\pi + T^h, \tag{6}$$

where the budget constraint reflects that households receive only a fraction θ of the firms' profits.

Optimality implies that

$$u_c(c, \ell)w = -u_\ell(c, \ell) \tag{7}$$

Definition 1 (Competitive equilibrium)**.** *A competitive equilibrium with trade policy* $\{\tau, T^h, T^f\}$ *a is a set of allocations* $\{\ell, m\}$ *and wages* w *such that:*

(i) Households optimize. That is, (6) *and* (7) *hold.*

(ii) Firms optimize. That is, (3) *and* (4) *hold.*

(iii) The government budget constraint (1) *holds .*

Notice that by combining households and firms' profits, we obtain the resource constraint

$$c = wh + (\tau pm - T^f) + \theta(F(\ell, m) - w\ell - p(1+\tau)m + T^f) \tag{8}$$

That is, the resources available for consumption are given by labor income, tariff revenue net of transfers to firms, and profits from equity holdings. One can see from (8) that given ℓ, m and T^f, a rise in wages w or tariffs τ provides more resources for consumption when foreign investors own a positive share of domestic firms (that is, $\theta < 1$). Similarly, a higher transfer to firms reduces household consumption when $\theta < 1$.

3 Optimal Trade Policy

The government's problem is to choose a policy $\{\tau, T^h, T^f, T\}$ that maximizes households' welfare. That is,

$$\begin{aligned} \max_{c,w,\ell,\tau,m,T^f \geq 0} \quad & u(c,\ell) \\ \text{subject to} \quad & \\ c &= wh + \tau pm + \theta(F(\ell,m) - w\ell - p(1+\tau)m) - T^f(1-\theta) \\ F_\ell(\ell,m) &= w \\ F_m(\ell,m) &= p(1+\tau) \\ u_c(c,\ell)w &= -u_\ell(c,\ell) \end{aligned} \tag{9}$$

It is important to note that given $T^f \geq 0$, lump-sum taxes on firms are ruled out. It is immediate to see that the optimal policy features $T^f = 0$, strictly for $\theta < 1$. That is, given that a lump-sum transfer to firms does not affect their decisions and lowers households' consumption, the optimal policy is to rebate any revenue from tariffs to households. This effect introduces a role for tariffs as a tool to redistribute from firms (and indirectly foreign investors) to domestic households. However, we will abstract from this effect by assuming that all the tariff revenue must be rebated to firms, as stated below.

Assumption 1. *All tariff revenue is rebated to firms. That is,* $T^f = \tau pm$.

3.1 Simple Example with Inelastic Labor Supply

In this section, we simplify the analysis by assuming that households supply inelastically $\bar{\ell}$ units of labor. In this case, the problem of the government is simply to maximize households' consumption. Replacing the implementability constraint for wages and the government budget constraint in the objective and using Assumption 1, we can write problem (9) as a planner's problem with a choice of imported inputs, m, subject to an implementability constraint. That is,

$$\max_{m} F_\ell(\bar{\ell}, m)\bar{\ell} + \theta(F(\bar{\ell}, m) - F_\ell(\bar{\ell}, m)\bar{\ell} - pm) \tag{10}$$

subject to

$$F_m(\bar{\ell}, m) \geq p \tag{11}$$

In effect, the planner maximizes a labor income plus the share of profits that accrue to domestic households. Notice that the implementability constraint with inequality reflects that transfers to firms, and therefore tariffs, cannot be negative. When the constraint is slack, this implies that tariffs are strictly positive.

Using that $F_{mm} < 0$, the optimality condition can be expressed as

$$(1-\theta)F_{\ell m}(\bar{\ell}, m)\bar{\ell} + \theta(F_m(\bar{\ell}, m) - p) \geq 0 \tag{12}$$

with equality if (11) is slack. That is, (12) holds with equality in an optimal solution where tariffs are positive. The first term represents the marginal effect of an increase in imported inputs on households' labor income. The second term represents the marginal effect of an increase in imported inputs on profits received by households.

The solution depends crucially on the sign of the cross partial derivative of the production function and the share of equity holdings. If $\theta < 1$ and $F_{\ell m} \geq 0$ for all ℓ, m, equation (12) must hold with strict inequality since the first term is strictly positive and the second one is non-negative. That is, when labor and imported inputs are Hicksian complements, optimal tariffs are nil.

On the other hand, consider a production function such that $F_{\ell m}(\bar{\ell}, \bar{m}) < 0$ where $\bar{m}$ represents the equilibrium level of inputs associated with zero tariffs (i.e, $F_m(\bar{\ell}, \bar{m}) = p$). Evaluating (12) at $m = \bar{m}$, we can see that the optimal condition does not hold.

