PROCOMPETITIVE MARKET ACCESS

Kala Krishna
Suddhasatwa Roy
Marie Thursby

Working Paper 6184

NBER WORKING PAPER SERIES

PROCOMPETITIVE MARKET ACCESS

Kala Krishna
Suddhasatwa Roy
Marie Thursby

Working Paper 6184
http://www.nber.org/papers/w6184

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 1997

Krishna's research was supported by the NSF under grant No. SBR-9320825 administered by the National Bureau of Economic Research. This paper is part of NBER's research program in International Trade and Investment. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

Procompetitive Market Access
Kala Krishna, Suddhasatwa Roy,
and Marie Thursby
NBER Working Paper No. 6184
September 1997
JEL No. F13
International Trade and Investment

ABSTRACT

The view that U.S. businesses are being unfairly hurt by barriers to access in foreign markets has raised demands for market access requirements (MARs) from within U.S. industry and government alike. We show that, contrary to the prevailing wisdom of the recent literature, MARs can be implemented in a procompetitive manner. The basic idea is that the requirement must be implemented in a way that provides the right incentives for increasing aggregate output or lowering prices. We provide two examples to illustrate this point. In the context of a Cournot duopoly, we show that an implementation scheme in which the U.S. firm receives a preannounced subsidy if the market share target is met leads to increased aggregate output. In a second example, we show that a MAR on an imported intermediate input can lead not only to increased imports of the intermediate good, but also to increased output in the final good market using the input. The intuition is that increasing output of the final good helps to make the MAR less binding and this reduces the marginal cost of production in the final good market. Thus our results buttress the point made in Krishna, Roy and Thursby (1997) that the effects of MARs depend crucially on the details of their implementation.

Kala Krishna
Department of Economics
The Pennsylvania State University
Kern Graduate Building
State College, PA 16802-3306
and NBER
kmk4@psuvm.psu.edu

Suddhasatwa Roy
Department of Economics
Purdue University
13 10 Krannert Building
West Lafayette, IN 47907-l 3 10

Marie Thursby
Department of Economics
Purdue University
13 10 Krannert Building
West Lafayette, IN 47907-l 3 10
and NBER
mct@mgmt.purdue.edu

1. Introduction

The view that U.S. businesses are being unfairly hurt by barriers to access in foreign markets has raised demands for market access requirements (MARs) from within U.S. industry and government' alike. For example, in the 1980's, U.S. semiconductor firms successfully lobbied for MARs to increase U.S. market share for semiconductors in Japan. In July 1993, the Clinton administration provided further endorsement of this view with the Framework Agreement to initiate negotiations for market opening measures in Japan across four broad sectors-automobiles and auto parts, medical equipment, telecommunications and insurance. Thus MARs are fast becoming a staple in the U.S. government's arsenal of trade policy instruments. However, despite the growing importance of MARs, not much attention has been paid to how they are implemented. Clearly, failure to understand the mechanisms used to attain market access represents a serious knowledge gap that precludes sound policy decision making.

Previous theoretical analyses – Irwin (1994), Greaney (1996a) and Krishna, Roy and Thursby (1997), among others – have suggested that MARs unambiguously reduce competition and raise prices. An exception to this conclusion is found in Krishna and Morgan (1996) showing that there exist conditions under which competition is increased when a MAR on a specific market is implemented by threats on a related market. This raises the important question: under what circumstances can a MAR be procompetitive?

This paper suggests that there may be a variety of situations under which a MAR is procompetitive. Specifically, we provide two very different examples illustrating this point. The first example is framed within an imperfectly competitive setting and employs the same timing assumption used by Greaney (1996a) to show the anticompetitive nature of MARs. The main idea is that when the instrument is targeted at the right set of firms, the market access requirement can be procompetitive. The second example explores the effects of a MAR imposed on an intermediate input.[1] Thus this example picks up the suggestion of Krishna and Morgan (1996) that in order to properly evaluate the effects of a market access requirement, it is important to consider not only the market subjected to the MAR but also markets that are related. This assumes even greater importance given that some of the major industries targeted for market access requirements involve intermediate goods like semiconductors and auto parts.

