Full length research paper

Foreign direct investment, joint ventures and export

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After a joint venture agreement with a high-income country's firm, an export-oriented but technologically backward firm in a low-income country may earn higher profit, but may not be able to improve its export market performance, unless the world market size is large. In a two-firm-two-country model, the export performance of a low-income country's firm may suffer in a joint venture, or if the high income country's firm plays a leadership game. However, the high-income country's firm may prefer a joint venture to a leadership game if the profit share of the low-income country's firm can be restricted. Under certain conditions, the low-income country's firm should compete with the high income country's firm and use various market signals to improve its credibility in the world market. A general model with 'n' firms of 'n' low-income countries forming a global joint venture with one firm of a high income country, shows that, the joint venture is feasible only if there are no more than three technologically backward firms and that it may be possible for a single firm of a low-income country to meet the export clause imposed by its government.

Key Words: Joint Venture; Oligopoly; Export; Signaling; Financial Markets; Asia; China
JEL Classification Code : F23 ; L13 ; F10 ; G10

INTRODUCTION

Will foreign direct investments (FDI) in the form of joint venture agreements with firms of high-income countries significantly improve the export performance of firms of low-income countries?[1] Joint ventures may give firms of low-income countries access to modern technologies required to produce products, which meet international standards for quality. At the same time, joint ventures extract monopoly rent by restricting output. Is it possible that joint venture agreements will decrease the exports of low-income countries? Can this explain the indifference of governments of low-income countries towards foreign collaborations and joint ventures?According to Panagariya (2006) although China experienced spectacular growth of FDI and exports, its export to GDP ratio declined during 1982-86. Also, Fung et. al (2002) indicate that the growth of Chinese FDI, though fairly impressive, was rather unstable during eighties. The annual issues of Government of India's *Economic Survey* report that the export growth in India was fairly high during 1992-95, after massive currency devaluation in 1991. But after the initial phase of economic liberalization was over, one did not observe any spectacular growth of the export sector comparable to China.

Similar are the experiences of other South Asian countries such as Pakistan and Sri Lanka.

In this paper we focus on FDI in the form of joint venture investments. The main point of the paper is to show that market size will determine whether the joint venture agreements with firms of high-income countries will increase exports of low-income countries. Exporting to high-income countries has been the primary source of economic growth for many East Asian countries. However, it is doubtful whether other countries in South Asia and Africa would be able to achieve similar success in an increasingly global world economy.Zhang and Felmington (2002) estimate a panel data model which concludes that although exports and foreign direct investments play a crucial role in accelerating economic growth in China, a greater exposure to the global economy may have increased its regional economic imbalance. Exports of[2] many East Asian countries excluding China suffered as a result of 2001 recessions in external core markets such as the United States. Market size is clearly one of the crucial factors that determine the relationship between FDI and exports. As the world economy slows down and the world market size decreases, exports of low-income countries are adversely affected. A joint venture agreement with firms of high-income countries may raise profits of firms of low-income countries. But the governments

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of many low-income countries formally or informally insist on an export performance clause before approving the joint venture.[3] In this paper we present a two-firm-two-country model where the export performance clause may not be met in a joint venture. Our results explain why governments of South Asian countries are reported to be rather indifferent towards joint ventures and foreign collaborations.[4]

