Tariffs and the Most-Favored-Nation Clause: A Game Theoretic Approach

Andrew Caplin
Princeton University and NBER
Kala Krishna
Harvard University and NBER

I. Introduction

The Most-Favored-Nation Clause (MFNC) has a long history in trade agreements. According to a country most favored nation treatment consists of offering the country a tariff rate at least as low as that offered to any other country on the same commodity. As early as 1226, Emperor Fredrick II extended to Marseilles the same trade privileges previously granted Pisa and Genoa.[1] In 1692, a treaty between Denmark and the Hanse Cities used the term "Most-Favored-Nation." In the early 17th century, most European countries insisted on mutual MFN status. More recently, the MFN clause has come into prominence since the articles of GATT require that signatories extend MFN status to all members.[2]

Eminent trade theorists such as Viner (1924, 1936, and 1950) and Johnson (1965) and more recently Baldwin and Murray (1977) and Finger (1979) have analyzed the MFNC. But there has been little recent work on the economic effects of the MFNC: notable exceptions are Gruenspecht (1985), and Fries (1987). In contrast, there has been a good deal of interest in MFN from a legal standpoint. Jackson, *et al.* (1985) is a useful guide to this work. In addition, there has been a good deal of work on customs unions, which is related to the role of the MFN – see Corden (1985) for a useful

[1] See David (1942), which is the basis for much of this early history.

[2] GATT allows a number of exceptions to the application of the MFNC. The three most important are the structure of imperial preferences, the possibility of having customs unions and the exceptions contained in Article XVI of GATT.

[Seoul Journal of Economics 1988, Vol. 1, No. 3]

survey. A selective discussion of the literature appears in the next section.

While the older work on the MFNC contains a number of interesting ideas, they need a more formal theoretical and empirical basis. In addition, a consolidation of previous work and extensions in an explicitly game theoretic direction seems worthwhile. This is especially so in light of the upcoming GATT negotiations regarding GATT and the lack of recent attention paid to such issues by trade theorists.

Section II presents a brief historical survey and summary of previous research. In Section III we provide a simple model which illustrates the role of the MFNC in a non-cooperative tariff-setting game. We find that the MFNC may raise *all* tariffs, and harm welfare. The model suggests ways in which institutional arrangements might foster trade liberalization. In Section IV, we consider the role of the MFNC in a static model of tariff bargaining. We show that there may be good reason to expect negotiated tariffs to rise in the presence of the MFNC in such a setting. In Section V we consider simple dynamic models of non-cooperative bargaining. This analysis suggests that the MFNC alters the power structure in negotiations. Section VI concludes.

II. A Survey of the Literature

In this section we discuss previous literature on the MFNC. We divide our survey into: (1) the effects of the MFNC on the costs and benefits of negotiations, (2) a discussion of the unconditional as opposed to the conditional MFNC, and (3) the strategic effects of the MFNC.

1. *Costs and benefits of negotiations*: A good deal of attention has been focused on trade treaties as an attempt to obtain some of the benefits of free trade. The costs of a sequence of bilateral treaties or multilateral negotiations which reduce tariffs are thought of as being greater than those of treaties concluded with a single country and extended to all countries via mutual MFN clauses. For this reason, the MFNC is thought of as reducing the cost of negotiations.

However, the MFNC also has an effect on the benefits of negotiation. Under the MFNC, a free rider problem develops. This is because costs, both direct negotiation costs and the cost of reducing

tariffs, fall on the negotiating countries, while benefits accrue to all countries with MFN status.

The free rider problem is less severe for commodities in which the pattern of trade is highly concentrated. For this reason, products on which concessions are granted are selected so that the partners involved in the negotiations are the principal traders. In the limit, goods can be defined in so narrow a manner as to make the MFNC irrelevant. The classic example of this is the following extract from a German–Swiss treaty of 1904 (quoted in Curzon 1976, p. 60, and Viner 1931, p. 101). Tariff concessions were granted on "Large dapple mountain cattle or brown cattle reared at a spot at least 300 metres above sea level and having at least one month's grazing each year at a spot at least 800 metres above sea level." By defining the items on which tariff reductions are obtained in a narrow way, the benefits of negotiation can be "internalized." However, the cost of this procedure is that the fraction of imports "covered" by negotiation falls. To the extent that such narrow definitions in contracts are too costly for universal application and implementation, product selection cannot eliminate the free rider problem, as pointed out by Johnson (1965).

This is the focus of Finger (1979), who looks at the extent to which the positive externality of concessions being generalized to third parties has been "internalized" by such means as product selection. He also examines the cost of such internalization in terms of "coverage." He finds that there is evidence of an internalization-coverage tradeoff, both at a bilateral and multilateral level, and analyzes the extent of the trade–off in successive rounds of negotiations. Table 1 which summarizes some of his work is derived from Table 1 in Finger (1979).

Finger estimates the percentage of imports on which tariff reductions and bindings were negotiated and which originated in the participating countries at a bilateral and multilateral level. This is given in rows (3) and (4) of Table 1. He compares these numbers to the dutiable imports from participants as a percentage of dutiable imports from all countries, the second row of Table 1. The difference between the two, given in rows (5) and (6) of Table 1, indicates the degree to which product selection internalized the benefits of U.S. concessions to countries that granted concessions to the U.S. at a bilateral and multilateral level. As expected, the latter is uniformly larger than the former in all rounds. However, the cost of this is a low value of coverage, i.e., of concession imports as a

TABLE 1
INTERNALIZATION AND COVERAGE IN U.S. NEGOTIATIONS ACROSS THE ROUNDS

(1) Concession imports as percentage of total imports	78	39	7	9	12	46
(2) Dutiable imports from participants as percentage of imports from all countries	65	6	34	67	66	72
Percentage of concession imports originating in participating countries:[1]						
(3) Bilateral	n.a.	16	56	74	69	n.a.
(4) Multilateral	76	18	62	89	96	94
(5) Bilateral internalization = (3)-(2)	n.a.	10	22	7	3	n.a.
(6) Multilateral internalization = (4)-(2)	11	12	28	22	30	22
ROUNDS	Geneva (1947)	Annecy (1949)	Torquay (1951)	Geneva (1956)	Dillon (1960-61)	Kennedy (1964-67)

[1] The denominator of both is the value of U.S. imports on which the U.S. made concessions. The numerator in the bilateral measure is the value of U.S. imports on which the U.S. made concessions which orignated from the country with whom the concession was negotiated. The numerator of the multilateral measure includes in addition imports from other participating countries as well.

percentage of total imports given in the first row of Table 1.

