

VERs and Price Undertakings under the WTO

Abstract

Under the rules of the WTO, governments are prohibited from negotiating voluntary export restraints (VERs) but can negotiate price undertakings (i.e, import price minima). While these two policies can have identical effects in models of perfect competition, they can have very different economic consequences with imperfect competition. The model presented here shows that with Bertrand duopoly competition, a VER can result in lower domestic prices and profits than a price minimum regime. This suggests that price undertakings should also be prohibited under the WTO.

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I. Introduction

An important reform at the Uruguay Round of trade negotiations was a new restriction on the use of voluntary export restraints (VERs) as a means of limiting imports. Member countries, which had used VERs as a primary import policy too during the 1980s, are now required to forego their use according to the new Agreement on Safeguards (1994). At the same time, the General Agreements on Tariffs and Trade (GATT) still allows minimum price regimes in antidumping petitions. In particular, governments can negotiate “price undertakings” whereby a foreign firm agrees to increase the price it charges on the domestic market in order to avoid the imposition of duties on its sales.

This asymmetric treatment of these two trade policy instruments in the new trade system overseen by the World Trade Organization (WTO) seems nonsensical in a model of perfect competition wherein a price minimum and VER can have similar effects. Properly chosen, the two instruments can result in identically higher prices, lower imports, increased domestic profits and domestic production. They also both would allow foreign firms to obtain identical quota rents in the domestic market. In such a model there is little economic justification for allowing undertakings and prohibiting VERs.

This paper will examine how these two instruments might differ in a duopoly model of international trade where the domestic and foreign firms are Bertrand competitors. The results indicate that a GATT-consistent price minimum regime can allow a domestic firm to raise its prices even more than with a GATT-illegal VER and thus receive higher profits. Furthermore, the domestic governments enforcement of price minima can allow the domestic foreign firm to

raise its price even more would be possible under an “equivalent” quantitative restriction. The model also shows that it is possible that the price instrument can result in lower consumer welfare than the quantity instrument. These results weaken the economic justification for allowing price undertaking agreements to be part of the newly-founded WTO system.

Both means of protection have been used in two important trade jurisdictions. The US used VERs extensively in the 1980s and early 1990s to settle antidumping complaints. Prusa (1992) notes that over one-third of US antidumping petitions during the 1980-1985 period were withdrawn by the petitioners, most of which were settled using VER-type arrangements. Only rarely has the US used a price undertaking, called a “suspension agreement” in US law. European practice has had a very different pattern; Messerlin (1989) notes that nearly half of antidumping petitions in the European Community during the same 1980-1985 period were settled using price undertakings.

The paper is organized in the following way. The paper is motivated in section II which contains a discussion of the GATT treatment of the two trade instruments and their use in the US and EU. Section III contains a short literature review. Section IV includes a brief description of the economic consequences of price undertakings and VERs under both perfect competition and with a domestic monopoly. Section V presents the same comparison with Bertrand duopoly competitors. Concluding remarks are offered in section VI.

II. Institutional and legal background

II. a. GATT Treatment of Price Undertakings and VERs

One of the GATT's main roles is to provide clear rules about when signatory governments may restrict imports. Two of the most important import measures are antidumping duties which deal with "unfairly" priced imports and safeguard mechanisms which allow temporary protection to counter import surges.

Antidumping measures are by far the more common. Under Article VI of the GATT, governments may impose import duties on foreign firms whose exports are sold at less than fair value (i.e., have been dumped) and cause "material injury" to a domestic industry. These duties can be no higher than the dumping margin (i.e., difference between the "normal" and import price) but can also equal the amount of duty needed to eliminate the material injury.

In the pre- and post-Uruguay Round world, governments have also used another method to restrict "unfair" imports under Article VI----import minimum prices, known in GATT-speak as "price undertakings." The Uruguay Round Antidumping Agreement (ADA) specifically allows WTO-member governments to terminate or suspend antidumping proceedings without imposing duties if an exporter agrees to "revise its prices or to cease exports...at dumped prices so that the [domestic] authorities are satisfied that the injurious effect of the dumping is eliminated."¹ Investigations can be restarted and duties imposed if the provisions of the agreement are violated by the foreign firms.

The GATT also allows import restrictions under Article XIX, the so-called safeguard

¹ADA, article 8.1.

clause. This provision allows for protection in the event of import surges and resultant “serious injury,” regardless of whether or not the foreign products are priced “fairly” or “unfairly”. The safeguard mechanisms are intended to be tariff restrictions placed on all imports under the most-favored-nation principle. Countries imposing tariffs under Article XIX are expected to offer compensation to the exporting countries or face the possibility of GATT-sanctioned retaliation.

Despite the presence of GATT-consistent safeguard mechanisms, voluntary export restraints became a favorite instrument of import restrictions for many GATT members in the 1980s. Under such a system, a foreign exporter would limit its exports “voluntarily” to a domestic market. This would increase prices in the importing country and lead to higher per-unit profits and quota rents to the exporting firm. VERs were not covered in the GATT and thus were used to circumvent the safeguard clause. Many governments avoided safeguard measures because “disruptive” exporters could not be targeted in the MFN-based safeguard mechanism and, secondly, the required compensation to exporting countries was difficult to implement in a politically acceptable manner. Consequently, the use of VERs exploded in the 1980s and early 1990s as the Uruguay Round was underway.

Negotiators finally agreed to eliminate VERs explicitly in the Uruguay Round. This prohibition was embodied in Article 11 of the Agreements on Safeguard. The member states agreed that they not “take or maintain any voluntary export restraints, orderly marketing agreements or any other similar measures on the export or import side.”² Informal arrangements were also discouraged: “Members shall not encourage or support the adoption or maintenance by

² Article 11.1.b of the Agreement on Safeguards (1994).

public and private enterprises of non-governmental measures equivalent to [prohibited VERs]”³

Thus, the GATT treats VERs and antidumping in a very different manner. However, as Hindley and Messerlin (1997) correctly point out: “Antidumping, though can produce VER-like outcomes without the need for a formal VER. Moreover, undertakings...that have VER-like characteristics are perfectly legal.”

II. b. Price Undertakings in Practice

Major users of antidumping provisions have adopted these price undertaking rules into their procedures though with different frequency of use.

The United States antidumping system has long allowed investigations to be suspended without the imposition of antidumping duties. The Department of Commerce is allowed under the statute to suspend an investigation if the foreign firm agrees to raise its prices so that any dumping margin is eliminated or any injurious effect on domestic firms is halted.⁴ The agreement must also be “enforceable.” Typically, the dumping margin can be eliminated by the foreign firm either: a) raising the price charged in the US though in principle it could lower the price charged in its home market; or b) raising its price up to its average total production cost. Alternatively, the US government can suspend an investigation if the price undertaking will: 1) eliminate all injury to the domestic industry; and 2) prevent foreign firms from causing “price suppression” or underselling US firms. The prohibition of price underselling typically requires that the foreign

³ Article 11.3 of the Agreement on Safeguards.