We first consider a simple Cournot duopoly and examine an implementation scheme under which the Japanese government moves first and announces a fixed amount subsidy to be given to the U.S. firm only in the event that the market share target is satisfied. We show that in this situation the MAR is procompetitive. The intuition is that the U.S. firm has an incentive to expand production in order to avail of the subsidy while the promise of a subsidy to the U.S. firm leaves the Japanese firm's strategic behavior unchanged. Since the decision variables are strategic substitutes, the expansion in U.S. output leads to a reduction of Japanese output. However, under general demand conditions and constant marginal costs, the increase in U.S. output more than outweighs the decrease in Japanese output so that, in equilibrium, aggregate output increases and price falls. Next we examine an example in which market access requirements in a market may have unexpected effects on related markets. Specifically, we show that requirements placed on the purchases of intermediate goods result in procompetitive effects in the final good market. The intuition is that by expanding production, the final good producer makes its constraint less binding. Our results buttress the point made in Krishna, Roy and Thursby (1997) that the effects of a MAR depend crucially on the way that it is administered.

The rest of the paper is organized as follows. In the next section, we present a quick

[1] See Qiu and Spencer (1997) for the implications of VIEs and VERs in the context of keiretsu.

review of the policy debate surrounding market access and the related literature. Section 3 sets up the simple duopoly model and analyzes the fixed amount subsidy scheme while Section 4 looks at the effect of a MAR on related markets. The last section offers concluding comments.

2. Policy Debate: Review and Analysis

The growing concern over the lack of access for U.S. firms to foreign markets perceived as being unfairly 'closed' has fostered the evolution of a new trade policy instrument – the market access requirement (MAR) otherwise known as the voluntary import expansion (VIE) – that has subsequently been endorsed by the Clinton administration.[2] A MAR seeks to increase market access in the following manner: if a specific foreign market is deemed 'closed' to U.S. firms, the U.S. government enters into trade negotiations with the foreign government and extracts from it some guarantee of a minimum share of that market for U.S. firms. The burden of enforcing the market access requirement, though, is usually left to the foreign government. As pointed out in Irwin (1994, pg. 63), '...the United States never seems concerned about the mechanism by which "voluntary" bilateral agreements are carried out and acts as if the foreign government can solve the problem by fiat.' In the case of the U.S.-Japan semiconductor trade dispute, Irwin (1996) documents how the Semiconductor Industry Association's section 301 petition and Micron's antidumping suit helped to pressure Japan into signing the Semiconductor Trade Agreement of 1986 stipulating that U.S. firms achieve a 20% share of the Japanese chip market by 1992. However, having signed the agreement the task of enforcement was left to the Japanese government. Irwin (1996, pg. 51) observes, 'Implementation - quite mistakenly - was not viewed as a major concern for U.S. negotiators, but it was a real problem for Japan precisely because it was now committed

[2] The terms 'MAR' and 'VIE' are used interchangeably throughout the rest of the text.

to certain action in a governmental agreement and under threat of sanction if the terms of the agreement were violated.'

While market access requirements have been modeled in several different ways in the literature, the general conclusion has been that these requirements reduce competition. Krishna, Roy and Thursby (1997) show that if the level of the instrument used by the government to enforce the MAR can be manipulated by the firms, the result is higher prices. Specifically, subsidy levels chosen by the home government to meet the market share target after duopolistic firms have picked prices (but before the market clears) create powerful incentives for both firms to raise prices in the targeted market. The intuition is that the U.S. firm has an incentive to trigger a subsidy for itself by raising price and lowering its sales such that the market share target is violated. On the other hand, the Japanese firm is strategically motivated to increase its price in order to reduce its market share and prevent the subsidy being conferred on the U.S. product.

Even when the firms cannot strategically affect the level of the instrument, the MAR can be anticompetitive. This is shown in the duopoly model of Greaney (1996a) where the Japanese government moves first and threatens its domestic firm with a fixed harsh financial penalty in the event that the market share target is not met. In this case, the Japanese firm has a strategic incentive to raise price in order to lower its sales and prevent the penalty from being triggered. *The strategic behavior of the U.S. firm is not affected by the penalty threat since the threat is enforced only after the market clears and profits have been earned.* However, since the firms are competing in strategic complements, the U.S. firm matches its rival's price increases and, in equilibrium, both prices are higher compared to free trade. We use the same timing structure as Greaney (1996a) and show that appropriate incentives can make a market access requirement procompetitive.

