Trade Protection to Reduce Redistribution

Amihai Glazer*and Priya Ranjan
Department of Economics
University of California, Irvine
Irvine, CA 92617

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Abstract

Trade policies which aid a domestic industry also increase the domestic price of the traded good. This increase in price can reduce the marginal utility of income of consumers who heavily consume the protected good. The lower marginal utility of income may in turn reduce political pressures to redistribute income to such consumers. Taxpayers who want to limit redistribution may therefore favor trade protection. And because different policies (such as tariffs and quotas) differ in how they affect the marginal utility of income, taxpayers may favor one policy over another.

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*Telephone: 949-24-5974. E-mail: aglazer@uci.edu.

1 Introduction

A continuing puzzle in understanding government is why it adopts inefficient policies. A primary example is the use of quotas instead of tariffs to limit imports, or the use of trade protection instead of production subsidies to protect jobs in favored industries.

This paper gives a new explanation. Our argument is that decisive voters in period 1 may favor an inefficient policy that will be in force in period 2 because that policy will reduce political pressures for redistribution in period 2. The policy adopted in period 1 can change political pressures by reducing the marginal utility of income to the people who would want the transfer in period 2. The lower marginal utility of income can affect pressures in two ways. First, if government places some weight on social welfare in period 2, then the lower an individual's marginal utility of income, the lower the social benefit of transferring money to him. Second, if a person who seeks to influence policy must incur a non-monetary cost to wield influence, then the lower his marginal utility of income, the less effort he will exert for the transfer.

Most political-economy models emphasize the influence of special interest groups consisting of manufacturers or of owners of factors of production intensively used in producing some goods. Such models can explain the existence of production subsidies. But since a tariff in effect combines a consumption tax and a production subsidy, the models do not explain the prevalence of tariffs, which in effect add a consumption tax.[1]

We avoid these problems by seeing tariffs not as solely aimed to benefit domestic producers, but as affecting future policy. Though we shall often speak of trade, our reasoning applies to other policy areas, such as regulations which limit innovation in the telephone industry, or regulations on automobile safety and pollution. All can affect the marginal utility of income.

2 Literature

2.1 Time inconsistency in trade policy

The importance of commitment in trade policy is studied by several authors. Staiger and Tabellini (1987) show how the optimal trade policy may

[1] See Mayer and Riezman (1987) for this point.

be time inconsistent: since an unexpected tariff more effectively redistributes income than an expected one, government would benefit from unexpectedly increasing any optimal tariff it had adopted. They also show that because a tariff imposes a greater distortion than a subsidy, government will prefer a time-consistent tariff policy over a time-consistent subsidy.

Relatedly, Staiger and Tabellini (1989) argue that if production decisions precede consumption decisions, governments with sufficient policy discretion could benefit by surprising producers with policies other than those announced.

2.2 Actions affecting future redistribution

We shall consider how a policy in the current period affects redistribution in future periods. Related work considers how a person's behavior in the current period affects the willingness of others to give him transfers in future periods. Thus, Lindbeck and Weibull (1988) and Bruce and Waldman (1990) analyze the Good Samaritan paradox, showing that recipients of altruistic benefits who anticipate the gifts may act in ways which increase their marginal utility of income, thereby inducing transfers to them. Becker's Rotten Kid Theorem (Becker (1974)) shows that a recipient of altruistic transfers may not want to harm another recipient: a fall in A's income or a rise in B's income will induce the altruist to transfer more to A and less to B. Acemoglu and Robinson (2001 and 2002) examine how democratization can commit government to make future transfers to the poor.

Altruism is also considered by Rotemberg (2003). He shows that, even if altruism is weak, direct democracy can lead to policies that are biased against trade. We assume the opposite from Rotemberg: whereas he supposes voters are altruistic, we suppose they are selfish. And whereas he abstracts from income effects, we focus on them. Nevertheless, some of our results are similar.