⁴AD Manual Ch. 15, p. 3.

price must exceed the US price, adjusted on a quarterly basis. An antidumping petition also can be suspended using quantitative restriction when the US government deems the exporting country to be a “non-market-economy,” such as the People’s Republic of China or the Russian Federation, neither of which have been GATT or WTO members. In such instances, the agreement once again must prevent price suppression or foreign underselling.⁵

In the pre-WTO era, nearly all US antidumping petitions were either brought to their final administrative conclusion (with a decision on dumping and material injury) or the cases were simply withdrawn. Prusa calculates that from 1980-1985, about 38% of all antidumping cases were concluded by a withdrawal of the petition. The vast majority of the withdrawn cases involved foreign exporters agreeing to restrict sales through voluntary export restraints, most notably in the steel industry.⁶ (See Prusa (1992) and Moore (1996) for more details.) In recent years, these VER-type arrangements have generally been removed. The comprehensive system of steel VERs, for example, were terminated in 1992.

Price undertakings have been and remain a rare outcome in US antidumping proceedings. On 1 January 2000, only sixteen “suspension agreements” were in force. Of these, eight cases involved price-based negotiated settlements. Six of these eight cases required foreign firms to eliminate a dumping margin, either by raising their price to their home price (one case) or by setting prices at least equal to their production costs. The other two cases required a minimum

⁵ Barnett and Skinner.

⁶ Current US law (see section 734 (a) (2) of the Tariff Act of 1930, as amended) still allows for the *termination* of an antidumping petition if a QR has been negotiated but Commerce Department policy is to avoid this avenue in the future.

price to eliminate any injury to US firms. One case required the foreign firm to refrain from underselling its US competitors and the other mandated a reference price based on other (non-dumping) import sources. The remaining eight cases were negotiated using VER-type arrangements but these all involved non-WTO members so that the VER ban did not apply. Of these eight cases, three involved simple uranium import quotas. The other five had a quantity constraint combined with a requirement that the foreign firms price above the contemporaneous US market price.⁷

In sum, US suspension agreements involved a number of different arrangements---half of the cases required the foreign firm to refrain from underselling, some required elimination of any dumping margin, and some involved simple quantitative restrictions. An important feature for later modeling is that the elimination of dumping requires a one time increase in the foreign price while the elimination of injury cases impose the restriction that foreign firms match domestic market prices.

The European Union, another user of antidumping measures, has had a very different experience with price undertakings. As noted above, Messerlin (1989) has shown that the European Commission frequently has used price undertakings to settle antidumping measures. In the period between 1980 and 1985 for example, 40.1% of all antidumping cases ended in price undertakings. Of those, 6.9% were ended by the foreign firm agreeing to raise its price to eliminate the dumping margin. Far more frequently (33.2%), the European Commission negotiated agreements under which the margin of “injury “ was eliminated which most often

⁷ See “ <http://ia.ita.doc.gov/stats/suspensions/suspensions.htm>” for more details.

meant that foreign firms agreed not to their undersell European competitors.

A recent antidumping report by the European Commission shows that 23 of the current 161 antidumping orders in place on 31 December 1998 (or about 15% of the EU total) involve price undertakings (European Commission, 1998). Of these, 7 involved quantitative restrictions designed to “eliminate injury,” including two cases with non-WTO members. The remaining cases were minimum prices also chosen to eliminate injury. .

It is important to revisit the role of “price underselling” in price undertakings. The prohibition of “price underselling” in US price undertakings may allow US domestic firms to gain a strategic advantage in its pricing decisions. Foreign firms would be required to mimic US prices and not just eliminate the original dumping margin. It is not clear to this author whether the US prohibition of “price underselling” is consistent with the Uruguay Round Antidumping Agreement which states that: “Price increases under such undertakings shall not be higher than necessary to eliminate the margin of dumping.”⁸ Unfortunately, EU practice is more opaque since specific information about how the price mechanisms were designed are not readily available in the Official of the European Communities. We do not know if EU practice requires that foreign firms refrain from underselling a periodically-readjusted EU price. EU legislation mimics the language of the ADA concerning undertakings⁹ but does not seem to preclude US-style prohibition of price underselling.

⁸See Article 8.1, ADA.

⁹ Council Regulation (EC) No 384/96 of 22 December 1995, Official Journal of the European Communities, No. L56/1.

III. Literature review

Very little research has been conducted into the differences between quantitative restrictions and price minimum regimes. The economics literature contains many analyses comparing the effects of tariffs and quantitative restrictions. Classic treatments include Bhagwati (1965), and Dasgupta and Stiglitz (1977). This literature and subsequent derivatives have generally emphasized how tariffs and quotas will not have identical effects under monopoly, changing demand, and uncertainty.

More recent work has considered other ways in which the two have different effects. Krishna (1989), for example, emphasize how VERs change strategic among firms under duopolistic competition. With prices as strategic substitutes, a VER allows for domestic and foreign firms to earn higher profits than with a tariff. Moore and Suranovic (1994) consider the choice between VERs and tariffs under the disciplines of the GATT. In particular, they show in a model of perfect competition that if a tariff must be accompanied by a compensatory reduction in another good's tariff (as required under the GATT safeguard clause), a VER may actually result in higher welfare. Collie and Su (1998) compare the two instruments in a model of differentiated products and find the counterintuitive result that the VER can be welfare superior to the tariff.

Prusa (1992) takes on an issue more directly related to the current study rather than the traditional comparison of tariffs vs. quantitative restrictions. He looks in a Bertrand competition model at the incentives for a domestic and firm to reach a settlement in an antidumping case rather than see the final imposition of a duty. The firms can reach higher profits if they are able to settle the petition by "forcing" the foreign firm to agree to increase its prices. The domestic firm may

then withdraw the original petition. The comparison studied in Prusa's paper however is whether a duty or negotiated settlement is preferable to firms, rather than a price minimum versus quantitative restriction.

A recent study by Panagariya and Gupta (1998) focus on the antidumping duty versus price negotiations considers issues somewhat similar to this paper. The authors show that with asymmetric information about the outcome of the antidumping investigation, it may be optimal to negotiate an agreement while at other times firms will have no incentive to short-circuit the investigation.

Section IV. Perfect Competition and Domestic Monopoly

In a standard, perfectly-competitive small country partial equilibrium setup, one can pick a voluntary export restraint and price minimum which yield exactly the same results on static production and welfare.¹⁰ A price minimum will result in fewer imports, with each unit sold at a price higher than the world price. The domestic competitors of the homogenous good will also raise their prices, with consequent higher domestic producer and lower consumer surplus. Alternatively, if a VER is picked equal to the level of imports of the price minimum regime, the same price will hold domestically, with equivalent impacts on domestic consumers and producers as well as foreign import quota rents.¹¹

¹⁰We do not model the underlying motivation for dumping or import surges.

¹¹Similar to the well known comparison between quotas and tariffs, if demand is growing, the VER will result in higher domestic prices and the price minimum if the demand curve shifts to the right. This provides some justification for the GATT decision to allow price minima while banning VERs.

Suppose instead that the domestic market is dominated by a monopolist producing a homogenous product available also from a completely competitive international market. In figure 1, we compare the two import policies based on an equivalent final level of imports and ascertain the impact on domestic prices and consumer welfare.

Domestic costs are given by MC^d which is assumed to be increasing in output. Total domestic demand (assumed linear) is given by D . Under free trade, the perfectly competitive foreign sector is allowed to sell domestically at a fixed price, P^w . The domestic monopolist uses this as its marginal revenue curve under free trade and produces where this price equals its marginal cost. The resulting level of domestic production and consumption yields imports equal to $Q^3 - Q^1$.