That is, starting from the level of imported inputs associated with no tariffs, a marginal increase in tariffs yields a strictly positive welfare gain when labor and imported inputs are

Hicksian substitutes.

The intuition behind these results is as follows. The cross-partial derivative captures how wages respond to changes in the level of intermediate inputs. When labor and inputs are Hicksian complements, $F_{\ell m} > 0$, a tariff depresses labor demand and reduces wages. In this case, tariffs are not optimal because they reduce both labor income and profits. On the other hand, when labor and inputs are Hicksian substitutes, $F_{\ell m} < 0$, a tariff lowers the demand for intermediate inputs and raises the demand for labor. As a result, the government balances the benefits of higher labor income against the costs of lower profits. The optimal solution $m^\star$ is characterized by

$$-(1-\theta)F_{\ell m}(\bar{\ell}, m^\star)\bar{\ell} = \theta(F_m(\bar{\ell}, m^\star) - p) \tag{13}$$

and the optimal tariff satisfies

$$\tau^\star = \frac{F_m(\bar{\ell}, m^\star) - p}{p} \tag{14}$$

Numerical example. We study now a numerical example.

Consider a CES production function that uses capital k, inputs m, and labor ℓ to produce the final consumption good:

$$F(\ell, m) = Ak^{1-\gamma}\left(\alpha m^{\frac{\rho-1}{\rho}} + (1-\alpha)\ell^{\frac{\rho-1}{\rho}}\right)^{\frac{\rho}{\rho-1}\gamma}.$$

where $k > 0$ is a fixed factor in fixed supply, A is the level of productivity, ρ is the elasticity of substitution between inputs and labor and γ is the degree of decreasing returns to scale.

We have that the cross-partial derivative of the production function is given by

$$F_{\ell m} = Ak^{1-\gamma}\gamma\left(\alpha m^{\frac{\rho-1}{\rho}} + (1-\alpha)\ell^{\frac{\rho-1}{\rho}}\right)^{\frac{\rho}{\rho-1}\gamma-2}\frac{\rho(\gamma-1)+1}{\rho}(1-\alpha)\ell^{\frac{\rho-1}{\rho}-1}\alpha m^{\frac{\rho-1}{\rho}-1}.$$

We thus have that $F_{\ell m} < 0$ if and only if $\rho > \frac{1}{1-\gamma}$.

The marginal product of labor can increase or decrease with A:

$$\frac{\partial^2 F}{\partial \ell\, \partial A} = Z\, k^{1-\gamma}\,\alpha(1-\alpha)\left(\tfrac{\rho-1}{\rho}\right)^2\left(\tfrac{\gamma\rho}{\rho-1}\right)\left(\tfrac{\gamma\rho}{\rho-1}-1\right)\left[\alpha(Am)^{\frac{\rho-1}{\rho}} + (1-\alpha)\ell^{\frac{\rho-1}{\rho}}\right]^{\frac{\gamma\rho}{\rho-1}-2}\ell^{-\frac{1}{\rho}}\, m^{\frac{\rho-1}{\rho}}\, A^{-\frac{1}{\rho}}$$

If $\rho > \frac{1}{1-\gamma}$, then $\frac{\partial^2 F}{\partial \ell\, \partial A} < 0$

There is clearly a wide range of estimates for the elasticity of substitution and decreasing returns which in turn vary significantly across sectors. Zarate, Muñoz-Morales and Bonilla

(2024), for example, present evidence that in agriculture the elasticity between inputs and labor is larger than one. Based on plausible values for these parameters, we argue that labor and imported inputs are Hicksian substitutes, at least for some sectors, and therefore the optimal tariff is strictly positive.

The figure below presents simulations of equilibrium allocations and welfare for given tariffs. We set $\theta = 0.5$, implying that foreign investors own 50% of the share of domestic firms. We set an elasticity of substitution across labor and inputs equal to $\rho = 2$, which is in the range of estimated values for the elasticity of unskilled labor and materials (Hamermesh, 1993). In addition, we set the labor share $\alpha = 0.65$ and a decreasing returns parameter $\gamma = 0.4$. As we can see in the figure, imported inputs (panel [a]) and profits (panel [d]) are decreasing in tariffs while labor income is increasing in tariffs (panel [c]). The solid dot represents the optimal allocation. As panel (b) shows, the optimal tariff is about 4%.