3 Assumptions

3.1 The actors

The actors in the model are capital owners, workers, and government. Capital owners use their capital, and hire labor, to produce the import-competing

good (X). The other good, Y, is produced with labor alone. The capital owners favor increased demand for the import-competing good, or alternatively a subsidy for producing the good. Let capital owners be richer than workers. The workers favor a transfer from the rich (capitalists) to the poor (workers); the rich oppose any such transfer. Government responds to political pressures from the two groups.

The total amount of labor in the economy is $L_x + L_y = L$; it is distributed equally among n_l workers. The total amount of capital K is distributed equally among n_k capitalists.

3.2 Sequence of actions

Our analysis relies on two primary assumptions. First, the trade policy adopted in period 1 is irreversible. Second, some persons determining policy in period 1 differ from the persons determining policy in period 2. We elaborate on these assumptions below.

In period 1 government commits to trade policy, such as a tariff, a quota, or a production subsidy. The commitment can be formal, such as by a treaty forbidding the import of CFCs, a treaty committing a government to reduce emissions of carbon, a constitutional prohibition (as in the United States) of an export tax, membership in the European Union which removes a member country's ability to set tariffs, and so on. But the commitment may be imperfect and informal. For example, if foreign producers expect a future government to restrict imports, they will invest little in capacity, so that even if in the future the government removes the limits, imports will be small.[2] Or, as Cassing and Hillman (1986) suggest, import restrictions that increase employment in the domestic protected industry induce an increase in the number of voters who would benefit from continued import protection.

In period 2, government redistributes income from the rich to the poor.

Though we shall speak of a two-period model, that is not essential for our purposes. Instead, it is critical that a decision about income redistribution can be made after trade policy is set. We could, for example, allow for income redistribution in period 0, a determination of trade policy in period 1, and a revised policy of income redistribution in period 2. Since our focus is on how trade policy affects later policy on income redistribution, we would focus on

[2]This mechanism resembles Rodrik's (1991) claims that trade liberalization will succeed if it induces the growth of firms that support such liberalization.

periods 1 and 2.

3.3 Political decisions

We allow trade policy set in period 1 to be determined by a different decisive voter, or to respond differently to political pressures, than is income redistribution which is set in period 2. The asymmetry can arise for constitutional reasons. For example, the U.S. Senate, but not the U.S. House of Representatives, ratifies treaties, but tax bills must be approved by both Houses and be initiated by the House of Representatives. Similarly, the U.S. president has greater discretion to negotiate trade treaties or to pressure a foreign country to limit exports (as the Reagan Administration did with Voluntary Export Restraints for Japanese automobiles) than to raise taxes or to reform welfare programs. Relatedly, as Shepsle (1979) and Shepsle and Weingast (1981) emphasize, different policy areas fall under the jurisdiction of different congressional committees, with members of the different committees thus having much different influence on different policies.

The asymmetries, however, can be informal. They can arise because some groups know more than do other groups about the effects of different policies. Producers, for example, may better recognize the effects of trade on consumption than do the poor.

We suppose that trade policy adopted in period 1 reflects the preferences of capital owners. Income redistribution in period 2 responds, in contrast, to the political pressures of the poor: the greater the benefit to the poor from an income transfer, the greater the tax imposed on the rich. In particular, the tax, t, in period 2 increases with the marginal utility of income of the poor in period 2.

3.4 Production

The domestic economy produces two final goods (X and Y) with two factors of production (labor and capital). Good X is produced with both labor and capital; good Y is produced with labor alone. Capital is thus a specific factor used in the production of X only. Good X is the import-competing good; Y is the export good. The numeraire is good Y. The production function for X has constant returns to scale in the two inputs:

$$X = f(K, L_x).$$

The production function for Y is

$$Y = L_y.$$

Assume that production of good Y is always positive. Then the production function for Y implies that the wage of labor always equals 1. Since we focus on domestic policy, we proceed with the assumption of a small open economy. Denote the world price of X by p_x^*. Policy interventions make the domestic price of X exceed the world price.

4 Comparing a tariff to a production subsidy

We start by considering the choice between a tariff and a production subsidy.