Assume first that the government sets a VER equal to $Q^3 - Q^2$ and lets prices adjust accordingly. As in Helpman and Krugman (1989), this restriction creates a residual demand curve parallel to the original demand and a residual marginal revenue curve, identified by D^V and MR^V , respectively. Domestic output would be set at Q^V where MC^d intersects MR^V . The domestic price is read off the residual demand curve, D^V and is equal to P^V . Foreign firms will receive quota rents equal to $(P^V - P^w) \times (Q^3 - Q^2)$, i.e., the per-unit rent multiplied by the quantity restriction.

Suppose instead that the domestic government sets a minimum price (P^M) which yields an equivalent number of imports into the domestic economy so that the two policies may be compared. This new minimum price will be the new marginal revenue for the domestic monopoly. It will now produce Q^M and imports will be equivalent to $Q^3 - Q^2$, or the distance

between D and D^V , by construction. Foreign firms will receive rents from the price minimum policy equal to $(P^M - P^W) \times (Q^3 - Q^2)$.

As indicated in figure 1, identical imports under both policies will result in a higher domestic price under the VER ($P^V > P^M$) as well as greater domestic consumer losses. The domestic monopolist also will restrict output more under the VER ($Q^V < Q^M$). Since foreigners are selling an equivalent amount under both policies, the higher price under the VER will result in receive higher rents with the quantitative restriction.¹²

Thus, the domestic monopoly and foreign producers would definitely prefer the VER to the price minimum while domestic consumers would prefer the latter. This also provides some justification for the WTO preference of prohibiting VERs but allowing price undertakings.

V. Bertrand Duopoly Competition

The preference of a price minimum to a VER need not hold within a model of Bertrand duopoly competition. The final effects will depend on how the price minimum policy changes the strategies of the domestic and foreign competitors.

V. a. Free-trade Bertrand-Nash

We first characterize the outcome when domestic and foreign firms set prices in a free-trade Bertrand-Nash (FTN) game. This will provide a benchmark for comparing price

¹²Note that the two policies can be equivalent if the price minimum were set high enough. In particular, if P^M is greater than the price charged by the domestic monopolist in the absence of foreign competition, no imports will enter the country. An import prohibition will result in an equivalent domestic (monopoly) price.

undertakings and VERs.

Suppose that domestic and foreign firms compete in the domestic market and charge P and P^* , respectively for a differentiated product. For simplicity, assume that both firms produce only for the domestic market.

Domestic demand domestic and foreign goods are represented by:

$$Q(P, P^*) \text{ where } Q_P < 0, Q_{P^*} > 0,$$

$$Q^*(P^*, P) \text{ where } Q_{P^*}^* < 0, Q_P^* > 0$$

where subscripts denote partial derivatives. We assume that the firms' goods are imperfect substitutes in domestic consumption and that (the absolute value of) own price effects exceed cross price effects ($|Q_P| > Q_{P^*}$ and $|Q_{P^*}^*| > Q_P^*$). We further assume that the first derivatives of own price effects are equal across products ($Q_{PP} = Q_{P^*P^*}^*$) as are the second derivatives ($Q_{PP} = Q_{P^*P^*}^*$). Domestic and foreign (constant) marginal costs are assumed equal and constant for simplicity. However, we assume that cross effects are not equal, in particular, demand for foreign sales are more sensitive to domestic price changes than vice versa:

$$Q_{P^*} < Q_P^*.$$

Domestic profits are given by:

$$\pi(P, P^*) = P \cdot Q(P, P^*) - C \cdot Q(P, P^*)$$

and foreign profits by:

$$\pi^*(P^*, P) = P^* \cdot Q^*(P^*, P) - C \cdot Q^*(P^*, P)$$

where C denotes (constant) per-unit production costs.

Firms are Bertrand-Nash competitors, i.e., they choose own output prices, while taking

the competitor's prices as constant. Under free-trade, domestic and foreign reactions functions are defined implicitly by the first-order condition for the profit maximization problems and are denoted by $R(P^*)$ and $r^*(P)$, respectively, in Figure 2:

$$\pi_p = (P - C) \cdot Q_p + Q = 0 \quad (1)$$

$$\pi^*_{p^*} = (P^* - C) \cdot Q^*_{p^*} + Q^* = 0 \quad (2)$$

Familiar conditions about second-order conditions for maxima and stability of the Nash equilibrium are assumed:

$$\pi_{pp} < 0; \quad \pi^*_{p^*p^*} < 0;$$

$$[\pi_{pp} \cdot \pi^*_{p^*p^*} - \pi_{pp^*} \cdot \pi^*_{p^*p}] > 0$$

Recalling the assumptions about demand, the stability condition implies that:

$$\pi_{pp^*} < \pi^*_{p^*p}$$

The FTN equilibrium, assumed to be unique, is give by the intersection of the two reaction curves in (P, P^*) -space and is denoted by (P^N, P^{*N}) . This point is denoted by N in Figure 2.

Note that the slope of the domestic and foreign reaction functions, respectively, can be derived from the first order conditions and are equal to:

$$R_{P^*} = - \left[\frac{p_{PP^*}}{p_{PP}} \right] = - \left[\frac{Q_{P^*}}{Q_P + (P - C) \cdot Q_{PP}} \right] > 0 \quad (3)$$

$$r_{P^*} \equiv - \left[\frac{p^*_{P^*P^*}}{p^*_{P^*P}} \right] = - \left[\frac{Q^*_{P^*} + (P^* - C) \cdot Q^*_{P^*P^*}}{Q^*_P} \right] > 0 \quad (4)$$

We assume that prices are strategic substitutes so that the reactions functions are upward sloping in (P,P*)-space. Note as well that as long as own marginal profit effects outweigh cross effects, we have that $r_{P^*} > 1$ and $R_{P^*} < 1$.

We assume that demand parameters are such that $P^N > P^{*N}$, i.e., at the Nash equilibrium, foreign firms “undersell” domestic firms. With linear demand and the assumptions about demand and costs above, a sufficient condition for $P^N > P^{*N}$ is that cross-marginal-profit effects for foreign profits exceed that of domestic profits: $\pi^*_{P^*P} < \pi_{P^*P^*}$, or, equivalently, if $Q^*_P < Q_{P^*}$. In other words, demand for imports must be less sensitive to domestic price changes than vice versa.

We will assume that this price differential is sufficiently high so that the domestic firm can successfully petition its government to impose an administered protection measure against the foreign firm.

V. b. Suspension agreements

We consider two types of suspension agreements, each consistent with provisions under the GATT Antidumping Agreement. Under the two regimes, the foreign firm agrees either to: 1) raise its price so that any injury to the domestic firm is eliminated; or 2) charge a price that eliminates the dumping margin.

The domestic firm is assumed to have full knowledge of the details of the suspension agreement negotiated between the domestic government and the foreign firm. In addition, we assume that the domestic government can enforce perfectly any agreement.

Regime 1: Eliminating injury by price-matching

We analyze first the outcome if the foreign firm agrees to eliminate any injury to the domestic firm. We assume that under this system the domestic government requires that the foreign firm agrees:

- a) to set its initial price at least equal to the free trade domestic (FTN) price; *and*
- b) not to sell for any price below the price charged by the domestic competitor, i.e., price underselling is eliminated.

