FOREIGN PROFITS AND THE POLITICAL ECONOMY OF QUOTAS

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> Tariffs are the weak, quantitative restrictions, the strong form of government interference with international trade.
>
> —Jan Tumlir (1985)

Introduction

Trade restrictions subsidize domestic producers. Foreign producers, along with consumers and allocative efficiency, are traditionally viewed as losers in the process of redistribution through trade restrictions. The increasing use of quantity restrictions, however, has induced students of trade policy to re-examine part of the traditional approach. New protectionist measures often take the form of discriminatory quotas—quotas allocated to individual foreign producers.[1] Such quotas can make foreign producers beneficiaries of protectionism by giving them a property right similar in value to the forgone revenue of the equivalent tariff. Here, I examine the simple relationship between quotas and the profits of foreign producers in order to demonstrate the surprising range over which a quota can raise foreign

[1]Nontariff barriers of some sort cover between 30 percent and 50 percent of world trade by some estimates. See Tumlir (1985) for a summary of studies examining the growth of nontariff trade restrictions, as well as for an incisive study of the political and legal history of protectionism. The U.S. experience is well documented by Bergsten et al. (1987). They estimate that 18.3 percent of U.S. imports were covered by quantitative restraints in 1986, up from 5.1 percent in 1980. When quotas are instituted and allocated by the exporting country, they are often referred to as voluntary export restraints.

producers' profits above free-trade levels.[2] The results reveal one of the political functions served by quotas and may help explain their increasing use.

Quotas and Profits

In general, quotas are assigned, not auctioned off. They may be granted directly to foreign producers or to individual countries, which then allocate them to producers. In either case, quotas are usually assigned to foreign producers on the basis of their historic market share. Hence, quotas transfer to the foreign producers the forgone revenue of an equivalent tariff. Such quotas are, of course, more profitable than the equivalent tariff to foreign producers. It is revealing to examine the range over which quotas are more profitable to foreign producers than free trade.

As long as the slope of the residual demand curve facing foreign producers is less than infinite—that is, as long as the elasticity of supply of domestic producers is less than infinite—foreign producers, as a group, face a downward-sloping demand curve, and their profit-maximizing output is less than the competitive (free-trade) output. That is trivial. But how much can imports be reduced before foreign producers' profits fall below the free-trade level?

A simple example demonstrates the magnitudes that might be involved. The supply functions of foreign and domestic producers are constructed so that import supply is slightly more elastic than domestic supply, and under free trade, imports have 40 percent of the market:

(1) Market Demand: $d = 30 - p$
(2) Domestic Supply: $s = -3 + 1.5p$
(3) Import Supply: $i = -12 + 2p$
(4) Total Supply: $t = i + s$.

Where d is quantity demanded, p is price, s is domestic supply, i is quantity imported, and t is total supply. Under free trade, the

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[2]Bergsten et al. (1987) present a comprehensive study of the effects of all U.S. quantitative restraints on foreign producers' profits. They estimate that quotas currently in place transfer over $9 billion to those holding the rights to import. The effect of quotas on foreign producers' profits also receives explicit attention in Bhagwati (1989), Deardorff (1987), Kaempfer et al. (1987), Hufbauer et al. (1986), Godek (1985), Clements and Sjaastad (1984), Ono (1984), and Jones (1984). Denzau (1986), Hickok (1985), Tarr and Morkre (1984), and Crandall (1984) are industry specific studies that examine quotas and foreign producers' profits.

equilibrium price is 10, quantity demanded is 20, domestic supply is 12, and import supply is 8. Figure 1 displays the model.

Now replace import supply with a quota. With linear supply and demand, foreign producers' profits are a quadratic function of the quota level. In this example, the profit (π), quota (q) function is