More recent work has continued to demonstrate the undesirability of market access requirements. Greaney (1996b) considers the case where differences in a U.S. firm's share of the market in a third country relative to the Japanese market in the current period affects both the probability with which the U.S. firm can successfully lobby for a VIE as well as the level of the VIE to be imposed on the Japanese market in the next period. If the petition is successful then enforcement takes the form of the financial penalty threat used in Greaney (1996a). In this framework, she demonstrates that the prospect of a VIE strategically affects both firms first period production decisions and can reduce the U.S. firm's average market share in the foreign market over the two periods - contrary to the prediction of VIE proponents.

Dumler (1996) examines using the threat of an administrative relief measure (ARM), e.g., an antidumping duty, as a means of implementing a VIE. Employing an intraindustry trade model as in Brander (1981) and Brander and Krugman (1983), he considers the case where, similar to Greaney (1996b), the domestic and foreign firm's first period market shares affect the probability that the domestic firm's petition for administrative relief will receive a favorable review. However, unlike Greaney (1996b), successful petitioning results in a reinstatement of the antidumping duty that had been suspended in return for the foreign government's acceptance of a market share VIE before the beginning of the game. Dumler shows that a VIE implemented with an ARM generally reduces overall trade volumes and increases prices.

In contrast, Krishna and Morgan (1996) considers the case of the U.S. – Japan auto parts trade dispute and shows that a MAR on the Japanese auto parts market can be implemented by a threat of punitive sanctions on Japanese auto exports to the U.S. market in a procompetitive manner. In like vein, this paper provides two other scenarios under which a MAR lowers prices. The next two sections discuss this in greater detail. Similar to Krishna and Morgan (1996), we present essentially a graphical treatment of the analysis.

3. Example with Imperfect Competition

3.1 Model

We consider a two-stage game played by the Japanese firm (firm 1), the U.S. firm (firm 2) and the Japanese government. In the first stage, the government credibly commits to a fixed amount subsidy S to be given to the U.S. firm only if the U.S. share of the market is larger than the pre-negot iated minimum. The Japanese and the U.S. firm, then, simultaneously and non-cooperatively choose outputs x and y, respectively, in the second stage after which the market clears. The government then observes the outputs and enforces its promise of a subsidy only if the market share target is met. We focus on subgame perfect equilibria.

Let P(X) be the twice continuously differentiable inverse demand function, downward sloping, $P'(.) < 0$, and strictly concave, $P''(.) < 0$, whenever positive. Let $P(.)$ be positive on some interval $[0, \overline{X}]$, for some $\overline{X} > 0$. Assume that each firm has a constant marginal cost of production c. Let the market share target be α, i.e., the constraint is satisfied only if $\frac{y}{x+y} \geq$ a, where $\alpha \in (0, 1)$.

3.2 U.S. firm's best response

Consider the U.S. firm's (firm 2's) optimal choice. Its ordinary Cournot profit is

$$\pi_2(.) = [P(x+y) - c]y \tag{1}$$

while its profit with the subsidy is

$$\overline{\pi}_2(.) = \pi_2(.) + S \tag{2}$$

For any Japanese output x, let $g_2(.)$ be the minimum output that the US. firm must produce in order to meet the market share constraint, i.e., $g_2(.) = \left(\frac{\alpha}{1-\alpha}\right)$ x. Clearly, firm 2 receives the subsidy for outputs greater than $g_2(.)$ but earns its ordinary profit for smaller outputs. Thus, its overall profit function is given by

$$\widehat{\pi}_2(.) = \left\{ \begin{array}{l} \pi_2(.) \text{ for } y_2 < g_2(.) \\ \overline{\pi}_2(.) \text{ for } y_2 \geq g_2(.) \end{array} \right\} \tag{3}$$

Let $B_2(.)$ and $\overline{B}_2(.)$ denote the unique maximizers of ordinary profit and subsidy-ridden profit, respectively. Further, let $\widehat{B}_2(.)$ be the maximizer of overall profit. Then, depending on its rival's output, firm 2's profit function must belong in one of the three possible regimes depicted in Figs. l(a)-l(c).