Suppose that government responds to pressures from producers of the import-competing good by adopting a policy to increase the quantity supplied by domestic firms from its initial quantity of q_0 to the higher quantity q_1. Let the industry consist of many small firms, with an upward-sloping supply curve. This supply curve determines the revenue per unit, $p(q)$, necessary to elicit that supply.[3]

The industry thus does not care whether government grants a subsidy or instead imposes a tariff. But the two policies differ in how they affect the price consumers face, with a tariff raising the price. A higher price has two effects on the marginal utility of income. First, a consumer enjoys less of the good, thereby increasing the marginal utility of consuming the good. Second, the price increase means that with any added income the consumer can buy less of the good. This means that for any given level of consumption, the marginal utility of income declines. Combining the two effects means that a price increase can increase the marginal utility of income, reduce it, or leave it unchanged. For example, if preferences are quasi-linear, a price increase leaves the marginal utility of income unchanged. Below, we will work with more general utility functions, where we will show that a price increase is likely to reduce the marginal utility of income.

The changes in the marginal utility of income under the two different policies will therefore generate different political pressures for redistribution in period 2. We suppose that in period 1, in response to political pressures

[3]Note that to determine the value of a tariff or subsidy, we must consider how income transfers in period 2 will affect demand in period 2.

from the rich, government adopts that policy that will generate less pressure for redistribution in period 2. If the poor heavily consume of the good in question, and if a price increase reduces the marginal utility of income to the poor, then the rich will prefer supporting the domestic industry with a tariff rather than with a subsidy.

To be more explicit, consider a tariff, of τ per unit, and a production subsidy, of s per unit. We assume that $\tau = s$, so that they raise the effective producer price by the same amount. Under a tariff, the consumer price also rises by the same amount. But under a production subsidy the consumer price remains the same as the world price.

4.1 Identical preferences

We assume that preferences are homothetic, making a person's indirect utility function

$$V(p_x, I) = v\left(\frac{I}{\psi(p_x)}\right) \tag{1}$$

where $v' > 0, v'' < 0$, and $\psi(p_x)$ is a price index which satisfies $\psi'(p_x) > 0, \psi''(p_x) < 0$. Since $v_I = \frac{v'}{\psi(p_x)}$ it can be verified that $\frac{dv_I}{dp_x} = \frac{\psi'(p_x)v'}{(\psi(p_x))^2}(-\frac{v''}{v'}\frac{I}{\psi(p_x)} - 1) < 0$, if $-\frac{v''}{v'}\frac{I}{\psi(p_x)} < 1$, that is when the elasticity of marginal utility of real income is less than 1. The marginal utility of income then decreases with p_x. We will make this assumption in the rest of the paper.

Assumption 1: $-\frac{v''}{v'}\frac{I}{\psi(p_x)} < 1$.

Some of our analysis is simplified by proceeding with a particular utility function, as follows:

$$U = \left(\frac{X^\gamma Y^{1-\gamma}}{\gamma^\gamma(1-\gamma)^{1-\gamma}}\right)^\beta; \quad \beta \leq 1. \tag{2}$$

The utility function above is an example of a homothetic utility function. It implies the following indirect utility function for each person:

$$V(p_x, I) = \frac{I^\beta}{p_x^{\gamma\beta}}, \tag{3}$$

where p_x^γ is the consumption price index. It is clear from 3 that the marginal utility of income decreases with p_x.

The income of the capitalists under a tariff is called $I^{K\tau}$; their income under a subsidy is I^{Ks}. The income of workers under a tariff is $I^{L\tau}$; their

income under a subsidy is I^{Ls}. Any tariff revenue is distributed in proportion to the share in factor income; the burden of a production subsidy is also in proportion to the share in factor income. Let imports be M, let $p_x = p_x^* + \tau = p_x^* + s$, and write I^{ij} as

$$\begin{aligned} I^{Ks} &= p_x X - L_x - \frac{p_x X - L_x}{L + p_x X - L_x} sX & (4) \\ I^{K\tau} &= p_x X - L_x + \frac{p_x X - L_x}{L + p_x X - L_x} \tau M & (5) \\ I^{Ls} &= L - \frac{L}{L + p_x X - L_x} sX & (6) \\ I^{L\tau} &= L + \frac{L}{L + p_x X - L_x} \tau M. & (7) \end{aligned}$$