We do not assume that the domestic government sets the final price pair but instead sets the initial conditions and requires particular behavior by the foreign firm. At the beginning of the suspension agreement, the domestic and foreign firms prices begin at the pair $(P, P^*) = (P^N, P^N)$, i.e, the foreign sets a price equal to the FTN domestic price. However, the firms are free to vary their prices afterwards, so long as the criteria above are met.

Under the suspension agreement, the foreign firm's profit-maximization problem becomes

$$\max_{P^*} p^* \quad s.t. \quad P^* \geq P$$

The lagrangian is:

$$L = \pi^* + \lambda [P^* - P]$$

with associated first-order conditions:

$$L_{p^*} = \pi_{p^*}^* + \lambda = 0$$

$$L_{\lambda} = P^* - P \geq 0$$

If the constraint does not hold so that $\lambda = 0$, then the foreign profit maximization condition is not affected by the suspension agreement and the original free trade foreign reaction curve still pertains. The constraint is more likely to hold, the higher is the domestic price.

Figure 3 illustrates the altered foreign reaction function (denoted by the dark line r^M) under the price-matching formulation. Define point B as the point where the foreign reaction curve intersects the 45° line and P^B as the associated domestic price. For any domestic price such that $P < P^B$, the foreign firm's unconstrained choice would be to charge a higher price than the domestic firm. In other words, the foreign firm would not be subject to the administered protection. Thus, the foreign reaction curve for $P < P^B$ (i.e., $\lambda = 0$) is equivalent to the free-trade Bertrand reaction curve. For $P \geq P^B$, the foreign firm would prefer to undersell the domestic competitor. The suspension agreement would therefore be in force and the foreign firm must match any price chosen by the domestic firm. If the foreign firm's price must equal the domestic price, then the foreign reaction function becomes a 45° line. Finally, note that condition a) above requires that the constrained foreign reaction function under the suspension agreement must pass through $(P, P^*) = (P^N, P^{*N})$ which is denoted by E in figure 3. Thus, r^M , illustrated with the heavy line in figure 3, is the 45° line above B and equal to $r(P)$ below B.

In order to characterize the new equilibrium, we must now determine the behavior of the domestic firm when it knows the structure of the suspension agreement in effect. The domestic

firm knows that the free-trade Nash equilibrium foreign price initially is less than its own price ($P^N > P^{*N} > P^B$), by our initial assumptions. Consequently, the suspension agreement constraint binds ---whatever higher price the domestic firm charges, it knows the foreign firm must raise its price from the original Bertrand-Nash price to the new domestic price thereafter. This knowledge allows the domestic firm to act as a Stackelberg leader, taking into account the new foreign reaction curve r^M .

This outcome is depicted in figure 3 where a domestic isoprofit curve is tangent to r^M at point M with associated domestic and foreign prices, P^M and P^{*M} , respectively.

How does this outcome compare to the original Nash equilibrium? Domestic prices for both domestic and foreign products are higher under the suspension agreement than the FTN outcome. In addition, domestic profits are higher than under free trade Nash price pair: the domestic isoprofit surface associated with point M necessarily dominates the one associated with point N.

Foreign prices must also be higher than under the FTN. This follows from the required initial foreign price increase from P^{*N} to P^N and the subsequent foreign behavior under the agreement which mandates that it match any domestic price increase.

The final outcome on foreign profits however depends on the curvature of its isoprofit curves. If foreign sales are relatively insensitive to changes in domestic prices, i.e., Q_p^* is small, then the isoprofit surface is relatively steep. A sufficiently small Q_p^* will result in lower foreign profits with the price-matching mechanism-----for a given increase in domestic prices, the foreign firm would prefer to raise its prices modestly. The requirement of matching the domestic price

increase would therefore result in lower profits. A relatively flat isoprofit curve could result in higher foreign profits under price-matching compared to the FTN so that the import restrictions would lead to a collusive outcome unavailable under the Bertrand Nash behavior.

We also see that this form of a suspension agreement allows the domestic firm to earn even higher profits at M than that it could have reached if it had been a Stackelberg leader under free trade, i.e., at point ST. The reason is simple. In the presence of the agreement, the foreign firm is required to match the domestic price increase, even though the cross price elasticity of demand mandates that it would maximize its profits by raising its price by less than the domestic price increase (as indicated by the slope of the free-trade foreign reaction curve $r(P)$). Thus, the suspension agreement builds in a higher foreign price which the domestic firm can use to increase its own profits even as it raises its own price.

Most importantly, since prices rise for both domestic and foreign goods, domestic consumer welfare unambiguously decreases.

Regime 2: Elimination of dumping margin

Suppose instead that the administering authority allows for a price undertaking if the foreign firm agrees to raise its price in order to eliminate the difference between the “fair” and export price. This difference is called the dumping margin and will be added to the free-trade Nash price.

For the basis of comparison with the suspension agreement modeled in the price-matching regime, we will suppose that the dumping margin equals the degree of underselling by the foreign

firm: $DM = P^N - P^{*N}$.

The foreign firm's maximization problems therefore will be:

$$\max \pi^* \text{ s.t. } P^* \geq P^T \equiv P^{*N} + DM$$

The foreign firm's decision will be based on charging a price which is greater than or equal to a fixed amount. By construction, this minimum price P^T will be equal to the domestic free-trade Nash price. In addition, this minimum price is not dependent on subsequent domestic firm behavior since P^N is known at the beginning of the game.

Figure 4 depicts the outcome in this case. Consider first the new foreign reaction curve, denoted by the dark line r^T . The foreign firm cannot offer a price below P^N regardless of domestic firm pricing decisions so that r^T must have a vertical section above P^N which goes through $(P, P^*) = (P^N, P^N)$ by construction. For a sufficiently high domestic price, the foreign firm would prefer to charge above $P^* > P^N$ even in the absence of the agreement. Thus, r^T is kinked where the vertical line intersects the free-trade foreign reaction curve at point C. Consequently, the constraint is not binding at high domestic prices rather than low domestic prices as in price-matching regime.

Domestic behavior is altered in a simple fashion. Once again, the domestic firm knows the entire structure of the suspension agreement. If the foreign firm charges P^N , the domestic firm knows that the suspension agreement is binding and will maximize profits knowing that P^* is fixed at P^N . If the foreign firm charges any $P^* > P^N$, the constraint is not binding and the domestic firm's behavior is unaffected, i.e., its reaction function remains $R(P^*)$. Thus, the domestic reaction function is truncated where $R(P^*)$ crosses the vertical line at P^N since any foreign price

below P^N is not admissible under the agreement.

The equilibrium is simply where a domestic isoprofit surface is tangent to r^T which is where the domestic free-trade reaction curve intersects r^T . This point is designated by T in Figure 4. It is evident that foreign prices are still below domestic prices in equilibrium; although the foreign firm originally raises its price to meet the domestic firm's free-trade Nash price, the domestic firm can raise its profits without concern that the foreign firm will drop its price anywhere below P^{*T} .

Once again we can compare the equilibrium to the free-trade outcome.

Prices for both domestic and foreign output are higher at T than the free-trade outcome N so that domestic consumers are clearly hurt by the policy.