First, note that ordinary profit is concave, and, that the subsidy profit curve is simply the ordinary profit shifted up vertically by the amount of the subsidy. Since the amount of the subsidy is fixed, the output that maximizes ordinary profit also maximizes subsidy profit, i.e., $B_2(.) = \overline{B}_2(.)$. The overall profit function is shown by the bold curve in all the three figures. In the first case, firm 2's ordinary (and subsidy) profit maximizer is greater than the minimum output required to meet the constraint and, clearly, it is best off producing along its Cournot best response, i.e., $B_2(.) = B_2(.)$. In the second case, $g_2(.) > B_2(.)$ and firm 2's best response is to produce the minimum required to meet the market share target, i.e., $\widehat{B}_2(.) = g_2(.)$. Finally, we may have the situation depicted in Fig. l(c) where firm 2 is better off ignoring the promise of the subsidy and producing its ordinary Cournot output, i.e., $\widehat{B}_2(.) = B_2(.)$.

The U.S. firm's best response is illustrated in Fig. 2. B_1 and B_2 are the Japanese and U.S. Cournot best responses, respectively, while OM represents the market share constraint line. Since the constraint is assumed to be binding under free trade it lies to the left of the free trade point F. The U.S. firm's overall best response is depicted by the bold curve. For small Japanese outputs, the best response lies along the Cournot best response until the point H where B_2 intersects OM. As Japanese output increases beyond this level, firm 2 switches to producing along the market share line. This occurs until point I is reached, whereupon, firm 2's overall best response jumps down to point J on its ordinary Cournot best response. It should be pointed out that when x = J_1 firm 2 is indifferent between points I and J.[3] Further, it can be shown that this jump point is increasing in S.

3.3 Equilibrium

Note that the Japanese firm is unaffected by the subsidy and its strategic behavior remains unchanged. This is a consequence of the timing of moves that we have used – the same timing employed in Greaney (1996a). Specifically, the subsidy, when granted, is paid out only after the firms have put their outputs on the market and sales have been made. Given this timing, since only the U.S. firm is offered the subsidy, it does not enter into the Japanese firm's profit function and, hence, leaves its best response unaltered. Identifying the equilibrium is simply a matter of finding the point where the U.S. firm's overall best response intersects the Japanese firm's ordinary Cournot best response, i.e., point E in Fig. 2. However, a different timing structure could very well impact on the Japanese firm's best response too and result in a different equilibrium. This, for instance, occurs with the timing employed in Krishna, Roy and Thursby (1997) discussed in the previous section.

Suppose the government chooses the minimum S which supports a pure strategy Nash equilibrium satisfying the market share target. This would be that S for which the jump point J_1 coincides with E_1 and results in an equilibrium at point E, i.e., the U.S. firm's best response jumps down from point E to point G at $x = E_1$ and coincides with its Cournot

[3] It can be mathematically shown that this jump point exists and is unique.

best response for larger x. However, any S greater than this critical level will also result in this equilibrium. Note that the locus of points with aggregate output equal to that under free trade is given by the line with slope -1 drawn through F in Fig. 2. Given our assumptions, the Japanese firm's Cournot best response B_1 is steeper than this line. Hence, the equilibrium at E represents a larger aggregate output and **lower price** compared to the free trade equilibrium at F![4] This result is robust to the type of competition, i.e., the fixed amount subsidy can be shown to also lower prices of both goods under Bertrand competition in a differentiated products duopoly.

It should be pointed out that, for purposes of expositional ease, Fig. 2 has been drawn on the assumption that the firms are completely symmetric. Consequently, the free trade point F lies on the 45 degree diagonal. Introducing asymmetries into the picture would not change the basic result as long as the slope of the best responses are between -1 and 0 (guaranteed by our assumptions on demand and cost). For instance, we could have the case where the Japanese ordinary best response has a much larger vertical intercept than the U.S. best response. This would yield a free trade U.S. market share smaller than 50 percent and the point of intersection of the Cournot best responses would occur to the right of the 45 degree line. However, again, as long as the market share constraint is binding under free trade, the same argument can be used to show that the equilibrium (occurring at the intersection of the market share line and the Japanese best response) is procompetitive.