Also notice the shift from bilateral internalization to multilateral internalization as is evident after the Tokyo Round when bilateral internalization fell sharply from 22 to 7, but the multilateral figure fell only from 28 to 22. This is evidence of more multilateral bargaining in later rounds.

Johnson (1965) also looks at the free rider problem and the MFNC but from a slightly different perspective. Johnson postulates a "preference for industrial production" in the countries concerned and explores the implications of this postulate.

2. *MFNC takes on two forms: the unconditional form and conditional form.* In the conditional version (CMFNC), *A* extends to *C* all concessions granted by treaty to *B*, only if *C* matches the concessions made by *B* to *A*. The conditional form was used by the U.S. in nearly all commercial treaties until 1923, when President Harding approved the adoption of the unconditional form in U.S. trade

treaties. During the same period, most European countries used the unconditional form.

Use of CMFNC was the subject of considerable debate in the U.S. in the 1930s. In a series of articles, Viner (1924, 1931, 1936) argued against the CMFNC, and in favor of the MFNC. He had a number of points to make.

(a) Trade creation vs. trade diversion: He argued in favor of the MFNC on the grounds that the unconditional extension of negotiated tariff reductions reduced the possibility of "trade diversion" and increased that of "trade creation" (Viner 1931, p. 97).

(b) Adverse revenue effects: He also argued that bilateral agreements on tariff reduction with a *small* supplier of the import would merely lead to a transfer of tariff revenue from the treasury to the producers in the small supplying country with no gain to domestic consumers since the *small* supplier has, by definition, no impact on the world price.[3]

(c) Finally, Viner argued that:

> The conditional pledge is to all intents and purposes equivalent to no pledge at all when it is received from a country all of whose pledges and whose practice is conditional [e.g., the U.S.], and is in its mode of operation identical with the unconditional pledge when it is received from a country whose pledges or whose practice is unconditional [e.g., France or Britain.] (Viner 1936, p. 88)

The first assertion is straightforward; the CMFNC only guarantees the extension of concessions granted to a third party on "payment" of equivalent compensation; but it is up to the grantor of concessions to determine what is meant by "equivalent." "No country ever derived any advantage from a conditional pledge by the United States, except in a few minor instances as the result of inadvertence on the part of the drafters of the pledge" (Viner, *ibid.*). The second becomes obvious on a little reflection. Say France has a CMFNC with the U.S., and an UMFNC with Britain. It exchanges concessions with Spain; these are automatically extended without compensation to Britain. But if Britain received the concessions gratuitously, then the U.S. is also entitled to receive them free, by virtue of her CMFN status. By this means the U.S. apparently was granted all concessions negotiated between Europeans before 1914,

[3] This was apparently the effect of the discriminatory reduction of duties on Hawaiian goods in 1875 – Hawaiian sugar exports to the U.S. rose but the U.S. price was unaffected.

without having to give anything in return. The CMFNC is thus empty in two ways. First, if used by a country which has an MFNC with any other country, it cannot be truly conditional. Second, if used as the basis of negotiation with all countries, it can be empty of content.

3. *Strategic effects*: If all other countries operate on an MFNC basis, it is in the interest of a single country to operate on a CMFNC basis. This is ruled out by GATT for good reason. This is precisely what the U.S. did prior to 1923. Although this was to the short run benefit of the U.S., it was not necessarily to its long run benefit as argued by Viner.

> The United States ··· has been the one important commercial nation, with the exception since 1918 of vanquished Germany, which has not been reasonably certain of being given equality of treatment in tariff matters by the rest of the Western world ··· The conditional practice, instead of operating, as its supporters contended, to gain specially advantageous conditions for American commerce, failed to secure for it mere equality of treatment with the commerce of other nations. (Viner 1924, p. 37)[4]

One reason Viner gives for this is simply that European irritation with America led them to discriminate openly against it (Viner 1924, p. 37). A more theoretical argument against searching for bilateral reciprocity (by means of the CMFNC) is that treaties are harder to negotiate: for if "the country receiving the concession does not also receive a pledge of most-favored-nation treatment, it is not likely to place a high value on the concession, since not only may it later be extended to other countries, but in subsequent negotiations other countries may be given even greater concessions on the same items, with the result that the original concession becomes totally useless" (Viner 1936, p. 83). In this view the MFNC's importance is as a commitment against future discrimination, rather than as a vehicle for ensuring present equality of treatment.

The MFNC says nothing about the *level* at which tariffs are set. It has also been noted that the provision may inhibit reductions in tariffs. For example, Curzon (1965, p. 59) points out that:

[4] This mirrors to some extent a finding by Finger that LDC's which took an active part in the Kennedy Round (rather than merely sitting back and demanding special treatment) did far better in that round in terms of concessions received. See Finger (1979, p. 435).

> With the rapid decline of trade after 1929 it [the MFNC] lost most of its effectiveness as an agent of freer trade, however. During this period the argument was that tariff concessions could not be granted to individual countries with whom one would have liked to make bilateral concessions because the clause in treaties with third parties spread these concessions to other countries unwilling to "pay" for them. Instead of some concessions between pairs of countries the fear of unrequited benefits for third parties led to a freezing of the then existing situation or even to increases in tariffs equally and indiscriminately applied to everyone. The most-favoured-nation clause, under these circumstances, reinforced protectionist tendencies.