Domestic profits under the dumping-elimination regime are higher than the FTN since point T is to the "northeast" of the Nash equilibrium at N along the domestic reaction curve. The impact on foreign profits is once again ambiguous and depends on the shape of the foreign isoprofit surface, just as in price-matching outcome.

Unlike the price-matching suspension agreement, one cannot say with certainty that the domestic profit is higher or lower than the Stackelberg leader outcome under free trade. It will depend on the curvature of the domestic isoprofit surface. In figure 4, an example is depicted where the dumping-elimination regime domestic profits are higher than the Stackelberg outcome (ST) but this need not generally hold.

It is worth noting how the two price undertaking regimes compare. Both domestic and foreign prices will be higher in the price-matching mechanism. The reasoning is simple. Suppose

that the price-pair equals (P^T, P^{*T}) under the price-matching scheme. From above, we know that $P^T > P^{*T} = P^N$ so that this pair cannot be an equilibrium. If the domestic firm raises its prices slightly, the foreign firm must increase its own prices until the two prices are equal. This price change will increase domestic profits. Thus, both firms raise prices beyond (P^T, P^{*T}) under the price-matching scheme. We can also see this in Figure 4 since the dumping-elimination equilibrium at point T lies off the 45-degree line-----the domestic firm will have an incentive to raise prices beyond P^T since this will increase its profits. Domestic consumers will obviously prefer the dumping elimination outcome while domestic producers prefer price matching. The ranking of foreign profit is once again ambiguous.

V. c. Voluntary export restraint

Suppose instead the domestic government requires that foreign sales equal the amount of imports if the foreign firm were to eliminate the dumping margin by matching the initial domestic Nash price, P^N . We assume that this quantitative restriction is the only requirement made by the domestic government. Thus, the initial condition for price and quantity match the initial minimum conditions under the two suspension agreements. Once again, the government does not require any particular *final* price pair outcome.

Define the level of maximum foreign sales as $V = Q^*(P^N, P^N)$, i.e., where both firms charge the domestic Nash price. This level of foreign sales thus equals the level associated with the elimination of any dumping or underselling. It also matches the initial level of prices required under both price undertaking regimes and thus provides a basis of comparison with those earlier

results. Many other price pairs can satisfy this quantity constraint so that $V(P, P^*)$. Since the goods are substitutes, this set of pairs is represented by the line V in figure 5.

The slope of V in (P, P^*) -space has the following property:

$$V_{P^*} = - \left[\frac{Q_{P^*}^*}{Q_P^*} \right]$$

Since own-effects exceed cross-effects, we have that $V_{P^*} > 1$. Using (4), we also know that :

$$r_{P^*} > V_{P^*} > 1$$

This means that V is steeper than the foreign reaction curve under price-matching (r^M) but flatter than the free-trade foreign reaction curve ($r(P)$). Note as well that by definition V must go through point E .

V defines the foreign reaction curve under the VER. For any given domestic price, the foreign firm cannot charge a price to the left of V since domestic demand for imported goods would exceed the quota. Conversely, for a given domestic price, the foreign firm will not charge a price to the right of V since it would be able to gain higher profits by increasing its price up to the point where the quota just binds, i.e., on V .

In order to derive the domestic reaction function, define the following points. Let K be the tangency between a domestic isoprofit curve U and the VER-distorted foreign reaction curve V . Let P^H be the associated domestic price. Let point F be where U crosses the domestic free-trade reaction curve and let P^L and P^{*L} be the associated domestic and foreign prices,

respectively.

As is well known from Krishna (1989), the domestic firm will charge P^H for any foreign price below P^{*L} in the presence of the quota. For $P^* > P^{*L}$, domestic profits will be maximized by using the free-trade domestic reaction function, $R(P^*)$. For $P^* = P^{*L}$, the domestic firm will reach profit level U with any price between P^H and P^L . This results in a mixed strategy outcome for the domestic firm while the foreign firm plays a pure strategy of P^{*L} . Domestic firms will thus reach a level of profit equal to U under the quota.

Once again, we find that prices for the domestic and foreign firms exceed that of the FTN since all possible combinations for the prices under the VER lie to the “northeast” of N . Domestic profits will be higher than both the free-trade Nash and free-trade Stackelberg outcomes. However, the ambiguity about foreign profits due to the curvature of the foreign isoprofit surface remains. Consumers once again are definitely worse off than under free trade.

V. d. Comparison of Suspension Agreement and VER

The central task of the paper is to examine the relative effects of a suspension agreement and a VER. The results of the previous three sections allow us to make some comparisons. Figure 6 displays critical points labeled consistently with the same points in previous figures. The figure shows that it is possible for a VER to welfare-dominate a price undertaking agreement.

Recall that points N , M , and T represent the price combinations under free-trade, price-matching and dumping-elimination, respectively. Points K and F determine the high and low domestic prices in the domestic mixed strategy outcome under the VER. A domestic isoprofit

surface connects points K and F, as shown in the preceding section. Figure 6 is drawn so that, by construction, the $P^H = P^M$. Note that this need not always be the case.

We see that domestic profits will always be higher under the price-matching mechanism than under the VER. This follows from the fact that the price-matching foreign reaction curve r^M is steeper than that of the VER mechanism, r^V . Domestic profits under the VER are higher than the dumping-elimination outcome, however.

The domestic firm obtains the highest profit from the price-matching regime since the foreign firm is required to refrain from any price underselling. Under the assumed demand structure, the foreign firm would prefer to charge a lower price than the domestic competitor. The price-matching mechanism precludes that possibility which allows the domestic firm to take full advantage of a price increase.

The ranking of the different policies in terms of the foreign profit is, as discussed above, sensitive to the underlying demand structure. In the particular example depicted in Figure 6, we label the Nash foreign isoprofit curve as Z. Furthermore, we have arbitrarily set the foreign profit level under the Nash outcome to be equal to the price-matching outcome. In this particular scenario, the price-matching regime results in the domestic firm extracting all of the benefits of the price increases. Surprisingly, the foreign firm is unable to obtain any rents associated with the import restrictions. In addition, foreign profits will generally be lowest under price-matching with higher levels under the VER and the dumping-elimination outcome but this once again depends on the curvature of the foreign isoprofit surface.

The impact on domestic consumers will also vary according to the particular outcome

depicted. Certainly, all of the import restrictions hurt the domestic consumer since all prices rise from the free-trade outcome. But we are interested in the comparisons among the various import regimes.

In Figure 6, we see that the least damaging outcome for consumers is under dumping-elimination. Both the domestic price (P^T) and the foreign price (P^{*T}) are lower than any of the other price combinations under restricted imports.

The comparison between the VER and the price-matching policy is more complicated. In the example shown in Figure 6, the upper bound of the VER domestic price mixed strategy (P^H) is assumed to equal the domestic price under price-matching (P^M). Consequently, the lower bound under the VER is necessarily lower: $P^L < P^M$. Foreign prices under the VER will be lower than under price-matching: $P^{*L} < P^{*M}$. Regardless of the probability of playing the high price under the mixed strategy VER outcome, this constructed example shows us a situation in which the VER would have a smaller negative impact on domestic consumers than a price-matching agreement. Other outcomes are possible, but we cannot rule out this ranking where the price instrument is more harmful than the quantity instrument.