Some firms of low-income countries do possess the technology required to produce high quality products or they can acquire it at a price. Information asymmetry makes it very difficult for the low-income country's firms to convince a buyer that their products meet international quality standards. This leads to adverse selection, as no firm of a low-income country would have the incentive to raise quality. A joint venture agreement with firms of high-income countries could solve this problem. But there are other ways to handle this problem of credibility in the world market. A firm can send signals to both the financial investors as well as buyers. It was Ross (1977) who first disputed the Modigliani-Miller theorem on the irrelevancy of financial structures in determining the market value of a firm's stocks. Bhattacharya (1979) shows that payment of cash dividends can act as a signal of company's financial performance, despite tax disadvantages associated with such a signal. In a subsequent paper, Bhattacharya and Ritter (1983) have pointed out that a company giving signals to both the financial and product markets may have to face a paradoxical situation, as its product market competitors extract information from the signals meant for investors in the financial markets. Latest work on this paradox by Myers and Majluf (1984) and Gertner, Gibbons and Scharfstein (1988) points to the possibility of companies avoiding share issue and preferring debt to equity. In fact, in many developing countries, banks underwrite debentures and commercial papers and the companies not having a well-established market reputation can use these financial instruments instead of share issues to have a better credibility in the product market. In this context it is also necessary to recognize that a company that belongs to a business group is likely to have better credibility in both financial and product markets. For instance, Feenstra, Yang and Hamilton (1999) show that business groups play a decisive role in determining product variety as well as product quality in exports from South Korea, Taiwan and Japan. Our model indicates that instead of forming joint ventures, firms of low-income countries may prefer to compete with firms of high-income countries by using various types of market signals to improve their credibility.

We now plot a course for the rest of the paper. The following section introduces the competitive model (Cournot) as well as the joint venture model to discuss the issues related to FDI and exports. The results in section III shows that if the firm of a high-income country is a market leader, exports of the firm of the low-income country will be less than the Cournot exports. However, the firm of the high-income country may not play a leadership game and prefer to form a joint venture. Section IV generalizes the basic model by introducing 'n' firms of 'n' low-income countries forming a global joint venture with one high-income country's firm. In the general model is may be possible for a single low-income country's firm to meet the export commitment in the joint venture. Concluding remarks appear in section V.

The Cournot Model

We present a two-country-two-firm model where the second country is a low-income country, not in a position to match the high-income country's export quality in the world market. The first firm is located in the high-income country, which possesses the technology to produce the best possible quality. The second firm is located in the low-income country and the quality of its products (or quality perception) needs improvement. Quality improvement is costly, although a better quality product can be sold at a higher price.

Equation (1) represents the world demand function, which is assumed to be linear. If both firms sell a homogenous product, equation (1) is a valid description of the world market. Variables q_1 and q_2 are the quantities sold by the two firms; $a>0$ is the indicator of market size.

$$(1) \quad \begin{aligned} p &= a - Q, \qquad Q = q_1 + q_2 < a \\ &= 0, \text{ for } Q \geq a \end{aligned}$$

We assume that the second firm's product does not possess full quality and therefore the two firms face different demand functions. These are represented by equations (2) and (3). Variables p_1 and p_2 are the prices at which the two firms can sell their products in the world market. Parameter α is an index of quality. The quality index of the first firm is unity, indicating full quality; whereas the quality index of the second firm is $\alpha \geq 1$, which means that other things remaining the same the second firm will get a lower price for its product. If $\alpha = 1$, then goods have the same quality and prices $p_1 = p_2 = p$.

(2) $p_1 = a - q_1 - q_2$ (3) $p_2 = a - q_1 - \alpha q_2$ Equation (4) is the quality production function. The second firm will have to spend e dollars in order to improve the quality of its product, i.e., reduce α. As $e \to \infty$, $\alpha(e) \to 1$. The quality parameter β represents quality perception, market reputation and quality signals. For a given value of β, an increase in expenditure e on quality improvements raises p_2. A decrease in β represents improvements in quality perception and market reputation and will also increase p_2. (4)

$$\alpha(e) = 1 + \frac{\beta}{e} \qquad 0 \leq \beta \leq \infty$$ We assume that $c>0$ is the constant average cost of production for both firms. When the firms play a Cournot game, their profit functions are:

$$(5) \; Max \prod_1 (q_1,q_2) = [\, a - q_1 - q_1 \,]q_1 - cq_1 \;\; w.r.t \{q_1\}$$

$$(6) \; Max \prod_2 (q_1,q_2,e) = [\, a - q_1 - (\, 1 + \frac{\beta}{e}\,)q_2 \,]q_2 - cq_2 - e \;\; w.r.t\{q_2,e\}$$