More recently, Gruenspecht (1985) points out that the MFNC put constraints on a government's ability to strategically tax and subsidize its exports,[5] since it cannot choose discriminatory levels of these instruments. Hence, given the tax/subsidy policies of other governments, the MFNC reduces a country's welfare. However, since the equilibrium itself changes, it may raise or lower equilibrium welfare.

In contrast to Gruenspecht, we do not focus on imperfect competition in the product market, but on the effects of institutions, such as the MFNC, on the equilibrium levels of tariffs with competitive product markets. Hence, we focus more explicitly on the game theoretic effects of the MFNC. Recent work along related lines by Fries (1987) focuses on the use of MFNC as a device for preventing discrimination, in a world where the discriminatory outcome is Pareto dominated.

Despite the acknowledgment of possible drawbacks of the MFNC in GATT, the general presumption in the literature is that the MFNC in GATT has been a major force behind trade liberalization.[6] Recently there has been considerable attention paid to the part played by GATT and the MFNC in facilitating trade liberalization.[7] Yet, little formal analysis using simple game theoretic tools has been attempted.

[5] See Brander and Spencer (1982), and Eaton and Grossman (1986) on these issues.

[6] See, for example, Pasvolsky (1936, p. 77), Curzon (1965, p. 68) and Gruenspecht (1985, pp. 2 and 4).

[7] See, for example, "The New Multilateralism: Can the World Trading System Be Saved?" by Camps and Diebold (1986).

III. Non-Cooperative Optimal Tariffs

We provide a benchmark analysis of a world with asymmetric optimal tariffs. In the absence of cooperation, countries set tariffs to trade-off domestic consumer surplus and tariff revenue: non-zero tariffs are a reflection of market power on the demand side of the market. Here, we find that the most favored nation clause may raise the equilibrium value of all tariffs, but with ambiguous effects on welfare. Further analysis of our asymmetric general equilibrium framework should clarify how the impact of MFN depends on preferences and on technological factors.

For the MFN clause to have any impact, it is necessary that each country have at least two external trading partners. Hence a 3-country world is the simplest possible benchmark. We model the commodities subject to MFN as three distinct varieties, and include a numeraire good. Each country is endowed with one unit of one variety of the good, along with a fixed amount of the numeraire commodity. The numeraire is assumed to be freely tradeable among countries, and is not subject to tariffs.

Overall, our model is designed to have a "representative agent" structure: utility functions U^j and endowments W^j of the distinct countries $j = A, B$ and C are related in cyclic fashion, as recorded in equation (1).

$$\begin{aligned} U^A(x_1, x_2, x_3, x_N) &= d\ln x_2 + \ln x_3 + x_N ; W^A = (1, 0, 0, I), \\ U^B(x_1, x_2, x_3, x_N) &= d\ln x_3 + \ln x_1 + x_N ; W^B = (0, 1, 0, I), \\ U^C(x_1, x_2, x_3, x_N) &= d\ln x_1 + \ln x_2 + x_N ; W^C = (0, 0, 1, I). \end{aligned} \quad (1)$$

Goods 1 to 3 are modelled as distinct varieties of a single commodity, which enter utility functions in a separable manner. The utility parameter $d > 1$ reflects the underlying asymmetry of the model: each country places greater weight on one of its two imports, and chooses distinct optimal tariffs. In other respects, the model is designed for simplicity: endowments and preferences dictate that A exports good 1 to B and C, B exports good 2 to A and C, and C exports good 3 to A and B. In addition, we assume that the endowment of the non-traded good, I, is "large" so that in the equilibria studied below, income is sufficient to purchase commodities to the point where the marginal utility of additional income is unity. Finally, the presence of the freely traded numeraire allows us to normal-

ize consumer prices, p, so that $p_N^A = p_N^B = p_N^C = 1$.

We study two distinct tariff-setting regimes. In the first regime, each country sets two distinct ad valorem tariff rates to maximize domestic welfare, taking other tariffs as given. In the second regime, countries are bound by MFN to set a single tariff rate. We begin with some general statements that apply to the model regardless of whether or not the MFN clause is in effect. Note that throughout the analysis we disallow domestic tax and subsidy schemes other than tariffs.

The first observation is that in equilibrium the price that exporters receive must be independent of the export market. The implications for equilibrium prices are recorded in equation (2), where we have introduced the notation q_i to stand for the export price of good i, and the change of variable $z_i^j = \frac{1}{1+t_i^j}$ to represent the ad valorem tariff of country j on good i.

$$\begin{aligned} q_1 &= z_1^B p_1^B = z_1^C p_1^C \\ q_2 &= z_2^A p_2^A = z_2^C p_2^C \\ q_3 &= z_3^A p_3^A = z_3^B p_3^B \end{aligned} \tag{2}$$

Equation (3) records tariff revenue for country B on commodity 1: analogous formulae apply to all imports.

$$TR_1^B = t_1^B x_1^B q_1 = (1 - z_1^B) p_1^B x_1^B = (1 - z_1^B) d. \tag{3}$$

The first substitution in equation (3) follows from equation (2), while setting $p_1^B x_1^B = 1$ results from the Cobb–Douglas form of the demand function, together with the requirements that I be sufficiently large to warrant the unit marginal utility of income. Equation (2) together with the Cobb–Douglas demand functions allow us to summarize the dependence of equilibrium prices on tariff rates in the simple form of equation (4),

$$\begin{aligned} q_1 &= dz_1^C + z_1^B \\ q_2 &= dz_2^A + z_2^C \\ q_3 &= dz_3^B + z_3^A \end{aligned} \tag{4}$$

The implications of equation (4) for tariff rates depend on whether or not the MFN clause is in effect. If not, country A has two instruments z_2^A and z_3^A with which to influence welfare, where

$$U^A(z_2^A, z_3^A) = dln\left[\frac{dz_2^A}{dz_2^A + z_2^C}\right] + ln\left[\frac{z_3^A}{dz_3^B + z_3^A}\right] + \left[I + d(z_1^C - z_2^A) + (z_1^B - z_3^A)\right] \tag{5}$$