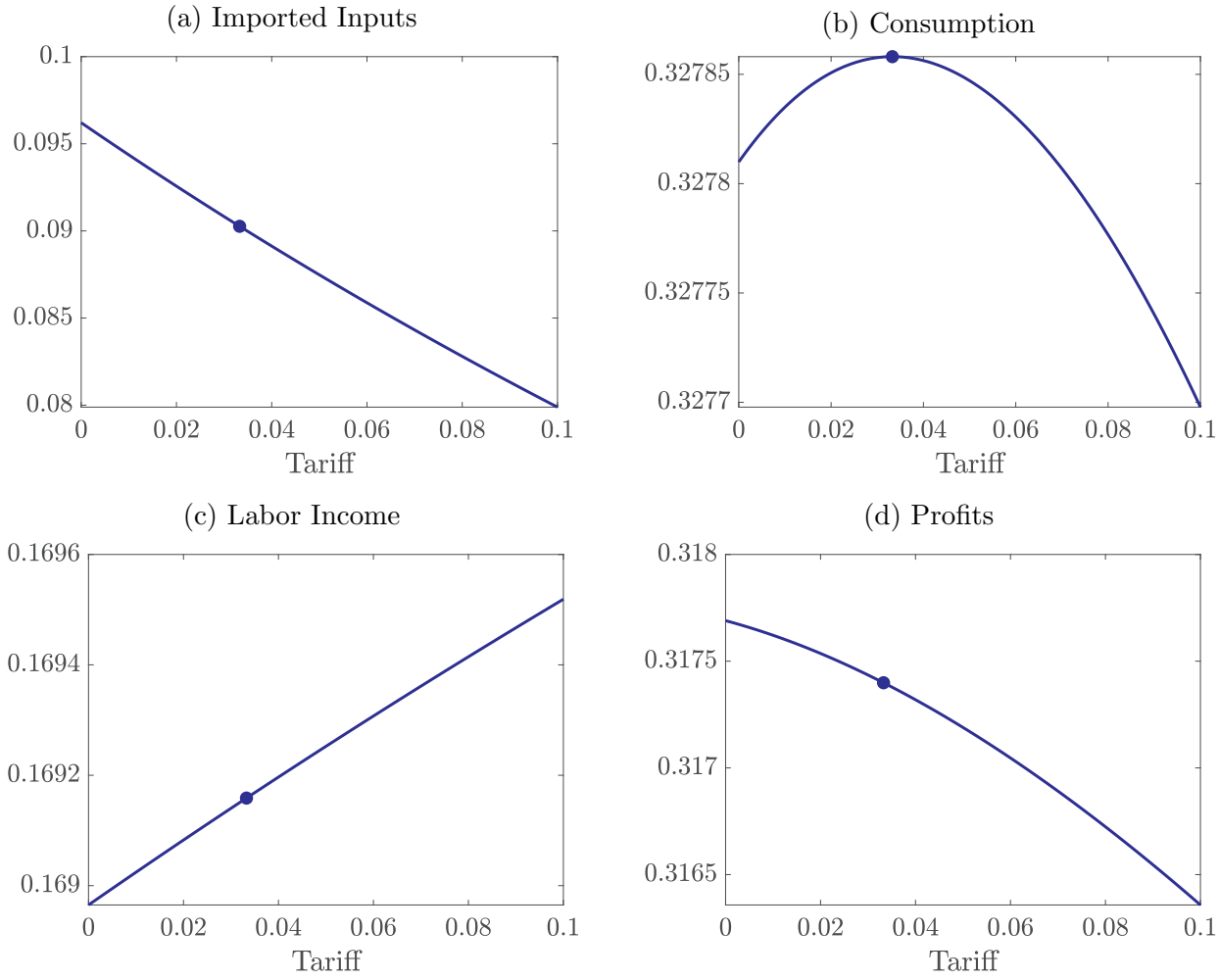


Figure 1: Allocations as a function of tariffs

Note: Parameter values $\theta = 0.5$ $\rho = 2.0$; $\gamma = 0.40$; $\alpha = 0.650$; p $= 1$; $\sigma = 2$.

3.2 Extension with endogenous terms of trade.

We now relax the small-open-economy assumption and let the pre-tariff price of imported inputs depend on aggregate imports, $p = p(m)$, with $p'(m) > 0$. Let

$$\varepsilon_p(m) \equiv \frac{d\log m}{d\log p} = \frac{p(m)}{m\,p'(m)}$$

denote the foreign export-supply elasticity, so that $mp'(m)/p(m) = 1/\varepsilon_p(m)$.