A comparison between the VER and the undertaking which eliminates dumping is relatively straightforward. Eliminating the dumping margin provides little strategic benefits to the domestic firm. It will still be undersold by the foreign firm, even if it can raise its profits somewhat. Given that P^L , the lowest possible domestic price under the VER, is derived by the intersection of a domestic isoprofit curve with the domestic free-trade reaction curve, the dumping elimination domestic price can be higher only if that intersection occurs to the “left” of T.

But this would be a price combination which would violate the VER which is defined by the imports associated with point E. Thus, domestic and foreign prices will be higher under the VER than with eliminating the dumping.

V. Conclusion

Before the successful conclusion of the Uruguay Round, member countries extensively used two policies to restrict imports. The US negotiated a significant number of voluntary export restraint agreements, often as a means to settle antidumping complaints by domestic industries. The European Community often took a different tack and used price undertakings wherein foreign firms were required to revise their pricing to either eliminate dumping or the associated injury to a domestic industry.

At the conclusion of the Round, VERs were banned while price undertakings retained their place in the WTO antidumping system.. As noted above, this differential treatment seems odd, at least from a standard model of international trade since a policy of maximum imports can have very similar effects to one with minimum prices.

This equivalence breaks down if one moves away from a model of perfect competition, however. We have shown, as in the previous literature, a quantitative restriction can be more damaging than a price restriction in the presence of a domestic monopoly with homogenous goods. A VER can result in higher prices paid by consumers, higher domestic profits, and higher rents transferred abroad to foreign firms than if a price minimum is imposed. This result would support the WTO's choice to ban VERs while allowing price undertakings.

This ranking need not hold in a model of Bertrand duopoly competition however. In particular, we find that if a foreign firm is precluded from underselling the domestic competitor, prices paid by consumers can exceed those associated with a quantitative restriction. The reasons is straight-forward. This type of price undertaking will provide the domestic firm with an upper bound on competition from foreigners. In a sense, it is an analog to the standard story of tariffs versus quotas with a domestic monopoly-----the quota determines a maximum level of import competition. In the price-matching scenario, the foreign firm's price choice is similarly restricted. We also find that it is possible that a prohibiting price underselling can result in all rents created by the import restriction could flow to the domestic firm. Of course, a critical assumption in this outcome is that the demand structure dictates that the foreign firm would prefer to charge a lower price than the domestic competitor.

Much less problematic for domestic consumers would be a policy which only stipulates that the foreign firm eliminate the original dumping margin but otherwise refrain from intervening into the interactions of firms. In this scenario, the domestic firm will gain much less strategic advantage since the foreign firm will not have to match *subsequent* price rises by the domestic firm.

Both types of price undertakings are available under the GATT antidumping code. Member countries are allowed to settle an antidumping petition by agreements which either eliminate dumping or the associated injury. The agreement itself is vague about the specific provisions of these two options however. The results of this research would indicate that some revision of the AD agreement would be worthwhile. In particular, the agreement should preclude

forcing a foreign firm to never undersell its domestic competitor. It could be required to raise its price only to the *original* domestic free-trade price but subsequent requirements to eliminate underselling will simply allow the domestic firm to extract more rent in a cartelized market.

In short, there is mixed evidence about whether a VER is worse than a price undertaking in terms of consumer welfare. We find that the specific structure of the price undertaking agreement is critical to determining the subsequent consumer effects of the import policies. One might certainly argue that these results indicate that price undertakings should be eliminated as an option as well.