The first two terms in (5) represent consumption of goods 2 and 3, while the final term represents tariff revenue, and income from endowments. The first order (and sufficient) conditions for optimal tariffs yield the two equation system,

$$\begin{aligned} z_2^C &= z_2^A(dz_2^A + z_2^C) \\ dz_3^B &= z_3^A(dz_3^B + z_3^A) \end{aligned} \tag{6}$$

Consider symmetric optimal tariffs, so that $z_2^A = z_3^B = z_1^C = \hat{z}_d$, and $z_3^A = z_1^B = z_2^C = \hat{z}_1$. In this case, (6) has the unique solution,

$$(\hat{z}_1, \hat{z}_d) = \left[\frac{\sqrt{d}}{\sqrt{d}+1}, \frac{1}{\sqrt{d}+1}\right], \text{ or} \tag{7}$$

$$(\hat{t}_1, \hat{t}_d) = \left[\frac{1}{\sqrt{d}}, \sqrt{d}\right]$$

Equation (7) confirms that without MFN countries will choose discriminatory optimal tariffs. Specifically, the tariff is higher on the commodity for which the country has the more intense preference: there is an incentive to raise the tariff in line with the degree of monopoly power on the demand side of the market.

With countries sharing mutual MFN status, country A has only one instrument, $z_2^A = z_3^A = z^A$. The first order condition for A's optimal tariff is,

$$\frac{d(z^C + z^B)}{z^A(dz^A + z^C)} = d + 1. \tag{8}$$

At a symmetric optimum, $z^A = z^B = z^C = \hat{z}$ yielding,

$$\hat{z} = \frac{2d}{(d+1)^2} \text{ or } \hat{t} = \frac{1+d^2}{2d}. \tag{9}$$

A comparison between equations (7) and (9) reveals that the MFN clause raises tariff revenue and may actually result in a uniform tariff rate in *excess* of the maximum rate in the absence of MFN. To verify the increase in tariff revenue, let TR^M and TR^N respectively denote the revenues with and without MFN. Direct computations reveal.

$$TR^M - TR^N = (\sqrt{d} - 1) + \left[\frac{d-1}{d+1}\right] \tag{10}$$
$$\sim 1 - \frac{\sqrt{d}+1}{d+1} > 0, \text{ for } d > 1.$$

Equation (10) also shows that MFN causes a greater increase in tariff revenue as d rises. A comparison between $\hat{t}$ and $\hat{t}_d$, the higher of the two non-MFN tariff rates, further highlights the role of d,

$$\hat{t} > \hat{t}_d \iff 1 + d^2 > 2d^{3/2}. \tag{11}$$

Equation (11) shows that $\hat{t}$ exceeds $\hat{t}_d$ for all values of d exceeding a critical value d_c, with $3 < d_c < 4$: with highly asymmetric preferences MFN unambiguously raises tariff rates. Note that the alternate case in which MFN lies below $\hat{t}_1$ is impossible,

$$\hat{t} - \hat{t}_1 = \frac{1 + d^2 - 2\sqrt{d}}{2d} > \frac{(1 - \sqrt{d})^2}{2d} > 0, \text{ all } d > 1. \tag{12}$$

Paradoxically, while MFN may raise all tariff rates, it also raises welfare. The representative utility levels with and without MFN satisfy,

$$U^M = d\ln\left[\frac{d}{d+1}\right] + \ln\left[\frac{1}{d+1}\right] + I \text{ and}$$
$$U^N = d\ln\left[\frac{\sqrt{d}}{\sqrt{d}+1}\right] + \ln\left[\frac{1}{\sqrt{d}+1}\right] + I, \tag{13}$$

so that $U^M > U^N$. The explanation is straightforward: in a symmetric equilibrium the only unknown is the proportion of the exported commodity which goes to the country with the high preference parameter. When tariffs are set separately, countries set higher tariffs on the commodities in which they have greater influence on the demand side of the market, and hence import relatively less of their favored commodity than in the free trade equilibrium. Here, MFN has the beneficial effect of preventing measures which discriminate against the more favored import, restoring the free trade equilibrium.

In a model with production, or with domestic consumption of the export commodity, the MFN-inspired increases in tariff rates will lower the volume of world trade, and have an offsetting effect on welfare. Consider a variant of the above model with domestic demand for the endowment commodity, as specified for country A in

(14) below.

$$U^A(x_1,\ x_2,\ x_3,\ x_N) = lnx_1 + dlnx_2 + lnx_3 + x_N. \tag{14}$$

The analogous adjustments are made for countries B and C. Equation (15) expresses the equilibrium condition for good 1.

$$q_1 = 1 + dz_1^C + z_1^B. \tag{15}$$

The first order conditions for symmetric optimal tariffs in the absence of MFN become,

$$\begin{aligned} z_1(1 + dz_d + z_1) &= 1 + dz_d \\ z_d(1 + dz_d + z_1) &= 1 + z_1. \end{aligned} \tag{16}$$

The following rearrangement is useful

$$\begin{aligned} z_1 + z_1^2 &= z_d + dz_d^2 \\ dz_d(1 - z_1) &= z_1(1 - z_d). \end{aligned} \tag{17}$$

As before, (17) shows that the optimal tariff is higher for the preferred commodity. Manipulation shows that with $d = \frac{(a-1)(a^2-3a+1)}{2a-1}$,

$$\begin{aligned} z_1 &= \frac{a-1}{a} \\ z_d &= \frac{2a-1}{a(a-1)}, \end{aligned} \tag{18}$$

any $a > 1$.