From the first order conditions of profit maximization, the best response functions of the two firms are:

$$(7) \; 2q_1 + q_2 = a - c$$

$(8) \; q_1 + 2q_2 = a - c - 2\sqrt{\beta}$ The optimum value of e

is,$(9) \; e = q_2 \sqrt{\beta}$

We assume that the market size allows two firms to exist in the market and therefore, *a-c>0*. The second order conditions for maximizing profits are satisfied by each firm. However, unless the second firm has a minimum level of quality (a sufficiently low value of *β*) or the market size is fairly large, only one firm will exist in the market. The set of equations in (10) is the solution of this static Cournot game. Variables E_1 and E_2 are values of total sales, including earnings from exports. We observe that: $p_2<p_1$, $q_2<q_1$, and $\Pi_2< \Pi_1$. A reduction in *β* brought about by various policies such as quality certification, better quality perception or market reputation would result in higher export earning for the second firm.[5] Π_1 is monotonically increasing and Π_2 is monotonically decreasing in *β*. The equilibrium of the Cournot model exists for all values of $(\beta)^{1/2}$ lying between 0 and *(a-c)/4*.

$$q_1 = (\, a - c + 2\sqrt{\beta}\,)\,/\,3$$

$$q_2 = (\, a - c - 4\sqrt{\beta}\,)\,/\,3$$

$$e = ((\, a - c - 4\sqrt{\beta}\,)\sqrt{\beta}\,)\,/\,3$$

$$\Pi_1 = (\, a - c + 2\sqrt{\beta}\,)^2\,/\,9$$

$$(10) \; \Pi_2 = (\, a - c - 4\sqrt{\beta}\,)^2\,/\,9$$

$$p_1 = (\, a + 2c + 2\sqrt{\beta}\,)\,/\,3$$

$$p_2 = (\, a + 2c - \sqrt{\beta}\,)\,/\,3$$

$$E_1 = p_1 q_1 = (\, a - c + 2\sqrt{\beta}\,)(\, a + 2c + 2\sqrt{\beta}\,)\,/\,9$$

$$E_2 = p_2 q_2 = (\, a - c - 4\sqrt{\beta}\,)(\, a + 2c - \sqrt{\beta}\,)\,/\,9$$

The recent literature on joint ventures and exports focuses on international joint ventures where the multinational firm and the low-income country's firm mostly compete in third markets .6 Their respective domestic sales do not play a significant role. UNCTAD (1998) claims that foreign affiliate exports make up about one-third of world exports.

Ideally, one would like to assume that the high-income country firm exports $\gamma_1 E_1$, the low-income country firm exports $\gamma_2 E_2$, when they are Cournot competitors. If they are partners in a joint venture, a proportion γ_3 of total sales are exported. In international joint ventures, one may however assume that world market sales are more important than domestic sales. To keep the algebra manageable, we assume that these export to sales ratios are equal: γ1 = γ2 = γ3.

Joint Venture and Export

Forming a joint venture may be advantageous to both firms. For the high-income country's firm, joint venture profits could exceed Cournot profits. The low-income country's firm may benefit also from transfer of technology or better market reputation. Monopoly profits are shared in accordance with the terms of the joint venture agreement. The second firm will not have to spend on quality improvement or on improving its market reputation. The joint venture profit function is:

$$(11) \; Max \; \prod^J = (\, a - Q \,)Q - cQ \;\; w.r.t \{Q\}$$

The total output is *Q=(a-c)/2*, price *p=(a+c)/2* and profit $\Pi^J = (a -c)^2/4$. The second firm will opt for the joint venture if it receives at least Cournot profits. At this stage, we assume that the second firm receives only Cournot profits.[7] Thus, the feasibility of the joint venture will depend on the first firm. It will accept the agreement if and only if, $\Pi^J > (\Pi_1 + \Pi_2)$. We obtain equation (12) by using the solutions for Π_1 and Π_2 in (10). We can see that the value of $\Delta\Pi$ in (12) is positive for all admissible values of $\sqrt{\beta}$ for which Cournot equilibrium exists.

$$(12) \; \Delta\Pi = \Pi^J - (\, \Pi_1 + \Pi_2 \,) = \frac{1}{36}(\, a - c + 20\sqrt{\beta}\,)(\, a - c - 4\sqrt{\beta}\,)$$