$$(5) \qquad\qquad \pi = -.65q^2 + 7.2q.$$

Figure 2 displays foreign producers' profits as a function of the quota level. Foreign profits are computed using the import supply function as the marginal cost function. The quota level is displayed as the ratio of allowed imports to the free-trade level. That ratio ranges from one (free trade) to zero (a complete prohibition of imports).
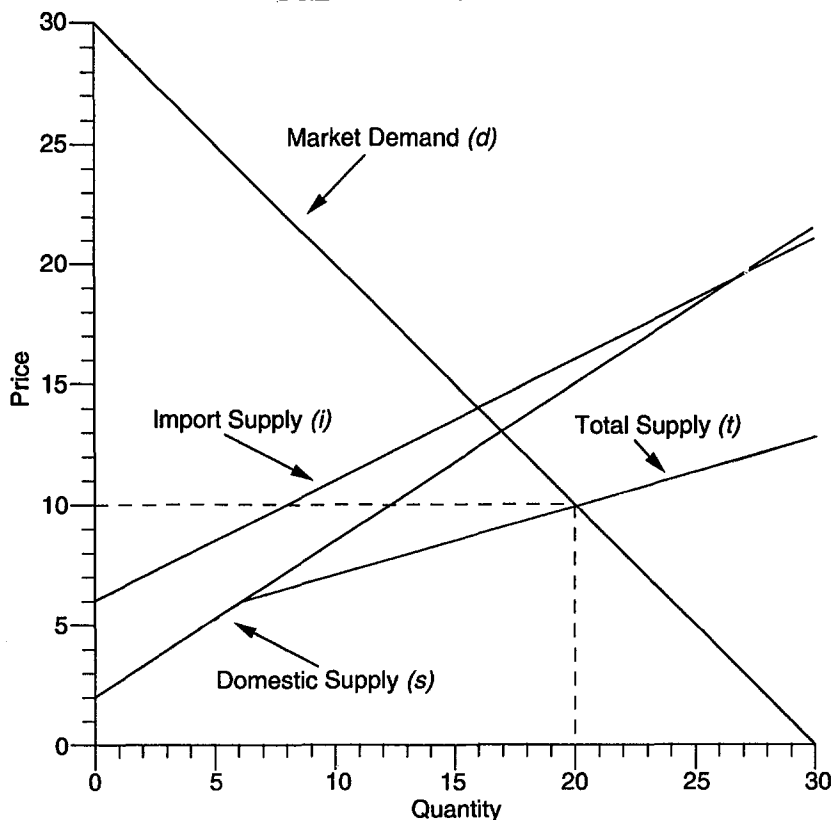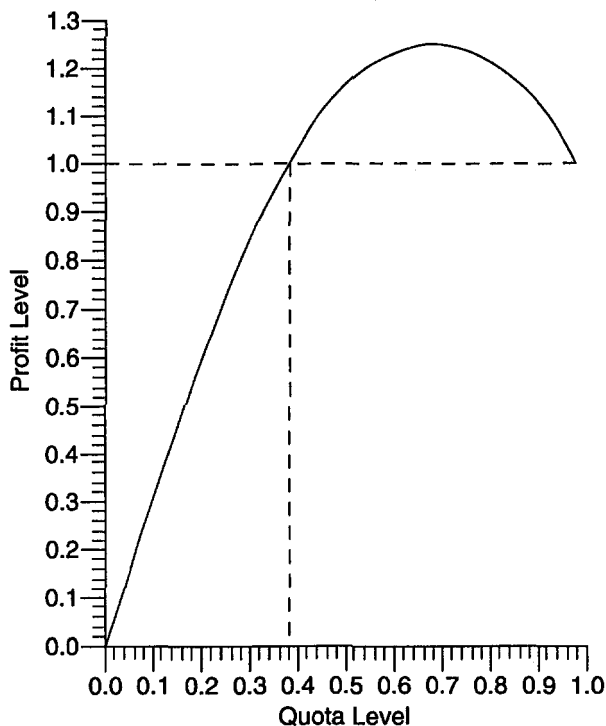
FIGURE 1
FREE-TRADE MODEL

FIGURE 2

FOREIGN PRODUCERS' PROFIT LEVEL AND QUOTA LEVEL

In this example, a quota that allows 69.2 percent of the free-trade quantity maximizes foreign producers' profits. More important, foreign producers do at least as well under a quota as under free trade until imports fall more than 61.5 percent. That is, 38.5 percent is the break-even point for foreign producers. It is the level of imports under a quota, as a fraction of free-trade imports, above which foreign producers' profits will be at least as high as under free trade.

We can solve for the break-even point somewhat more generally, which will also allow us to demonstrate that the more elastic the supply of imports, the greater the range over which quotas raise profits above the free-trade level. With linear functions,

$$
\begin{aligned}
(6) && d &= A + Bp \\
(7) && s &= C + Dp \\
(8) && i &= E + Fp.
\end{aligned}
$$

Profits as a function of the quota level are

(9) $\pi = - \{[1/(D - B)] + [1/(2F)]\} q^2 +$

                    $[(A - C)/(D - B) + (E/F)]q.$

The range, over which profits are above the free-trade level, is defined by the smaller root of the quadratic equation formed by subtracting the free-trade level of profits from the right-hand side of the above equation.