By comparison, the first order condition with MFN can be rearranged to,

$$z^2(d+1)^2 - z(d-1) - (d+1) = 0. \tag{19}$$

Formulae (18) and (19) can be used to show that in the presence of domestic consumption of the export commodity, MFN may raise all tariffs *and* lower welfare when preferences are asymmetric. Note first that the consumption vectors in a symmetric equilibrium with and without MFN, x^M and x^N respectively, obey

$$\begin{aligned} X^N &= \left[\frac{1}{1+dz_d+z_1},\ \frac{dz_d}{1+dz_d+z_1},\ \frac{z_1}{1+dz_d+z_1},\ I\right] \text{ and} \\ X^M &= \left[\frac{1}{1+dz+z},\ \frac{dz}{1+dz+z},\ \frac{z}{1+dz+z},\ I\right] \end{aligned} \tag{20}$$

with the first commodity representing the export commodity, and the second representing the commodity with preference parameter d. From (18) it is clear that without MFN as d rises, so z_1 heads to unity, and consumption of the commodities with the same preference parameter heads to equality. In addition the product dz_d comes to approximate the value of a (recall $d = \left[\frac{a-1}{2a-1}\right][a^2 - 3a + 1]$) as before. With MFN, equation (19) shows that as d rises, so dz approaches $\frac{a}{\sqrt{2}}$, so that for high d both imports are reduced by MFN.

Consider a numerical example with $d = 15$ so that with MFN $z \approx \frac{2 \cdot 16\sqrt{16}}{2 \cdot 16^2} = \frac{1}{4}$ (from the quadratic formula applied to (19)). This results in utility,

$$ln \frac{z}{(1+dz+z)^2} + d\ ln \frac{dz}{1+dz+z} \approx ln \frac{1}{100} + 15\ ln \frac{3}{4}. \quad (21)$$

Without MFN, $d = 15$ corresponds to $a \approx \frac{15}{2}$, so that $dz_d \approx 4$ and $z_1 \approx \frac{13}{15}$ (from (8)); and

$$ln \frac{z_1}{(1+dz_d+z_1)^2} + d\ ln \frac{dz_d}{1+dz_d+z_1} > ln \frac{1}{45} + 15\ ln \frac{3}{4}, \quad (22)$$

exceeding the MFN value.

Overall, for high d, MFN damages welfare in two ways. First the country chooses to levy high tariffs on both commodities, forcing consumption of the one it favors less toward zero. Even for the commodity it prefers, the tariff rate is higher with MFN: hence consumption is shifted still further toward the domestic product.

IV. Institutional Variations

The model of the previous section suggests that although the MFNC is a simple way of changing the institutional structure within which tariffs are set, and thus the equilibrium level of tariffs — it may well raise all tariffs. The natural question to ask then is whether other institutional structures are suggested by the model which would reduce the levels of tariffs in equilibrium.

Suppose that each country could set different tariffs on the two countries from which it imports but that countries have agreed to link the tariffs they set on a particular variety of the good. In particular, suppose that a unit increase in country A's tariff on Variety 2 is linked to a γ decrease in country C's tariff, and vice versa. so that

$$\frac{dz_2^C}{dz_2^A} = \frac{dz_3^B}{dz_3^A} = -\gamma .$$

In this case, the first order conditions for A's optimal tariffs are,

$$\begin{aligned} z_2^C + \gamma z_2^A &= z_2^A (dz_2^A + z_2^C), \quad \text{and} \\ d(z_3^B + \gamma z_3^A) &= z_3^A (dz_3^B + z_3^A). \end{aligned} \tag{23}$$

At a symmetric solution, $z_2^A = z_3^B = z_d$ and $z_3^A = z_2^C = z$, yielding

$$\begin{aligned} &(a)\ z_1 + \gamma z_d = z_d(dz_d + z_1), \quad \text{and} \\ &(b)\ d(z_d + \gamma z_1) = z_1(dz_d + z_1). \end{aligned} \tag{24}$$

Consider the graphs of 24(a) and 24(b) in (z_1, z_d) space. It can be shown that for $\gamma \geq 0$ the equations have a unique non-zero solution, with $0 < z_d < z_1$. It is also straightforward to verify that both graphs shift out as γ increases and have positive slope where they intercept. Hence increases in γ change both tariffs in the same direction. Finally with $\gamma = 1$, $\hat{z}_1 = \frac{1+d}{2}$ and $\hat{z}_d = \frac{1+d}{2d}$, both of which lie above their values when $\gamma = 0$. Hence an increase in γ raises both equilibrium levels of z, lowering optimal tariffs.

The reason for this reduction in tariffs is that the institutional arrangement inhibits each country's monopoly power. An increase in A's tariff on good 2 reduces the *world* price of good 2 less if it is accompanied by a simultaneous reduction of C's tariff on the same good. However, if $\gamma < 0$, the arrangement would increase each country's monopoly power and would raise tariffs by the same arguments.

It is also easy to verify that an arrangement which linked the level of z_2^A positively to z_1^B and z_3^A to z_1^C would also have a similar effect. In this case tariff increases by a country on its imports would be discouraged since they would automatically lead to tariff increases on its exports.

The preceding analysis suggests that it may be useful to think of rules or agreements as cooperatively setting the environment within which countries behave non-cooperatively. Of course, the politics of such agreements are likely to be very complicated and for this reason, our analysis should be interpreted with a great deal of caution.

V. MFN and Bargaining

In practice, tariff-setting frequently involves cooperative elements, with deals struck in either bilateral or multilateral negotiations. In the remaining models we analyze the impact of the MFN clause in a number of different bargaining contexts, which idealize different aspects of tariff-bargaining. As will be seen, the role of MFN varies with the institutional setting within which tariff bargains arise. Hence arguments that MFN was beneficial prior to the GATT agreements need not imply that it aids the GATT bargaining process.

Throughout our analysis, we maintain that tariff bargains between two countries are honored, unless the same parties agree later to alter the terms of the bargain. In practice, there may be little or no reason to honor past agreements as circumstances change. In this case, a vital function of an international trading arrangement is to punish violators. The MFN clause may play a role in such punishments. While this is an interesting possibility, it does not appear that the existing GATT arrangements provide clear punishments: disputes are resolved by intricate bargaining procedures, rather than by strict application of GATT codes. Nevertheless, the topic is sufficiently important to warrant further attention.