The natural question that arises now is what would happen if the subsidy were to be given to the Japanese firm only? Using similar analysis, it can be shown that a subsidy offered to the Japanese firm only would be anticompetitive. In this case, the U.S. firm's best response would remain unaffected by the subsidy. The Japanese best response would lie along its

[4] Note that the free trade equilibrium F is also a candidate equilibrium but it does not satisfy the market access requirement.

ordinary Cournot best response for small values of y up to some critical point at which it would jump down to the market share line OM. For larger U.S. outputs, the Japanese best response would switch back to its Cournot best response. Hence, the equilibrium would be at point H (in Fig. 2) which yields a higher price than F. Here, the promise of the subsidy provides an incentive for the Japanese firm to cut back on output. This, in turn, is associated with a less than proportional increase in the U.S. firm's output such that, aggregate output falls and price rises.

4. Example with Interrelated Markets

A surprising consequence of implementing firm specific import targets is sketched below. Suppose that targets for imports are set on the Japanese firms using the imported U.S. good as input in production. Then, the effect of the import requirement can be shown to result. in a reduction in each importing firm's marginal cost of production for given input prices, The intuition is straightforward: increasing output helps to make the market access requirement less binding and this reduces the marginal cost of production. Thus, this scheme would not only raise exports of the U.S. intermediate input, it would also impact the final product market since lower marginal costs of production tend to increase the supply of a firm in most models of perfect and imperfect competition.

4.1 Model

Let us consider the simplest possible model where a representative Japanese firm, say firm 1, uses two inputs (one U.S. input and one Japanese input) to produce a final good. Let x and y denote the amounts of the Japanese input and the U.S. input, respectively, purchased by firm 1. Now, suppose the Japanese government imposes firm-specific requirements on the U.S. input purchases of firm 1. Specifically, assume that the value of firm l's U.S. input purchases must exceed a pre-specified minimum T.[5] Let r and w denote the prices of the Japanese and U.S. input, respectively,which are taken as given by firm 1, and let Q represent firm l's output of the final good. How does this market access requirement affect the final good producer?

4.2 Final good producer's optimization problem

Let $C(r, w, Q)$ be firm l's ordinary cost function and let $F(x, y)$ be its production function. Now, due to the input purchase requirement, it faces the following problem:

$$\text{Minimize } R = rx + wy \text{ subject to } wy \geq T \text{ and } F(x, y) = Q \tag{4}$$

or, equivalently,

$$\text{Maximize } \tilde{R} = -rx - wy \text{ subject to } T - wy \leq 0 \text{ and } F(x, y) = Q$$

Setting up the Lagrangian and taking the first order conditions, we get

$$L = -rx - wy - \lambda[Q - F(x, y)] - \mu[T - wy] \tag{5}$$

$$\frac{\partial L}{\partial x} = -r + \lambda F_x = 0 \tag{6}$$

$$\frac{\partial L}{\partial y} = -w + \lambda F_y + \mu w = 0 \tag{7}$$

$$\frac{\partial L}{\partial \lambda} = F(.) - Q = 0 \tag{8}$$

$$\frac{\partial L}{\partial \mu} = wy - T \geq 0, \mu \geq 0, \mu(wy - T) = 0 \tag{9}$$

[5] Such requirements can be implemented through the threat of prohibitively harsh financial penalties for non-compliance.

If the constraint is binding ($\mu > 0$), from (6) and (7), we get

$$\frac{F_x}{F_y} = \frac{r}{w - \mu w} \tag{10}$$

Notice that the market access requirement acts like a subsidy of μw on the U.S. input and increases firm l's cost minimizing y/x input ratio. This, in turn increases the marginal product of Japanese input F_x and lowers λ (= $\frac{r}{F_x}$ from equation (6)) .[6] But, λ is simply the firm's marginal cost of production! Hence, firm 1 increases its production of the final good leading to a fall in the price of the output.

5. Conclusion

We show that, contrary to the findings of the recent literature, market access requirements can be implemented in a procompetitive manner. The basic idea is that the requirement must be implemented in a way that provides the right incentives for increasing aggregate output or lowering prices. In the first example, procompetitive effects occur if the right firm is targeted by a preannounced subsidy. In our second example procompetitive effects occur because the MAR acts like a subsidy on the imported input. Because increased purchases of the imported input increase the marginal product of the other input, the marginal cost of production falls, which in most models will lead to an increase in output of the final good. Thus this paper demonstrates that procompetitive enforcement of MARs must pay attention to the issues of proper targeting and the effects of related markets.