Equation (12) simply reiterates the proposition that the joint monopoly profit is greater than the sum of duopoly profits. Therefore, the joint venture will be feasible unless the low-income country's firm demands a profit share that is substantially higher than its Cournot profit. The governments of low-income countries are however more interested in whether total sale by the joint venture exceeds the sum of sales of the two Cournot competitors. If so, exports from the joint venture are likely to exceed exports by each individual firm. Since it has been assumed that export/ sales ratios are identical for the two firms and that the same ratio is applicable when joint venture is formed, we can compare joint venture sales with the sum of sales of the Cournot competitors. The joint venture sales are, $E^J \equiv pQ=(a+c)(a-c)/4$. From (10),
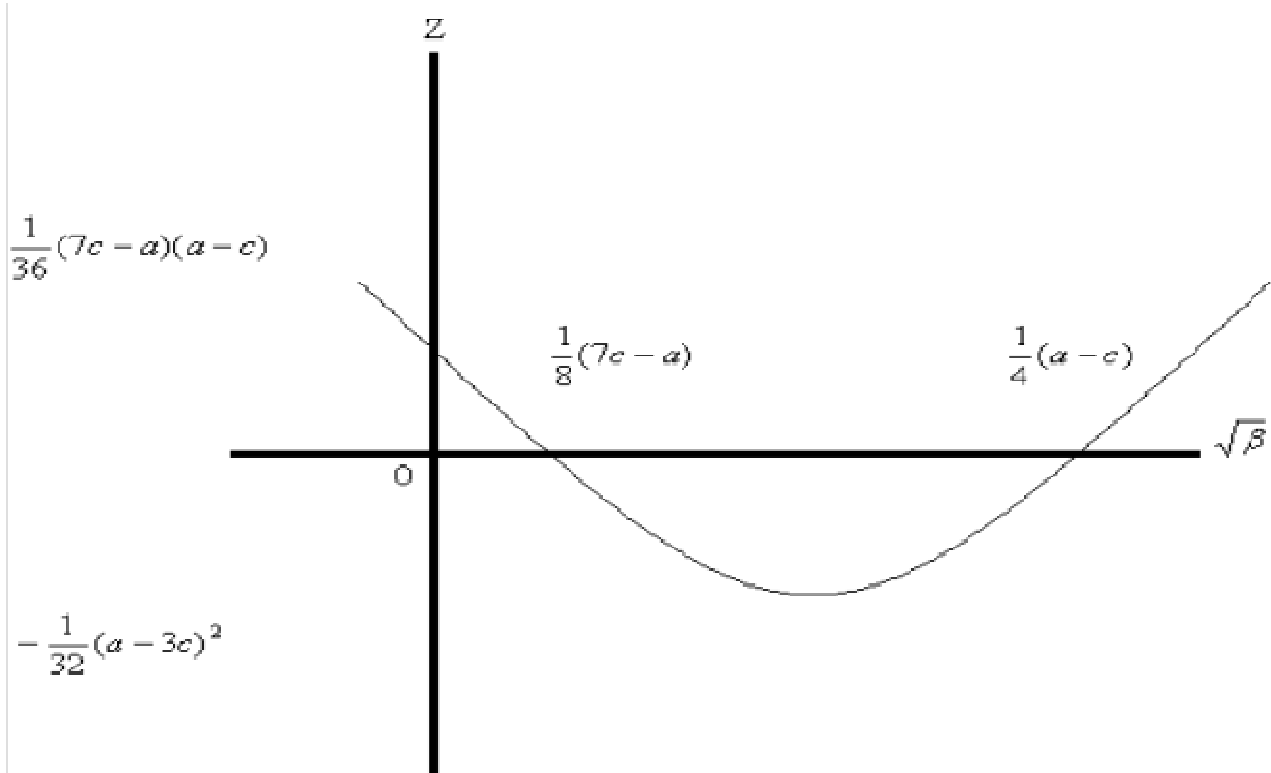
Figure 1. Restricted Market Size