The model of this section is of an essentially static nature, and captures the free-rider aspects of bargaining under MFN. The need to lower tariffs to more than one country represents an externality which is not captured in simple bilateral bargains. As a result a simultaneous round of bilateral bargains may be less effective at lowering tariffs with MFN than without. The model appears most relevant to the pre-Tokyo round GATT negotiations, which were conducted on bilateral lines.

In Section VI we turn to dynamic bargains in which countries may bargain sequentially. In these dynamic models, the MFN clause may have more subtle and interesting effects, such as altering the balance of power in negotiations, and making the order of negotiation a key strategic variable.

There is a simple observation which illustrates the difficulties in providing a general bargaining-theoretic rationale for MFN. There is a grand utility possibility frontier available to countries using all the commercial trading instruments at their disposal, such as tariffs. If we view the bargaining process as yielding efficient out-

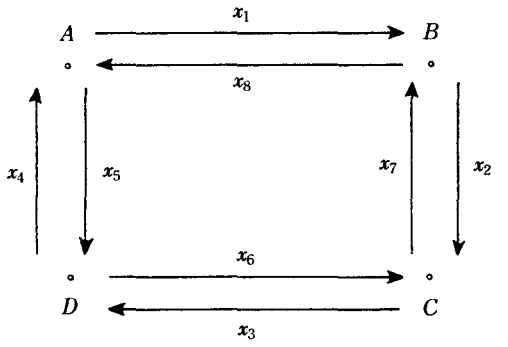

FIGURE 1

comes, as for example with the Nash bargaining solution, then MFN simply limits the tools available to different countries, shifting in the utility possibility frontier. Hence the most positive aspects of MFN can only be illustrated when the bargaining process absent-MFN yields inefficient outcomes. It is for this reason that dynamic analyses, in which issues of time-consistency may arise, appear promising as settings in which MFN may aid efficiency.

A. Simultaneous Bilateral Bargains

As in Section III, we present the simplest "representative agent" structure with sufficient heterogeneity for MFN to have an impact. Here, it is convenient to maintain all variables as powers of 2: there are 4 countries, A through D, and 8 commodities x_1 through x_8. The commodity flows between countries are schematically recorded in Figure 1. It is convenient to use simple reduced-form utility functions which record that optimal tariffs on imports are positive, while countries like tariffs on their exports to be reduced to zero. Equation (25) records country A's utility function as it depends on the ad valorem tariff rates on A's imports and exports,

$$U^A(t_1, t_4, t_5, t_8) = -\{(t_4 - T)^2 + (t_8 - T)^2 + t_1^2 + t_5^2\}. \quad (25)$$

Other countries have analogous utility functions.

The non-cooperative outcome has all tariffs at level T, with welfare $-2T^2$. The symmetric welfare optimum has tariffs at level $T/2$, with welfare $-T^2$. We consider two alternative bargaining structures, with and without MFN. In both cases bargains are bi-

lateral. Without MFN, A and B negotiate over (t_1, t_8), B and C negotiate over (t_2, t_7), C and D over (t_3, t_8) and A and D over (t_4, t_5). With MFN, each country j sets a single tariff rate t^j and so can take part in only one bargain: we let A and B bargain over (t^A, t^B), and C D over (t^C, t^D).

Each bargain is resolved at the Nash bargaining solution. The solution is simplified by noting that the payoff in any bilateral bargain is independent of the outcome of other bargains: this follows from the separability in the utility function. Hence to compute the outcome of the bargain between A and B in the absence of MFN, we need only vary the t_1 and t_8 arguments in the utility function. Note also that the disagreement point between A and B involves reversion to the non-cooperative tariff level of T. Hence,

$$\begin{aligned} U^A(t_1, t_8) - \bar{U}^A(T,T) &= -(t_1^2 + (t_8 - T)^2) + T^2 = 2t_8T - t_1^2 - t_8^2 \\ U^B(t_1, t_8) - \bar{U}^B(T,T) &= -(t_8^2 + (t_1 - T)^2) + T^2 = 2t_1T - t_1^2 - t_8^2 \end{aligned} \tag{26}$$

The Nash bargaining solution solves,

$$\max_{t_1, t_8 \geq 0} (2t_8T - t_1^2 - t_8^2)(2t_1T - t_1^2 - t_8^2). \tag{27}$$

Manipulation of the first order conditions gives the solution $t_1 = t_8 = T/2$, so that bilateral Nash bargains yield the symmetric welfare optimum. This is not surprising in light of the simple pattern of trade in the model.

With MFN, a country sacrifices more from a tariff reduction without gaining more from its partner's willingness to cut tariffs. Concretely, A and B bargain over (t^A, t^B) with utility functions,

$$\begin{aligned} U^A(t^A, t^B) &= -[t_B^2 + 2(t_A - T)^2] \quad \text{and} \\ U^B(t^A, t^B) &= -[t_A^2 + 2(t_B - T)^2]. \end{aligned} \tag{28}$$

As before, the threat point is (T, T), with reference utility level $\bar{U}^A = \bar{U}^T = -T^2$. Hence the Nash bargaining solution solves,

$$\max_{t_A, t_B \geq 0} \{T^2 - [t_B + 2(t_A - T)^2]\}\{T^2 - [t_A^2 + 2(t_B - T)^2]\}. \tag{29}$$

Examination of the first order conditions yields $t = 2T/3$, so that the introduction of MFN raises tariffs and lowers welfare.

In general, there seem to be three reasons why MFN treatment

may impede bilateral negotiations. First, MFN treatment makes any tariff concession more costly since it has to be given to more countries. This is the essence of the point we have detailed above. Second,the benefits of receiving a tariff cut on its exports are smaller to a country since the tariff cuts are given to its competitors as well. Finally, in a sequential framework, each country may be free riding on another negotiation. This effectively reduces the benefits perceived from negotiation, making it less likely to occur.