Let p_f represent the free-trade price and q_f the free-trade quantity of imports. The quadratic can then be written:

(10) $-\{[1/(D - B)] + [1/(2F)]\} q^2 +$
              $[(A - C)/(D - B) + (E/F)]q -$
              $\{(p_f q_f) - [(q_f)^2/(2F)] + [q_f(E/F)]\} = 0.$

The constant term is the free-trade profit level. We can use the free-trade equilibrium condition $p_f = (A - C - q_f)/(D - B)$ and the identity $E = q_f - Fp_f$ to simplify the equation to

(11) $-\{[1/(D - B)] + [1/(2F)]\} q^2 +$
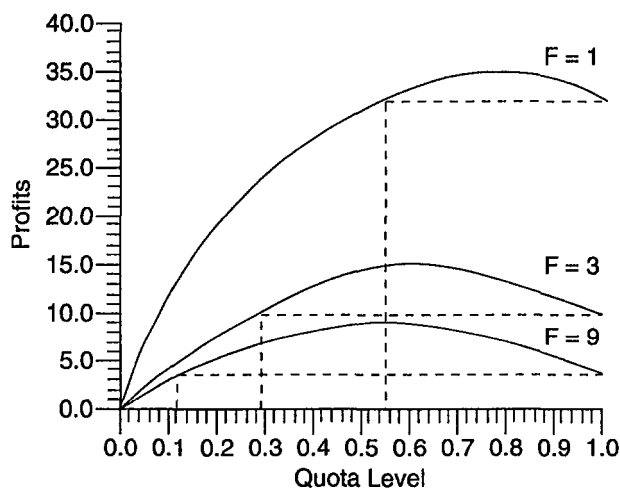 $\{(q_f/F) + [q_f/(D - B)]\} q - [(q_f)^2/(2F)] = 0.$

The smaller root of that quadratic, as a fraction of q_f, is

(12) $(D - B)/(2F + D - B).$

That value is the break-even point for foreign producers. Once again, the break-even point is the level of imports under a quota, as a percentage of free-trade imports, above which profits will be greater than under free trade. Note that that value is a simple function of the slopes and not the intercept terms. For example, regardless of free-trade import shares, if the slope terms are all approximately equal in absolute value, foreign producers' profits increase under a quota unless imports are reduced by more than 50 percent.

Note also how the slope of the import supply function (F) affects the break-even point. The break-even point decreases with F, approaches zero as F approaches infinity, and approaches one as F approaches zero. Thus, for any given domestic supply and demand functions, the more elastic the supply of imports, the larger is the range over which quotas raise foreign profits over the free-trade level. Figure 3 displays the relationship between quota levels and foreign producers' profits for three different values of the import supply response. The values of F used in the figure are 9, 3, and 1. (For clarity, the value of E is adjusted to hold the free-trade import share at 40 percent. Note that the horizontal location of the break-even

FIGURE 3

FOREIGN PRODUCERS' PROFITS AND QUOTA LEVEL AT
VARYING IMPORT ELASTICITIES

point is not affected by whether import shares are held constant in this way. The domestic demand and supply functions are those used in Figure 2.) Only as the import supply response approaches zero does the profit level decline monotonically with the quota level. As the supply response approaches infinity, a foreign producer will prefer any quota level (above zero) to free trade.

While the exact results here depend on linearity, the basic finding is quite general. In many markets, there is likely to be a large range over which quotas can be enforced while increasing the profits of established foreign producers. Given that the market shares of foreign producers are usually not dramatically reduced by quotas, the large rent transfers reported by Bergsten et al. (1987) should not be surprising. With quotas, the political sector can join foreign and domestic producers in an alliance of protectionism, even when imports are significantly reduced.

Political Equilibrium

How do international trade quotas fit into the economic theory of regulation? Following the approach of Stigler (1971) and Peltzman (1976), we explain government policy as a political-support-maximizing tradeoff among competing groups with different lobbying efficiencies—that is, among groups with different levels of influence.