Under Assumption 1 and inelastic labor supply $\bar{\ell}$, the planner solves

$$\max_m \; F_\ell(\bar{\ell}, m)\bar{\ell} + \theta\Big(F(\bar{\ell}, m) - F_\ell(\bar{\ell}, m)\bar{\ell} - p(m)m\Big)$$

subject to

$$F_m(\bar{\ell}, m) \geq p(m).$$

If the optimal tariff is interior, the first-order condition is

$$(1-\theta)F_{\ell m}(\bar{\ell}, m)\bar{\ell} + \theta\Big(F_m(\bar{\ell}, m) - p(m) - mp'(m)\Big) = 0.$$

Using the firms' optimality condition $F_m(\bar{\ell}, m) = p(m)(1+\tau)$, we obtain

$$\tau^* = \frac{m^* p'(m^*)}{p(m^*)} - \frac{1-\theta}{\theta}\frac{\bar{\ell}}{p(m^*)}F_{\ell m}(\bar{\ell}, m^*) = \frac{1}{\varepsilon_p(m^*)} - \frac{1-\theta}{\theta}\frac{\bar{\ell}}{p(m^*)}F_{\ell m}(\bar{\ell}, m^*).$$

This expression decomposes the optimal tariff into two motives. The first term, $1/\varepsilon_p$, is the standard terms-of-trade motive. The second term is the ownership motive emphasized in this paper. When labor and imported inputs are Hicksian substitutes, $F_{\ell m} < 0$, the ownership motive raises the optimal tariff above the Johnson benchmark. When they are Hicksian complements, $F_{\ell m} > 0$, the ownership motive lowers the optimal tariff.

A compact sufficient-statistic representation is obtained by defining

$$\kappa(m) \equiv -\frac{1}{p(m)}\frac{d[w(m)\bar{\ell}]}{dm} = -\frac{\bar{\ell}}{p(m)}F_{\ell m}(\bar{\ell}, m),$$

where $w(m) = F_\ell(\bar{\ell}, m)$. In words, $\kappa(m)$ measures the marginal incidence of imports on domestic labor income, normalized by import expenditure. Then welfare changes from a marginal tariff satisfy

$$\frac{dW}{d\tau} = \theta p(m)\left(-\frac{dm}{d\tau}\right)\left[\frac{1}{\varepsilon_p(m)} + \frac{1-\theta}{\theta}\kappa(m) - \tau\right].$$

Hence the interior optimum is characterized by

$$\tau^* = \frac{1}{\varepsilon_p(m^*)} + \frac{1-\theta}{\theta}\kappa(m^*).$$

This formula makes clear that the foreign-ownership channel enters only through the ratio of foreign to domestic shares, $(1-\theta)/\theta$. Therefore, holding fixed the labor-income incidence of imports, countries with greater foreign ownership optimally choose higher tariffs when $\kappa > 0$, that is, when imported inputs depress domestic labor income.

Finally, $\kappa(m)$ can be decomposed into observables. Let

$$s_L(m) \equiv \frac{w(m)\bar{\ell}}{p(m)m}, \qquad \eta_{w,m}(m) \equiv \frac{d\log w}{d\log m}.$$

Then

$$\kappa(m) = -s_L(m)\eta_{w,m}(m),$$

so the optimal tariff can also be written as

$$\tau^* = \frac{1}{\varepsilon_p(m^*)} - \frac{1-\theta}{\theta}s_L(m^*)\eta_{w,m}(m^*).$$

For a local sufficient-statistic characterization around free trade, let $\bar{m}$ satisfy $F_m(\bar{\ell}, \bar{m}) = p(\bar{m})$. Then a marginal tariff is welfare-improving if and only if

$$\frac{1}{\varepsilon_p(\bar{m})} + \frac{1-\theta}{\theta}\kappa(\bar{m}) > 0.$$

Under Hicksian substitutes, $\kappa(\bar{m}) > 0$, so the ownership motive and the terms-of-trade motive both point toward a positive tariff. Under Hicksian complements, $\kappa(\bar{m}) < 0$, the ownership motive works in the opposite direction and may overturn the standard terms-of-trade argument.

Quantification

[...]

4 Conclusions

We study optimal trade policy when domestic firms are owned by foreign investors. We show that when labor and imported inputs are Hicksian substitutes, a strictly positive tariff on imported inputs is optimal.

The return to protectionism has raised concerns about the effects on supply chains, as about two-thirds of international trade is in intermediate inputs. However, the findings in this paper highlight that imposing tariffs on inputs may be desirable to induce firms to substitute inputs for labor and raise households' income.

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