Against this are arguments that MFN has an important effect in preventing future bargains which unravel existing agreements. To examine these possibilities, we must introduce dynamic considerations.

VI. MFN and Bargaining: Some Dynamic Aspects

In this section we present an extremely stylized model of non-cooperative bargaining, based on the work of Rubinstein (1982). The model shows that an important aspect of the MFNC may be its effect on the distribution of gains between countries. We believe that other important aspects of MFNC will be best undertood in dynamic bargaining models, and view this as a promising avenue of research.

A Stylized Model of the MFNC

In a non-cooperative setting, the possibility of free riding on other negotiations alters the balance of power.[8] How it might do so is the focus of this section.

There is assumed to be a "trade pie" which can be obtained if countries can only agree to its division. The "trade pie" is of a fixed size. There are assumed to be three countries, labeled 1, 2 and 3. The simplest possible pattern of offers is specified. Country 1 makes offers to Country 2 or 3, who can only accept or reject Country 1's offers. Only bilateral negotiations are allowed, and Country 1 is assumed to negotiate with 2 and 3 in sequence. The

[8] There are many unrealistic aspects of the game as specified. The payoffs are not based on a model of tariff setting, but rather are meant to capture one effect of the MFNC – that of free riding being possible. The timing of moves is exogenously specified rather than being endogenous, and the cost, ϕ, incurred by the party being negotiated with is thought of as being independent of x.

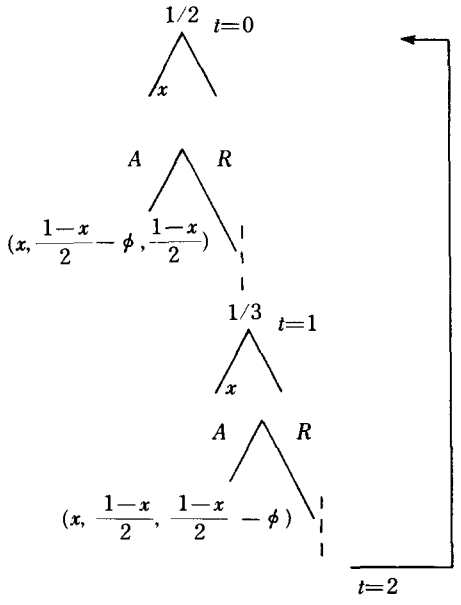

FIGURE 2

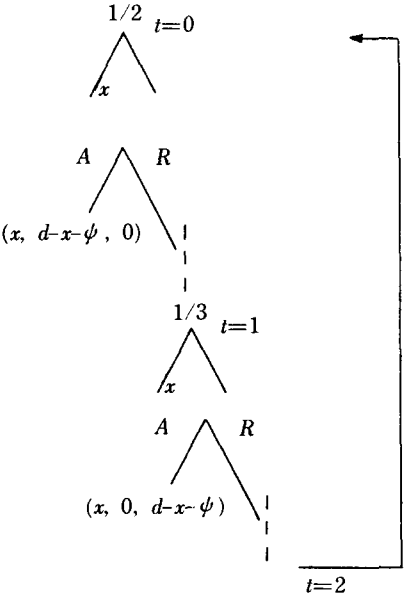

FIGURE 3

structure of the bargaining game is illustrated in Figure 2. At $t = 0$, Country 1 makes an offer to Country 2 of x. An offer of x is a proposal that Country 1 get a payoff of x. While Countries 2 and 3 also benefit, Country 2 does less well than Country 3 who free rides, via MFN, on the negotiations between 1 and 2. It is assumed that while both Countries 2 and 3 share $1-x$ equally, country 2 also incurs a negotiation cost of ϕ. Thus, Country 2 gets $\frac{1-x}{2} - \phi$ and Country 3 gets $\frac{1-x}{2}$, as shown in Figure 2.

If Country 2 refuses 1's offer, then we move into the next period, $t = 1$, when Country 1 makes an offer to Country 3 of x. If Country 3 accepts the offer, then it must pay the negotiation costs and Country 2 free rides since the payoffs are now $(x, \frac{1-x}{2}, \frac{1-x}{2} - \phi)$.

If Country 3 refuses, then we move into the next period and Country 1 makes an offer to Country 2 — so that we are back in the same position as at $t = 0$. As usual, a crucial driving force of the model is impatience, and this is captured by the discount factor $\delta < 1$.

Before analyzing the equilibria of this game, consider its analogue in the absence of MFN, when there is no free rider problem. In this case all benefits can be internalized between the bargaining parties. Thus, if Countries 1 and 2 bargain and come to an arrangement,

there are no benefits for Country 3. As before, Country 2 incurs some cost of negotiating denoted by ψ. The game, in the absence of an MFN, is represented in Figure 3. An agreement between Countries 1 and 2 leaves Country 3 with zero, while one between Countries 1 and 3 leaves Country 2 with nothing. The total size of the pie to be split between Countries 1 and 2 or 1 and 3 is given to be $d > \psi$.

We show that the inability to free ride on bargains curtails the ability of Countries 2 and 3 to *credibly* threaten to refuse offers of Country 1 which give them a low share of the trade pie. The result of this lack of credibility is that in the unique perfect equilibrium Country 1 is able to obtain a payoff of $d-\psi$ so that 2 and 3 are left with a payoff of zero in equilibrium. As usual, agreement is reached immediately in equilibrium.

To confirm that this is a perfect equilibrium outcome, consider the following strategies which form a Nash equilibrium in every subgame. Countries 2 and 3 accept any offer which gives them at least zero in net payoff and reject any offer which does not. Country 1 cannot do better than always offering $x = d-\psi$. It would not do better by offering a lower x, since $d-\psi$ is accepted. It will not offer more than $d-\psi$ at any time since its offer would be rejected. Countries 2 and 3 can do no better by rejecting such offers of $d-\psi$ in any subgame, so that accepting is a best response for them. The uniqueness of the equilibrium is shown in Proposition 1 of the Appendix.