From that perspective, an import restriction is viewed as a politically efficient method of redistributing rents or market surplus from consumers to producers. The political equilibrium is reached at the quota level that maximizes political support.[3]

The maximization problem representing the political process is easy to describe. The function that relates foreign and domestic profits and consumer surplus, as determined by the quota level, is referred to as the surplus transfer function. A political preference function, which defines political utility or support as a function of domestic profits, foreign profits, and consumer surplus, is maximized subject to the constraint of the surplus transfer function. The political preference function would be pictured as an indifference set (a set of iso-political-utility surfaces in consumer surplus, foreign profit, and domestic profit space) maximized subject to the surplus transfer function (a curved line in that space).
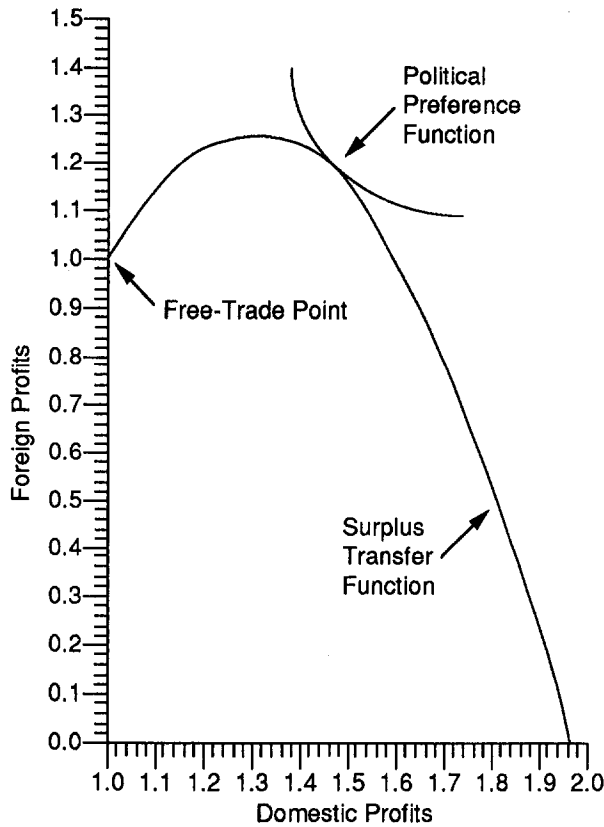
Figure 4 illustrates the equilibrium in two dimensions, ignoring the level of consumer surplus. The figure shows the surplus transfer function for foreign and domestic profits and the maximum attainable level of the political preference function. (In the figure, profits are measured relative to their free-trade levels, so that both values equal one at the free-trade point.)

An important question is: What particular characteristics of the domestic and international markets explain the shape of the political preference function? That is, what makes some industries more powerful than others? For example, why is copper traded relatively freely, while steel imports are constrained by quotas? And why is there a quota on Japanese automobiles, while Japanese motorcycle and light-truck producers face high tariffs? Those questions have received a good deal of attention from economists, although distinguishing between tariffs and quotas is a relatively new line of inquiry.[4]

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[3]Hillman and Ursprung (1988) present a rigorous model of the political economy of alternative forms of trade restriction. Their paper also contains a useful survey of the literature.

[4]For empirical studies of the relation between domestic industry characteristics and types of trade restriction, see Godek (1985), Ray and Marvel (1984), Marvel and Ray (1983), Ray (1981), and the papers they cite. Magee et al. (1989) is a useful survey. For example, as summarized in Godek (1985, p. 700): "Quotas do appear to be a distinct regulatory entity. They are more likely to exist and be more restrictive in larger or more geographically concentrated industries. Tariffs, on the other hand, decrease with the number of firms and increase with the share of the market dealing in final goods. The incentive to generate either type of trade restriction is strongly and inversely related to the average wage." The influence of foreign producers has not yet been controlled for in any systematic way.

FIGURE 4

POLITICAL EQUILIBRIUM

The simple presumption here is that, like the domestic producers, foreign producers may be able to directly influence the political process. Foreign producers may also be able to lobby their governments to intercede on their behalf. Or, as will be discussed, they may be able to bring legal action under international trade agreements to oppose tariff increases. Thus, foreign producers will have varying degrees of influence over the type and level of trade restrictions they face. And as we have seen, if foreign producers are to face a quota, they may not be ardent supporters of free trade.

If we refer to Figure 4 again, corner solutions are possible although rare in practice. If consumers have no political influence (have no weight in the political preference function), imports still may not be totally prohibited. Only when consumers and foreign producers both

lack political influence will no imports be allowed. If foreign produc-
ers are very influential, relative even to domestic producers, quota
levels may approach the foreign producers' profit-maximizing level.
If domestic and foreign producers have no political influence, trade
will be unencumbered.