The above implies the following relations between incomes under a tariff and under a production subsidy:

$$\begin{aligned} I^{K\tau} &= I^{Ks} + \frac{(p_x^* + \tau)X - L_x}{L + (p_x^* + \tau)X - L_x} \tau D_x & (8) \\ I^{L\tau} &= I^{Ls} + \frac{L}{L + (p_x^* + \tau)X - L_x} \tau D_x. & (9) \end{aligned}$$

In this expression D_x is the total demand for X under a tariff. From (1) and Roy's identity we get the following expression for D_x:

$$D_x = \frac{I^\tau \psi'(p_x^* + \tau)}{\psi(p_x^* + \tau)}. \quad (10)$$

4.1.1 A production subsidy is more efficient than a tariff

We first establish that aggregate real income measured in terms of the consumption price index is higher under a production subsidy than under a tariff. Define $I^s \equiv I^{Ks} + I^{Ls}$, and $I^\tau \equiv I^{K\tau} + I^{L\tau}$.

Lemma 1 $\frac{I^s}{\psi(p_x^*)} > \frac{I^\tau}{\psi(p_x^* + \tau)}$.

Proof. Note that (8) and (9) imply that $I^\tau \equiv I^s + \tau D_x$. Algebraic manipulation shows that

$$D_x = \frac{I^s \psi'(p_x^* + \tau)}{\psi(p_x^* + \tau) - \tau \psi'(p_x^* + \tau)}. \quad (11)$$

The inequality in Lemma 1 thus reduces to

$$\psi(p_x^* + \tau) - \tau\psi'(p_x^* + \tau) > \psi(p_x^*). \tag{12}$$

Because $\psi'' < 0$, this is always satisfied. ■

We can also show the following relation between the indirect utility functions:

Lemma 2 *$V(p_x^*, I^{Ks}) > V(p_x^* + \tau, I^{K\tau})$ and $V(p_x^*, I^{Ls}) > V(p_x^* + \tau, I^{L\tau})$.*

Proof. To show the first part of the lemma, it suffices to show that $\frac{I^{KS}}{\psi(p_x^*)} > \frac{I^{K\tau}}{\psi(p_x^*+\tau)} \equiv \frac{I^{Ks}+\alpha_k \tau D_x}{\psi(p_x^*+\tau)}$, where $\alpha_k \equiv \frac{(p_x^*+\tau)X - L_x}{(p_x^*+\tau)X - L_x + L}$. Next, we can verify that α_k equals $\frac{I^{Ks}}{I^s}$, which implies that the first inequality in lemma 2 is the same as the inequality in (12). The proof of $V(p_x^*, I^{Ls}) > V(p_x^* + \tau, I^{L\tau})$ proceeds similarly. ■

We thus established that when future periods see no redistribution, both capital owners and workers are better off under a production subsidy than under an equivalent tariff.

4.1.2 Effects of trade policy on redistribution

Next we establish how the possibility of future redistribution to workers may make owners of capital favor a tariff over a production subsidy. Suppose the owners of capital expect government to redistribute income through direct taxation after the trade policy (a tariff or a production subsidy) is adopted. The tax rate depends, in turn, on the lobbying efforts of workers. To be precise, the tax on capital owners, denoted by T, increases with the lobbying effort by a worker, e. The worker's disutility from lobbying effort is $c(e)$, with $c'(e) > 0, c''(e) > 0$. Under a production subsidy a voter in period 2 who is a worker therefore maximizes

$$v\left(\frac{I^{Ls} + T(e)}{\psi(p_x^*)}\right) - c(e). \tag{13}$$

Similarly, under a tariff the workers maximize

$$v\left(\frac{I^{L\tau} + T(e)}{\psi(p_x^* + \tau)}\right) - c(e). \tag{14}$$

The first-order conditions for the optimal choice of lobbying effort under a production subsidy and under a tariff are

$$v'\left(\frac{I^{Ls}+T(e)}{\psi(p_x^*)}\right)\frac{T'(e)}{\psi(p_x^*)} = c'(e) \quad (15)$$

$$v'\left(\frac{I^{L\tau}+T(e)}{\psi(p_x^*+\tau)}\right)\frac{T'(e)}{\psi(p_x^*+\tau)} = c'(e). \quad (16)$$