we obtain the expression for the sum of sales of the Cournot competitors, $E_1+E_2=[2(a+c)(a-c)+2c(a-c)-(a+5c)\sqrt{\beta}+8\beta]/9$. Then, we define $Z\equiv E_1+E_2 -E^J= 8(\sqrt{\beta})^2/9-(a+5c)\sqrt{\beta}/9+(7c-a)(a-c)/36$. Therefore, $Z=0$ is a quadratic equation in $\sqrt{\beta}$ with two real roots: $r_1=(a-c)/4$ and $r_2=(7c-a)/8$. Also, we can see that the quadratic function is minimized at $\sqrt{\beta}=(a+5c)/16$, where the minimum value of $Z =Z_{Min} =-(a-3c)^2/32 < 0$. The comparison between joint venture sales and sum of sales of the Cournot competitors depends crucially on the market size (a) and the second firm's extent of backwardness ($\sqrt{\beta}$).[8] We now discuss two world market situations: (i) restricted market size and (ii) large market size.

(i) Restricted Market Size ($3c < a < 7c$): In this case both roots r_1 and r_2 are positive and the difference $r_1 - r_2 = 3(a-3c)/8 >0$. Figure 1 is a graph of the quadratic function $Z=0$ against $\sqrt{\beta}$. When $\sqrt{\beta} = 0$, the value of $Z = (7c-a)(a-c)/36$. The graph indicates that $Z<0$ for low values of the extent of backwardness, $\sqrt{\beta}$; and $Z>0$ for high values of $\sqrt{\beta}$. Market size is also important. Lower the market size, higher is the possibility of sum of Cournot sales exceeding joint venture sales.

(ii) Large Market Size ($a > 7c$): The quadratic equation $Z = 0$ has one positive root, $r_1 = (a-c)/4$ and one negative root $r_2 = (7c-a)(a-c)/36$. Figure 2 is a graph of the quadratic function $Z=0$ against the extent of backwardness, $\sqrt{\beta}$. For the range of values of $\sqrt{\beta}$ for which

Cournot equilibrium exists, $Z < 0$ and joint venture sales are higher than the sum of sales of the Cournot competitors. Proposition 1 summarizes these results.

Proposition 1

Whether a low-income country's firm exports more under a joint venture agreement depends on two factors: the extent of its backwardness ($\sqrt{\beta}$) and size of the world market (a). If the low-income country's firm is not very backward ($\sqrt{\beta}$ is low) and world market size is small, joint ventures are likely to decrease the firm's exports. If the world market size is large, then the low-income country firm's export performance is likely to improve under the joint venture, irrespective of extent of its backwardness.