[6] Note that $R(r, w, Q, T)$ is the minimized value of firm 1's cost. By the envelope theorem, $\frac{\partial \widetilde{R}(.)}{\partial Q} = \frac{\partial L(.)}{\partial Q} = -\lambda(.)$ and since $R(.) = -\widetilde{R}(.)$, we get $\frac{\partial R}{\partial Q} = \lambda(.)$. Similarly, we get $\frac{\partial R}{\partial T} = \mu(.)$.

6. References

1. Brander, James A., 1981, "Intra-Industry Trade in Identical Commodities", Journal of International Economics 11, l-14.

2. Brander, James A. and Paul R. Krugman, 1983, "A 'Reciprocal Dumping' Model of International Trade", Journal of International Economics 15, 313-323.

3. Dumler, Christopher, 1996, "Implementing Market Access Agreements through Threats of Administrative Relief,', Mimeo.

4. Greaney, Theresa, 1996a, "Import Now! An Analysis of Market-Share Voluntary Import Expansions (VIEs)", Journal of International Economics 24, 149-163.

5. _______________, 1996b, "Manipulating Market Shares: The Indirect Effects of Voluntary Import Expansions (VIEs)", mimeo.

6. Irwin, Douglas A., 1994, Managed Trade: The Case Against Import Targets, The AEI Press, Washington, D.C.

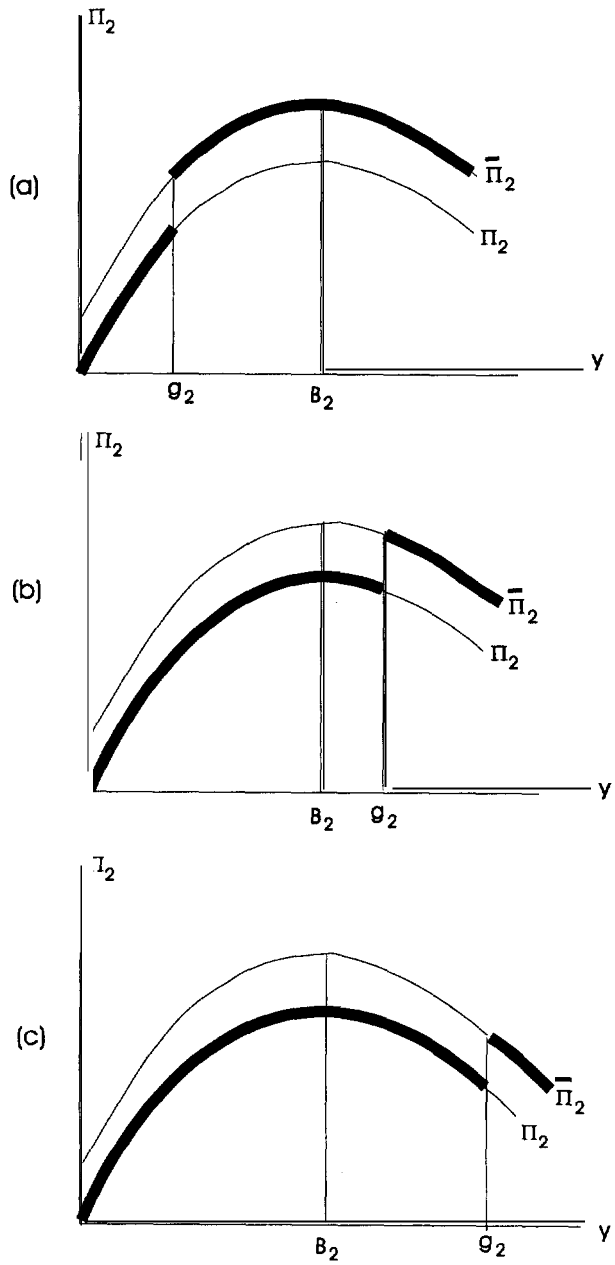
7. _______________, 1996, "Trade Politics and the Semiconductor Industry", in: Anne 0. Krueger, ed., The Political Economy of American Trade Policy (The University of Chicago Press, Chicago), 11-66.

8. Krishna, Kala, and John Morgan, 1996, "Implementing Results-Oriented Trade Policies: The Case of the U.S. Japanese Auto Parts Dispute", (forthcoming) European Economic Review.