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Figure 1

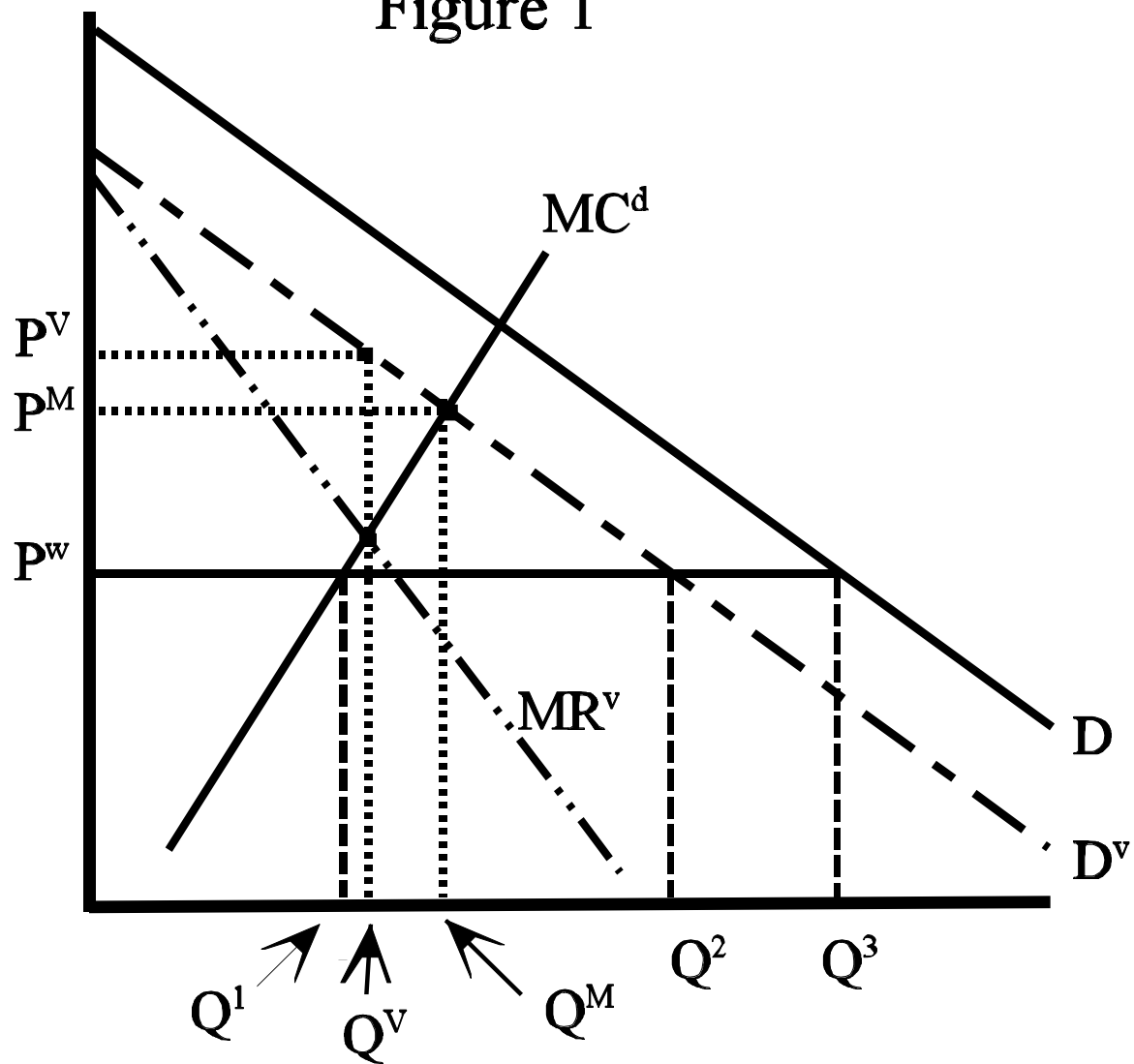


Figure 2

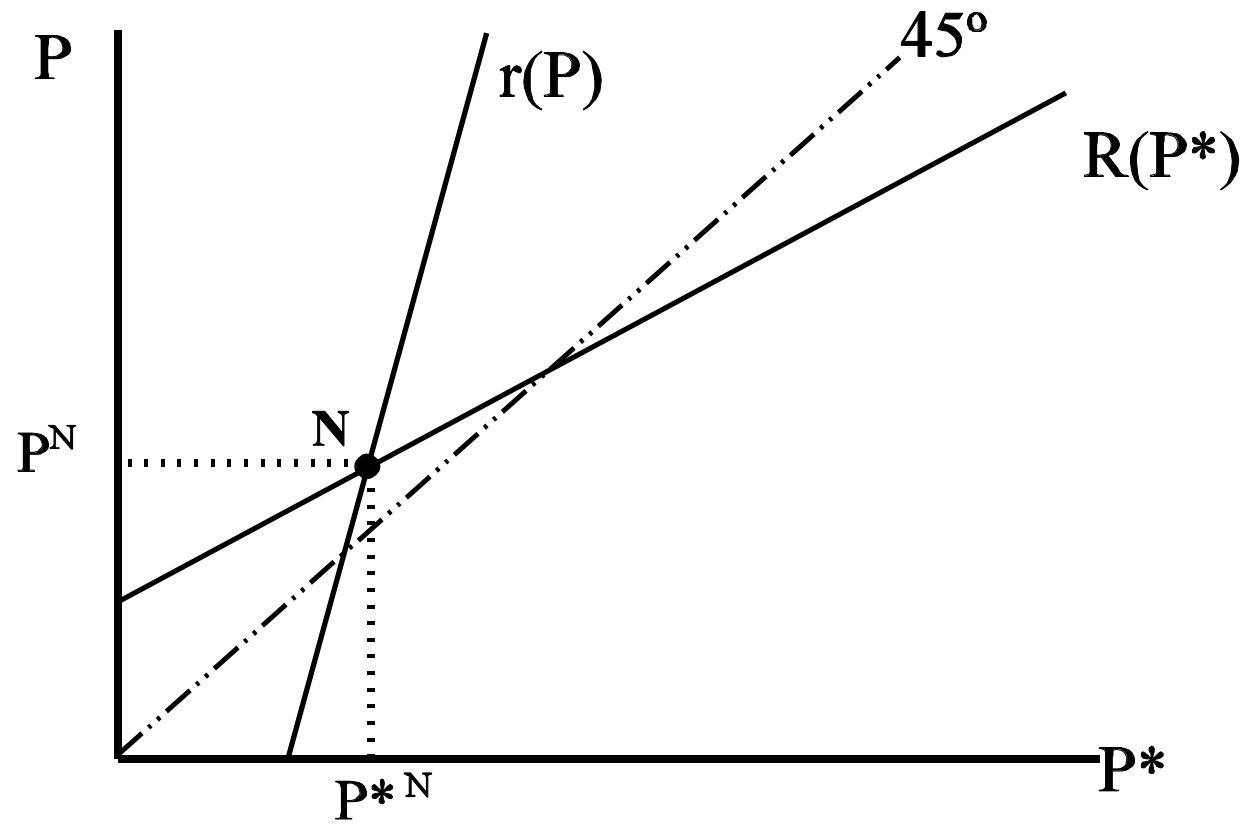