The size of world market is crucial for the low-income countries that are trying to work out the implications of liberalizing their FDI policy, particularly their approach to joint ventures. A recession in the world economy will definitely reduce sales and exports of the joint venture. In hindsight, countries that opt for a liberal FDI policy may realize that directly competing with firms of high-income countries would have been a better strategy for raising export earnings. In the post-colonial era, many low-income countries had prohibitive rules against FDI. In the light of the present analysis, such protectionist policies
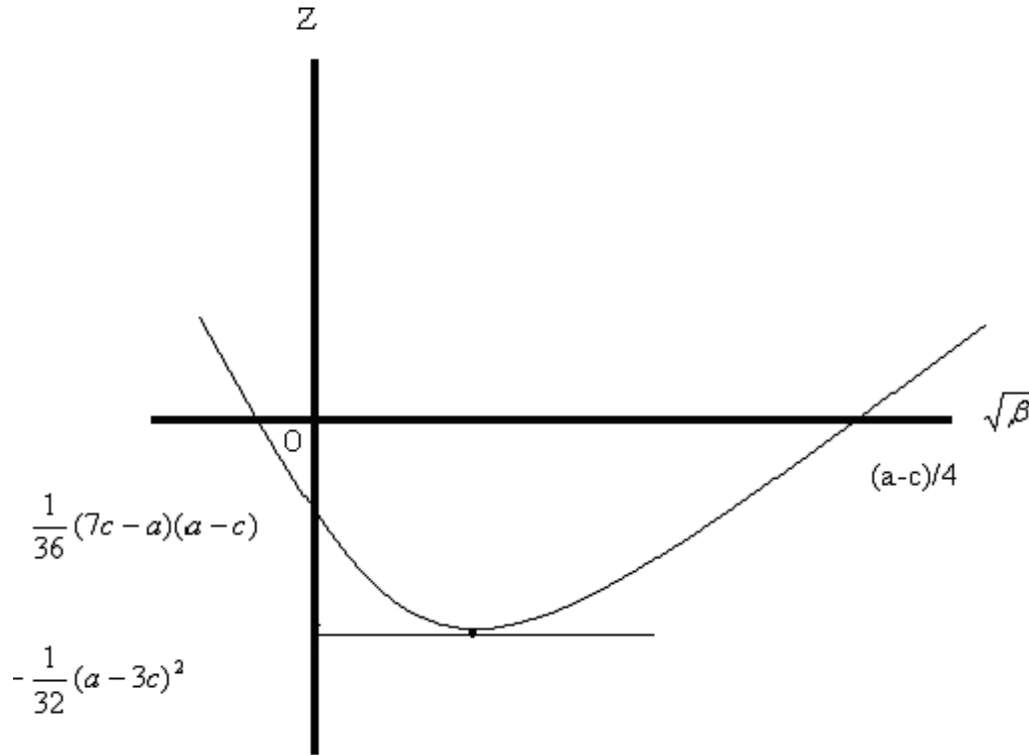
Figure 2: Large Market Size

may have been justified, particularly since the worldmarket size was small and unstable at that time.

Export Performance Requirement

Country firm to negotiate for a profit mark-up that exceeds $c/(a+c)$. Proposition 2 summarizes these results on export performance requirement. So far, we show that the joint venture will be feasible for all admissible values of $\sqrt{\beta}$, for which Cournot equilibrium exists. Governments of low-income countries often insist on an export clause as a condition for approving the collaboration with the foreign firm. Can the low-income country's firm earn at least the same export revenue from the joint venture as it earns as a Cournot competitor? We assume that the total exports of the low-income country's firm are a constant fraction of the world market sales, which includes the firm's domestic sales. In other words, the second country's exports are a given fraction of E_2 defined in (10). Let us suppose that the first firm allows the second firm to sell q_2* under the joint venture agreement. Then the second firm's joint venture sales are, $(a+c)q_2*/2$. The export performance clause of the government of the low-income country may insist that the second firm under the agreement earn at least a much export revenue as it earns as Cournot competitor, or

$(a+c)q_2 * / 2 \geq E_2$. This condition is captured by equation (13).

(13) $\quad q_2* \geq \dfrac{2(a - c - 4\sqrt{\beta})(a + 2c - \sqrt{\beta})}{9(a + c)}$

We will take the minimum value of q_2* from (13) and compute the second firm's profit under the joint venture. Assuming that the second firm's output is equal to the expression on the right hand side of (13), this profit is,

(14)

$$\Pi_2* = \frac{(a - c)(a - c - 4\sqrt{\beta})(a + 2c - \sqrt{\beta})}{9(a + c)}$$

However, the first firm will allow the second firm to sell q_2* if and only if $\Pi_2* \leq \Pi_2$. In other words, the second firm will fulfill the export performance criterion if condition (15) is valid.(15) $(a - c)(a + 2c - \sqrt{\beta}) \leq (a + c)(a - c - 4\sqrt{\beta})$

There is however no $\sqrt{\beta} > 0$ that can satisfy condition (15).[9] We started with the minimum value of q_2* in order to derive condition (15). If q_2* is more than its minimum value, then the impossibility of meeting condition (15) is further strengthened. The intuition behind this result is simple. A joint venture is like a cartel where the quantity is restricted for a higher price and this makes it impossible for the second firm to maintain its export revenue at the level of Cournot competition.