9. Krishna, Kala, Suddhasatwa Roy and Marie Thursby, 1997, "Implementing Market Access", Review of International Economics (forthcoming).

10. Qiu, Larry, and Barbara J. Spencer, 1997, "Keiretsu and Relational Quasi Rents: Implications for VIEs and VERs," mimeo.

Eiaure



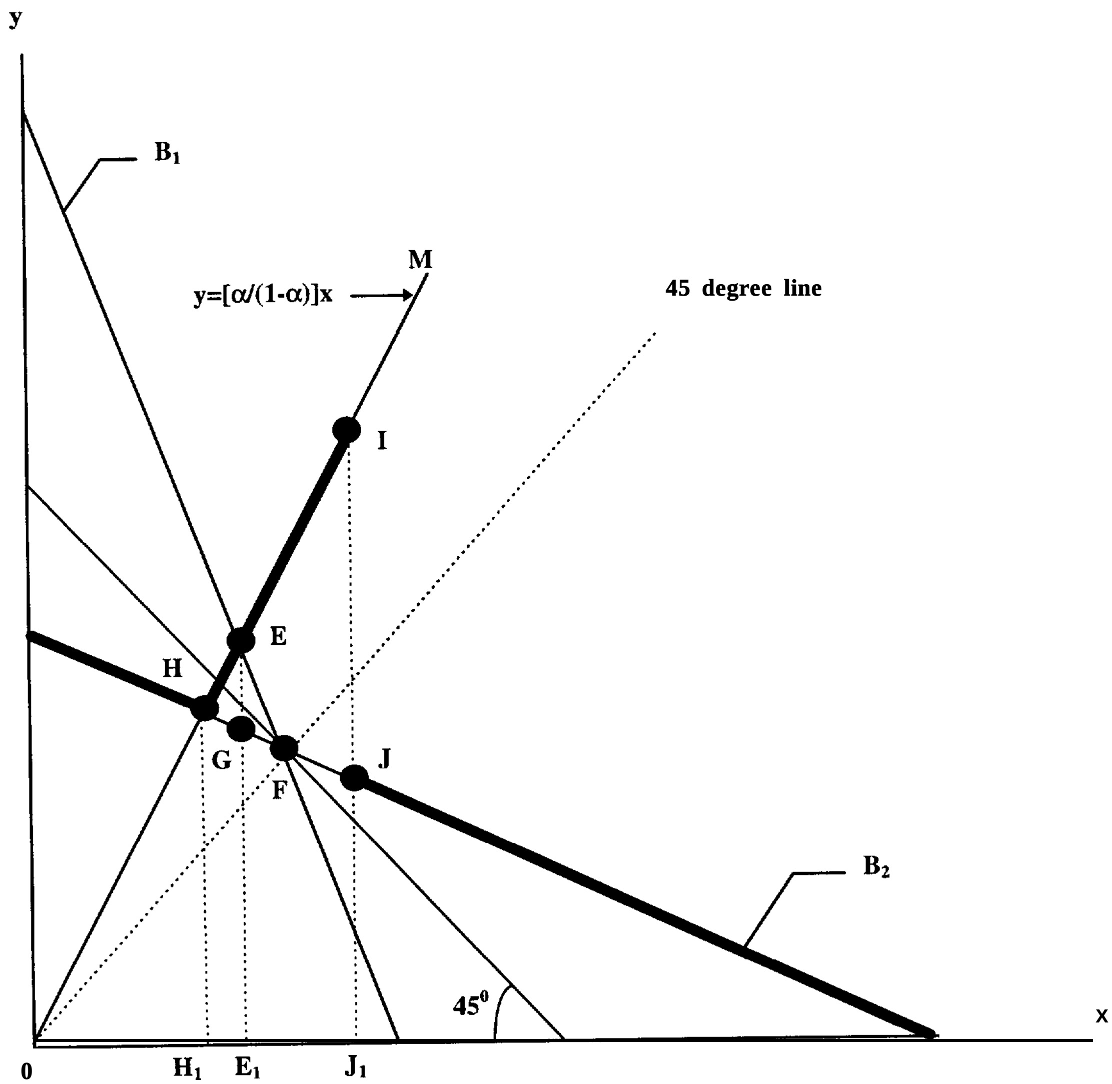


Figure 2