Figure 3

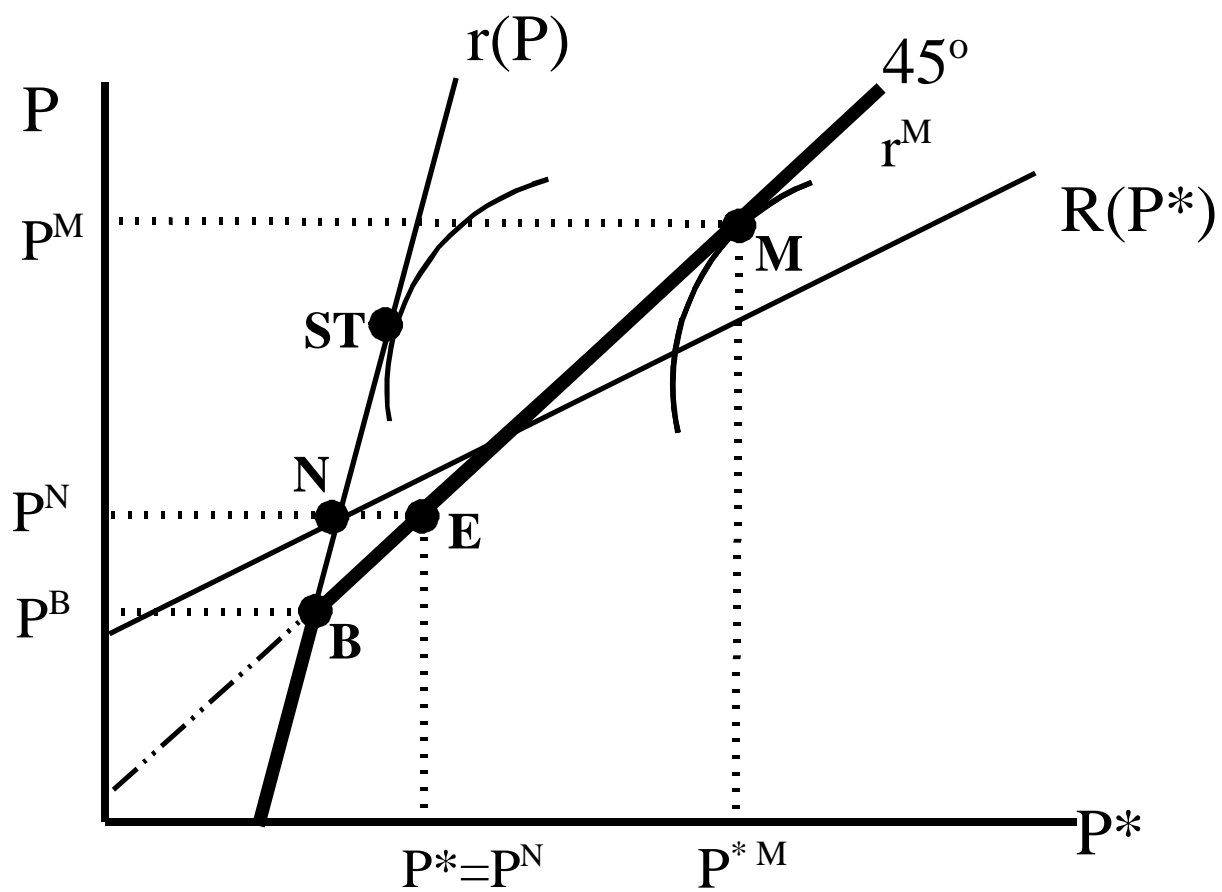


Figure 4

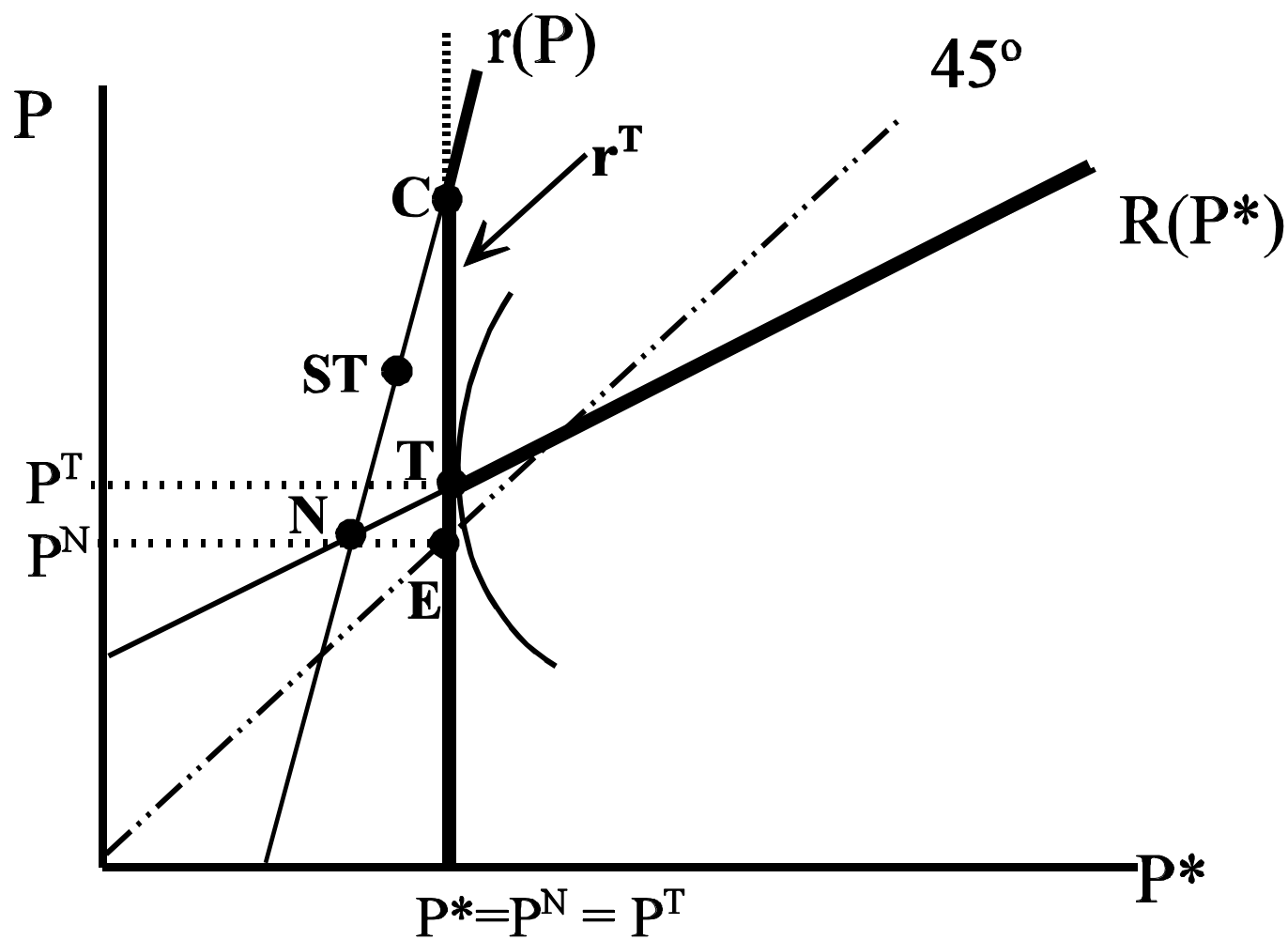


Figure 5

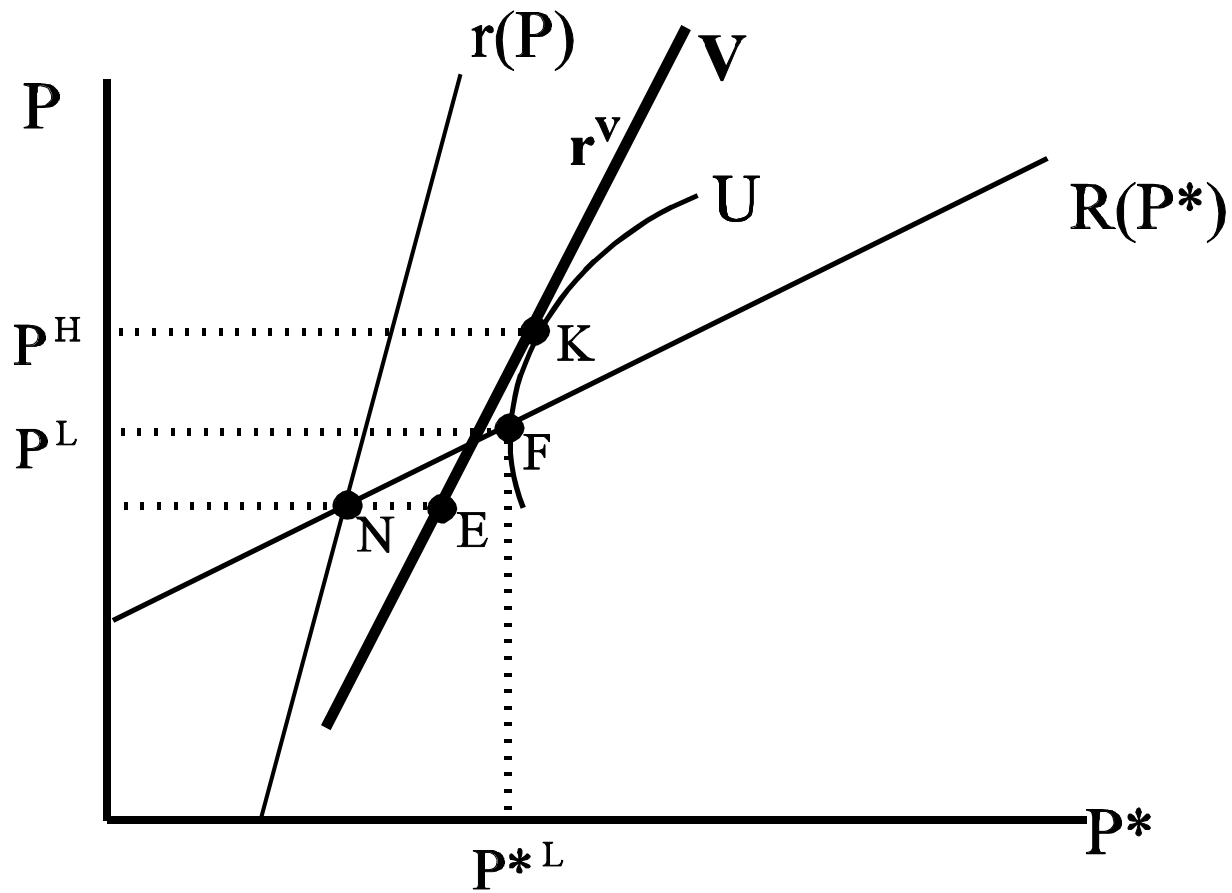


Figure 6