Assumption 1 along with $v'' < 0$ and $I^{L\tau} > I^{Ls}$ imply the following set of inequalities.

$$v'\left(\frac{I^{Ls}+T(e)}{\psi(p_x^*)}\right)\frac{1}{\psi(p_x^*)} > v'\left(\frac{I^{Ls}+T(e)}{\psi(p_x^*+\tau)}\right)\frac{1}{\psi(p_x^*+\tau)} > v'\left(\frac{I^{L\tau}+T(e)}{\psi(p_x^*+\tau)}\right)\frac{1}{\psi(p_x^*+\tau)}.$$

The last inequality implies that for each level of effort e the left-hand side of (15) exceeds the left-hand side of (16). That is, the marginal return from lobbying effort is higher under a production subsidy than under a tariff. Intuitively, a tariff raises the consumer price of the imported good more than would a production subsidy, reduces the marginal utility from an extra dollar of redistribution, and so results in less lobbying for redistribution. Therefore, the equilibrium lobbying effort and so the equilibrium redistributive taxation is higher under a production subsidy than under a tariff: $T(e_s) > T(e_\tau)$.

The welfare of the capital owners in the two cases are

$$V^{Ks}(T) = v\left(\frac{I^{Ks}-T(e_s)}{\psi(p_x^*)}\right), \quad (17)$$

$$V^{K\tau}(T) = v\left(\frac{I^{K\tau}-T(e_\tau)}{\psi(p_x^*+\tau)}\right). \quad (18)$$

If the redistributive tax responds strongly to lobbying effort, that is, if $T(e_s)-T(e_\tau)$ is large, then $V^{K\tau}$ can exceed V^{Ks}. This dominance is likely satisfied if workers spend a large share of their incomes on the imported good. It can be shown that $V^{K\tau}(T) > V^{Ks}(T)$ if and only if

$$I^{Ks}\frac{\psi(p_x^*+\tau)-\tau\psi'(p_x^*+\tau)-\psi(p_x^*)}{\psi(p_x^*)(\psi(p_x^*+\tau)-\tau\psi'(p_x^*+\tau))} < \frac{T(e_s)}{\psi(p_x^*)}-\frac{T(e_\tau)}{\psi(p_x^*+\tau)}. \quad (19)$$

The left-hand side of the above inequality, $\left(\frac{I^{Ks}}{\psi(p_x^*)}-\frac{I^{K\tau}}{\psi(p_x^*+\tau)}\right)$, is the loss from a tariff in the absence of redistribution; the right-hand side is the gain from a

tariff due to lower taxation. Whenever gains in the form of lower redistributive taxation exceed the non-redistributive loss from a tariff, capital owners prefer a tariff to a production subsidy. We give a numerical example below.

Numerical Example. Let. $C(e) = \lambda e^2,\ T(e) = \phi\sqrt{e},\ \psi(p) = p^\gamma,\ I^{Ks} = 1; p_x^* = 1,\ \tau = 0.1,\ \gamma = 0.5,\ \lambda = 2$ and $\phi = 0.5$ The parameters above imply that $T(e_s) = 0.198$; given that $I^{Ks} = 1$, the redistributive tax under a production subsidy would be 19.8%. The redistributive tax when the tariff is 10% is 19.5%. The value of the left-hand-side in (19) is 0.001; the value of the right-hand side is 0.012. The inequality in (19) is therefore satisfied, and capital owners would prefer a tariff to a production subsidy.