Similarly, for small enough ϕ, i.e. $\frac{1-\delta}{2} \geq \phi$. the unique perfect outcome of the MFN game is for Country 1 to obtain a share, x, of $1-\frac{2\phi}{1-\delta}$, for Country 2 to obtain $\frac{\delta\phi}{1-\delta}$, and for Country 3 to obtain $\frac{\phi}{1-\delta}$. Agreement is again reached immediately and the strategies which support this outcome are as follows. 1 always offers a share for itself of $x^* = 1-\frac{2\phi}{1-\delta}$ to both 2 and 3. 2 and 3 accept any offer x weakly below x^* and reject any x above x^*. These strategies constitute a Nash equilibrium in every subgame. x^* is the largest acceptable offer and so 1 can do no better than to offer it, given the strategies of 2 and 3. Similarly, 2 would obtain $\frac{\delta\phi}{1-\delta}$ by rejecting an offer so that the best response is to accept any offer that gives more than $\frac{\delta\phi}{1-\delta}$, i.e. any x such that $\frac{1-x}{2} - \phi > \frac{\delta\phi}{1-\delta}$. Rearranging terms shows that this means accepting any x weakly below x^*. Similarly, 2 would be best off rejecting any offer x above x^*. The same arguments apply for 3, so that these strategies do support a subgame perfect equilibrium. Uniqueness of this equilibrium is estab-

lished in Proposition 2 of the Appendix.

Thus, in the absence of MFN Country 1 can exclude the country it is bargaining with, 2 or 3, by bargaining with its opponent. This allows it to appropriate all the surplus in the transaction. However, MFN prevents such exclusion, giving more bargaining power to countries 2 and 3, and prevents 1 from appropriating all the surplus.

VII. Conclusions

We have outlined some new approaches to assessing the economic impact of the Most-Favored-Nation Clause. Preliminary analysis suggests that the Clause may not have the powerful liberalizing effects suggested by proponents. Further empirical and theoretical analysis is required before more definitive statements can be made. Such work may also suggest more appealing alternatives to MFN in tariff agreements. The topic is made urgent by the current round of trade negotiations which continue to place MFN in a central position.

Appendix

Proposition 1

In the game depicted in Figure 3, it is a dominated strategy for 2 (or 3) to accept any offer by 1 of $x > d-\psi$ and to reject any offer $x \leq d-\psi$. Also, it is a dominated strategy for 1 to offer any x other than $x = d-\psi$.

Proof: It is a dominated strategy for 2 (or 3) to accept a share for 1 exceeding $d-\psi$ since this gives 2 (or 3) a negative payoff. By refusing all offers 2 can attain his security level of zero.

It is also a dominated strategy for 2 (or 3) to reject any offer by 1 of $x < d-\psi$. The proof consists of the iterated removal of dominated strategies. To begin with, 2 will never refuse an offer by 1 or $x = 0$ which gives him a payoff of $d-\psi$. This is therefore the most 2 can get after two periods. Thus, any offer today which gave 2 more than $\delta^2[d-\psi]$ could not be rejected by 2. Therefore, any x such that $d-x-\psi > \delta^2[d-\psi]$ could not be rejected, i.e. any $x < [1-\delta^2][d-\psi]$ could not be rejected by 2 in two periods. Thus, 1 would at most offer an $x = [1-\delta^2][d-\psi]$ so that at best 2 could hope for

$d-\psi-[1-\delta^2][d-\psi] = \delta^2[d-\psi]$ in two periods. Thus, 2 could not reject any x which gave him more than $\delta^4(d-\psi)$ today—i.e. any x such that $d-x-\psi > \delta^4(d-\psi)$ or $x < (1-\delta^4)(d-\psi)$. Continuing the iteration shows that at the N^{th} step, any $x < (1-\delta^{2N})(d-\psi)$ could not be rejected. As $N \to \infty$ this shows that no $x < d-\psi$ can be rejected by 2 in a perfect equilibrium. The same arguments also show that 3 cannot reject any $x < d-\psi$. This leaves only the strategy accept any $x < d-\psi$ and reject any $x > d-\psi$ for 2 and 3. This rules out any strategies for 1 which do not involve offering $x = d-\psi$. Offering $x < d-\psi$ is dominated by offering a slightly higher x which is also accepted. Offering an $x > d-\psi$ is dominated by offering $d-\psi$ since the former is rejected and the latter accepted, so that the most 1 can get is $\delta[d-\psi]$ by offering $x < d-\psi$, which is less than $d-\psi$. It is then iteratively weakly dominated for 2 (or 3) to reject $x = d-\psi$.

Proposition 2

If $\phi < (1-\delta)/2$, the unique perfect equilibrium outcome consists of 1 obtaining $1-\frac{2\phi}{1-\delta}$, 2 obtaining $\frac{\delta\phi}{1-\delta}$, and 3 obtaining $\frac{\phi}{1-\delta}$.

Proof: As above, it can be shown by iterated removal of dominated strategies that the equilibrium strategies are unique and correspond to 1 offering $x^* = 1-\frac{2\phi}{1-\delta}$ and 2 and 3 accepting any x weakly below x^* and rejecting any x above x^*.

It is worth noticing that if $\phi \geq 1/2$, there are no gains from agreement possible for the person being bargained with and so no agreement can be reached. If $1/2 > \phi \geq \frac{1-\delta}{2}$, no stationary equilibrium exists. However, two non-stationary equilibria exist. One involves 1 always offering $x^* = 1-2\phi$ and 2 accepting any $x \leq x^*$ and rejecting any $x > x^*$ while 3 only accepts x which gives 3 at least $\delta\phi$. The other has the roles of 2 and 3 reversed. The first equilibrium involves immediate agreement, while the second involves a one-period delay.

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