The political sector can also choose the surplus transfer function
generated by a tariff. In that case, foreign profits and consumer sur-
plus both decline monotonically with imports. A tariff may be used
when foreign producers have no political influence or if quotas are
particularly difficult to administer in a given market. One of the
political benefits of a tariff is, of course, the revenue collected.

However, the imposition of tariffs is more effectively constrained
by international trade agreements than are quotas. The case has
been made that quotas are used specifically to circumvent those
agreements. Tumlir (1985) has argued that discriminatory quotas are
used to benefit foreign producers because those producers could
successfully challenge increased trade restrictions under the General
Agreement on Tariffs and Trade.

The prohibition of high tariffs by international trade agreements
may explain the increased use of quotas in recent years. The trade
agreements lowered tariffs below their political equilibrium levels.
That is, many industries that found themselves with less tariff protec-
tion still had the influence necessary to generate a replacement, the
discriminatory quota. And the replacement allowed the industries to
add another group, the foreign producers, to the lobbying coalition.
From that perspective, the increased use of quotas is the ironic result
of trade agreements that effectively prohibited high tariffs.[5]

Also, it has been observed that quotas are often used to supplement
tariffs. That is, industries that already enjoy a high degree of tariff
protection are more likely to be further aided by nontariff barriers.[6]
That observation is consistent with the explanation that quotas are
used to circumvent international trade agreements. After such agree-
ments, industries with lowered but still higher-than-average tariffs
receive further protection with quotas. Similarly, it may be that a
tariff is used initially to grant protection. If further protection is
required to reach political equilibrium, a quota may then be used,
both to appease the foreign producers and to avoid a tariff in excess
of agreed-upon levels. In either case, it should be observed that the
quota makes the tariff redundant, not vice versa.

[5]That analysis implies that the separate industry lobbying groups were unable to form
a single coalition in order to stop the trade agreements.
[6]See the papers cited in footnote 4, in particular Godek (1985, pp. 693–701).

There is extensive literature on the non-equivalence of tariffs and quotas under different regimes of uncertainty. The consequences of uncertainty can also give quotas a political advantage over tariffs.[7] Quotas mandate precise quantities or market shares without the need to determine or adjust the tariff levels necessary to accomplish the same result. Thus, increased exchange rate volatility may have made quotas preferable and may help explain their recent popularity. In a world of import-level volatility, quotas can simplify the process of protectionism.

From that perspective, quotas can confer another benefit on foreign producers. A quota that specifies a given quantity, as opposed to a market share, can increase the cyclical volatility of domestic production and decrease the volatility of foreign production.[8] Under free trade, an elastic supply of imports insulates the domestic industry from shifts in demand. With a quota, however, the market share of imports is procyclical and shifts in demand are transmitted directly to the domestic industry. In such cases, it would seem that domestic producers are willing to forgo lower variance for a higher mean or that foreign producers are particularly influential.

Many economists have also studied the non-equivalence of quotas and tariffs when the domestic industry is not competitive.[9] Those studies derive interesting results concerning the relative economic and political efficiency of quotas, but they generally do not help us understand the increasing use of quantitative restrictions over time. There is no systematic evidence that the choice of quotas reflects market power in the domestic market, although that may be a fruitful avenue for future research.

Conclusion

The international trade quota can serve determined political goals. It is a policy tool that includes foreign producers as beneficiaries in the process of redistribution in order to circumvent international trade agreements.[10] Since the 1970s, the allocated quota has disrupted and reversed progress toward free trade. In steel, textiles, automobiles, computer chips, and several agricultural products,

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[7]Deardorff (1987), McCulloch (1987), Lloyd and Falvey (1986), and the papers they cite discuss the effects of uncertainty on the political choice of tariffs versus quotas.

[8]Hickok (1985) makes that point succinctly.

[9]See Helpman and Krugman (1989), Anderson (1988), Kaempfer et al. (1987), Cassing and Hillman (1985), Ono (1984), and the papers they cite for recent examples.

[10]From that perspective, suggestions that quota rights be auctioned are naive. Such auctions would duplicate the effects of a tariff and, thus, defeat the political purposes of the quota.

international cartels have been formed and policed under government auspices. Unless countries relinquish the use of discriminatory quotas, international trade may continue to degenerate into formalized market-sharing agreements.

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