4.2 Heterogeneous preferences

Lemma 1 makes clear that if redistribution in period 2 is designed to maximize aggregate welfare (that is, the sum of welfare of capital owners and workers), then capital owners will prefer a production subsidy to a tariff because utility is higher under a production subsidy, and the government redistributes income equitably. But this result can change if preferences are heterogeneous. In particular, we will show that if workers prefer the imported good more than do capital owners, then capital owners may prefer a tariff over a production subsidy, even if they expect no redistribution in the future.[4]

We continue to assume that the preferences of the capital owners are given by (1), namely

$$V(p_x, I) = v\left(\frac{I}{\psi(p_x)}\right).$$

But assume that workers more stongly prefer the imported good: at each price the ratio of X to Y consumed is higher for workers than for capital owners. Write the preferences of workers as

$$V^L(p_x, I) = v\left(\frac{I}{\phi(p_x)}\right), \tag{20}$$

[4]Gresser (2002) finds that the average U.S. tariff on low-tech consumer goods, which account for a large fraction of spending by the poor is 10.5% ; the average tariff on everything else is 0.8%. He concludes that the U.S. tariffs hurt the poor the most.

so that $\phi(p_x)$ and $\psi(p_x)$ satisfy:

$$\frac{\phi'(p_x)}{\phi(p_x) - p_x\phi(p_x)} > \frac{\psi'(p_x)}{\psi(p_x) - p_x\psi(p_x)}. \tag{21}$$

An example of the above preferences is

$$U^K = \left(\frac{X^\gamma Y^{1-\gamma}}{\gamma^\gamma(1-\gamma)^{1-\gamma}}\right)^\beta; U^L = \left(\frac{X^\delta Y^{1-\delta}}{\delta^\delta(1-\delta)^{1-\delta}}\right)^\beta; \quad \beta \leq 1, \delta > \gamma. \tag{22}$$

The corresponding indirect utility functions are

$$V^K(p_x, I) = \frac{I^\beta}{p_x^{\gamma\beta}}; V^L(p_x, I) = \frac{I^\beta}{p_x^{\delta\beta}}. \tag{23}$$

We note that we would obtain similar results if all consumers have the same preferences, which are not homothetic. That could make rich people consume goods in different proportions than do poor people. Some evidence suggests that non-homotheticity is empirically important. Hunter and Markusen (1988) estimate a linear expenditure system for aggregate demand across thirty four countries and eleven industries, finding that tastes deviate from homotheticity in a statistically significant way. Using a different approach, Tchamourliyski (2002) rejects at any conventional significance level the hypothesis that tastes are homothetic.

4.2.1 No redistribution

Lemma 3 *If preferences are heterogeneous, capital owners may prefer a tariff to a production subsidy, even in the absence of any future redistributive considerations.*

Proof. We want to show that the inequality $\frac{I^{KS}}{\psi(p_x^*)} > \frac{I^{K\tau}}{\psi(p_x^*+\tau)}$ need not hold in this case. Because equations (4)-(9) remain valid, it can again be established that $\alpha_k = \frac{I^{Ks}}{I^s}$. The expression for D_x in (10), however, differs:

$$D_x = \frac{\psi'}{\psi} I^{K\tau} + \frac{\phi'}{\phi} I^{L\tau} = \frac{\psi'}{\psi}(I^{Ks} + \alpha_k \tau D_x) + \frac{\phi'}{\phi}(I^{Ls} + \alpha_l \tau D_x). \tag{24}$$

Re-arranging the above equation gives

$$D_x = \frac{\frac{\psi'}{\psi} I^{Ks} + \frac{\phi'}{\phi} I^{Ls}}{1 - \alpha_k \tau \frac{\psi'}{\psi} - \alpha_l \tau \frac{\phi'}{\phi}}. \tag{25}$$

Upon using the above expression for D_x, the inequality that we are evaluating becomes

$$\frac{1}{\psi(p_x^*)} - \frac{1}{\psi(p_x^* + \tau)} > \frac{\tau(\phi\psi'\alpha_k + \psi\phi'\alpha_l)}{\psi(\phi\psi - \phi\psi'\alpha_k\tau - \psi\phi'\alpha_l\tau)}. \tag{26}$$

The arguments of ψ and ϕ on the right-hand side of (26) are $p_x^* + \tau$. For $\psi = \phi$ the above becomes (12), and hence is always satisfied. When, however, ψ and ϕ satisfy (21) the above inequality may be reversed. Numerical solutions for the Cobb-Douglas preferences given in (23) confirm that the reversal is more likely the larger is the gap $\delta - \gamma$, and the larger the share of labor income in total income, α_l. For low values of τ the consumer surplus loss is small and the inequality in (26) is violated; for higher values of τ the inequality is satisfied. ■

The reversal of the inequality in (26) implies that because a tariff generates revenue whereas a production subsidy requires spending, when preferences are heterogeneous, capital owners may prefer tariffs to production subsidies. Workers pay more of the tariff revenue to the government because they consume more of the imported good, but get back less because the redistribution of tariff revenue is in proportion to the share in factor income. The burden of a production subsidy is proportional to the share in factor income. If the revenue effects of a tariff are sufficiently strong, owners of capital may enjoy higher utility under a tariff than under a production subsidy.

4.2.2 Redistribution

Next we show that even if, in the absence of future redistributional concerns, capital owners prefer a production subsidy to a tariff, when they expect government to redistribute in the future they may prefer a tariff. Let T_i be the lump-sum tax on capital owners which is transferred to workers. Suppose that in period 2 government maximizes aggregate welfare by levying a redistributive tax:

$$\underset{T_i}{Max}\{V^K(p_x, I^{Ki} - T_i) + V^L(p_x, I^{Li} + T_i)\}. \tag{27}$$

Since the algebra is complicated with general utility functions, in this section we use particular functional forms to derive the results. To be precise, V^K is given in (3) and V^L is given in (23). Define $\frac{(\delta-\gamma)\beta}{1-\beta} \equiv \beta'$. The first-order condition for the above welfare maximization is

$$I^{Ki} - T_i = p_x^{\beta'}(I^{Li} + T_i). \tag{28}$$

Simplification yields

$$T_i = \frac{I^{Ki} - p_x^{\beta'} I^{Li}}{1 + p_x^{\beta'}}. \tag{29}$$

The post-tax income of capital owners is

$$I^{Ki} - T_i = \frac{(I^{Ki} + I^{Li}) p_x^{\beta'}}{1 + p_x^{\beta'}}. \tag{30}$$

We ask whether capital owners prefer a tariff over a subsidy, or whether the following inequality holds:

$$\frac{I^{K\tau} - T_\tau}{(p_x^* + \tau)^\gamma} > \frac{I^{Ks} - T_s}{(p_x^*)^\gamma}. \tag{31}$$

Use (30) to rewrite the above as

$$\frac{I^\tau (p_x^* + \tau)^{\beta' - \gamma}}{1 + (p_x^* + \tau)^{\beta'}} > \frac{I^s (p_x^*)^{\beta' - \gamma}}{1 + (p_x^*)^{\beta'}}. \tag{32}$$

Use the earlier result that $I^\tau = I^s + \tau D_x$ to write this as

$$\frac{(I^s + \tau D_x)(p_x^* + \tau)^{\beta' - \gamma}}{1 + (p_x^* + \tau)^{\beta'}} > \frac{I^s (p_x^*)^{\beta' - \gamma}}{1 + (p_x^*)^{\beta'}}. \tag{33}$$

Express D_x as a function of I^s and other exogenous parameters:

$$D_x = \frac{\gamma(I^{K\tau} - T_\tau) + \delta(I^{L\tau} + T_\tau)}{p_x^* + \tau}. \tag{34}$$

Using (29) and (30) gives

$$D_x = \frac{(\delta + \gamma(p_x^* + \tau)^{\beta'}) I^s}{(p_x^* + \tau)(1 + (p_x^* + \tau)^{\beta'}) - \delta\tau - \gamma\tau(p_x^* + \tau)^{\beta'}}. \tag{35}$$

Using the above expression for D_x in (33) gives

$$\frac{(p_x^* + \tau)^{\beta' - \gamma}}{1 + (p_x^* + \tau)^{\beta'}} + \frac{(\delta + \gamma(p_x^* + \tau)^{\beta'})\tau)(p_x^* + \tau)^{\beta' - \gamma}}{(1 + (p_x^* + \tau)^{\beta'})[(p_x^* + \tau)(1 + (p_x^* + \tau)^{\beta'}) - \delta\tau - \gamma\tau(p_x^* + \tau)^{\beta'}]} > \frac{(p_x^*)^{\beta' - \gamma}}{1 + (p_x^*)^{\beta'}}. \tag{36}$$

Numerical simulations verify that even when the inequality in (26) is satisfied, the inequality in (36) may also be satisfied. This implies that even when capital owners prefer a production subsidy in the absence of future redistributional concerns, they may prefer tariffs in the presence of redistributive concerns. In addition, if they prefer a tariff in the absence of future redistributive concerns, they continue to prefer tariffs with redistributive concerns.

Example 1: Set the parameter values as $\alpha_l \in [0, .397]$, $\gamma = 0.5$, $\delta = 0.53$, $p_x^* = 1$, $\beta = 0.8$, and $\tau = 0.1$. Then the inequalities (26) and (36) are satisfied. In the absence of future redistributive concerns, capital owners therefore prefer a production subsidy; in the presence of future redistribution, they prefer a tariff.

Example 2: Let $\alpha_l \in [0.4, 1]$, $\gamma = 0.5$, $\delta = 0.53$, $p_x^* = 1$, $\tau = 0.1$, and $\beta = 0.8$. Then (26) is violated whereas (36) is satisfied. This implies that capital owners prefer tariffs both when they do and do not care about future redistribution.

Intuitively, a tariff reduces both the marginal benefit and the marginal cost of taxation for the redistributive government compared to a production subsidy. The marginal benefit of taxation is the increase in the utility of workers; the marginal cost is the decrease in the utility of capital owners. Since the workers more strongly prefer the imported good, their marginal utility decreases more, which may reduce redistribution under a tariff. In the presence of future redistributive concerns, capital owners may therefore prefer tariffs to production subsidies.

5 Tariff versus quota

A similar analysis can apply to the choice between a tariff and a quota on imports. A quota compared to a tariff makes the aggregate supply curve to the domestic market less elastic, and so reduces the marginal utility of income to consumers.

Compare a tariff to a quota that raises the domestic price of the import-competing good by the same amount in the absence of future redistributive concerns. If government redistributes income to workers, and if workers more strongly prefer the imported good, then the redistribution increases the demand for the import-competing good. Under a tariff, the domestic price remains at the pre-redistribution level and the volume of import increases.

Under a quota, however, the excess demand arising from redistribution cannot spill over into imports, and so the domestic price of the import-competing good increases. This increase in the domestic price of the import-competing good reduces the marginal utility of income of workers. Workers therefore lobby less, making the redistributive tax lower than it would be under a tariff.

When, instead, government maximizes the sum of utilities of individuals, since the marginal benefit from taxation is lower under a quota than under a tariff, government imposes redistributes less under a quota. Capital owners concerned about future redistribution may therefore prefer a quota over a tariff.

6 Notation

β Parameter

γ Parameter

τ Tariff

$c(e)$ disutility from lobbying effort

D_x Total demand for X under a tariff

e lobbying effort

$I^{K\tau}$ Income of capitalists under a tariff

I^{Ks} Income of capitalists under a production subsidy

$I^{L\tau}$ Income of workers under a tariff

I^{Ls} Income of workers under a production subsidy

I^s $I^{Ks} + I^{Ls}$

L Total labor

L_i Labor used in producing good i

M Volume of imports

n_k Number of capitalists

n_l Number of workers

p_x $p_x^* + \tau = p_x^* + s$

p_x^* World price of X

s Production subsidy

X Import-competing good

Y Export good

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