The export pessimism described above is based on the assumption that the first firm can force the second firm to accept Cournot profits in the joint venture agreement. We feel this assumption is reasonable. The joint venture has several benefits for the second firm. It solves the second firm's problems due to asymmetric information and perception of quality. The first firm transfers the technology for producing better quality products to the second firm. For these reasons the first firm is in a stronger position to negotiate a better share of the joint profits. In addition, the second firm could plan to copy the first firm's technology and break the joint venture agreement in the second period, and therefore would be quite satisfied with Cournot profits. However, one can assume that the second firm would be interested in forming the joint venture, if and only if, its profit from the joint venture is at least as high as its Cournot profit, i.e., $\Pi_2^* \geq \Pi_2$. The difference between these two cases is that while in the preceding one the first firm could ensure that the second firm's profit did not exceed its Cournot profit, in the present case the second firm insists that its profit is at least as large as its Cournot profit. We assume,

$$(16) \quad \Pi_2^* = (1+d)\Pi_2 \qquad\qquad d \geq 0$$

The value of the parameter d is negotiable and it would normally vary inversely with β. Using (14) and the expression for the second firm's Cournot profit in (10), we get,

$$(17) \qquad \sqrt{\beta} = \frac{(a-c)\{d(a+c)-c\}}{3a+5c+4d(a+c)} \quad \text{From (17),}$$

we see that, $\sqrt{\beta} > 0$ if an only if, $d > c/(a+c)$. We can treat d as a profit mark-up for the second firm. The low-income country's firm will not be able to meet its export commitment under the joint venture, unless it negotiates a sufficiently high profit markup. Higher the market size, easier it is for the second

Proposition 2

The government of a low-income country may insist on an export performance requirement before approving a joint venture agreement with the foreign firm. However, the domestic subsidiary may not be able to maintain its Cournot exports unless the foreign firms allows it to earn more than its Cournot profit. Larger the market size, easier it is for the low-income country's firm to negotiate for a profit mark-up, i.e. more than its Cournot profit and easier it is for the local firm to meet its export obligation.

Market Leadership

In this section we explore the third possibility that the high-income country's firm is a market leader. The leader

maximizes its profit subject to the follower's best response function. Equation (8) is the second firm's best The high-income country's firm maximizes the profit function in (5) subject to (8). E quation (18) presents the solutions, with 'L' representing the leader's variables and 'F' representing the follower's variables.

$$q_1^L = (a-c+2\sqrt{\beta})/2 > q_1$$

$$q_2^F = (a-c-6\sqrt{\beta})/4 < q_2$$

$$\Pi_1^L = (a-c+2\sqrt{\beta})^2/8\Pi_1$$

$$\Pi_2^F = (a-c-6\sqrt{\beta})^2/16 < \Pi_2$$

(18)

$$p_1^L = (a+3c+2\sqrt{\beta})/4 < p_1$$

$$p_2^F = (a+3c-2\sqrt{\beta})/4 < p_2$$

$$p_2^F q_2^F < p_2 q_2$$

The last inequality in (18) shows that the second firm will export less as a follower than as a Cournot competitor. It will however be non-optimal for the second firm to sell q_2^* when it is acting as a follower. If the high-income country's firm restricts the profit share of the low-income country's firm to the Cournot profit, it will prefer joint venture to a leadership game. The high-income country's firm's joint venture profit is, $\Pi_1^J \equiv \Pi^J - \Pi_2 = (a-c)^2/4 - (a-c-4\sqrt{\beta})^2/9$. The difference between the first firm's leadership profit and joint venture profit is, $H \equiv \Pi_1^L - \Pi_1^J = (a-c+2\sqrt{\beta})^2/8 + (a-c-4\sqrt{\beta})^2/ - (a-c)^2/4 = 41(\sqrt{\beta})^2/18 - 7(a-c)\sqrt{\beta}/18 - (a-c)^2/72$. The leadership equilibrium exists if $\sqrt{\beta} < (a-c)/6 = 0.167(a-c)$. Equation $H=0$ is a quadratic function in $\sqrt{\beta}$ and it has one positive and one negative root. The positive root is $\sqrt{\beta} = 33(a-c)/164 = 0.2(a-c)$, which is outside the range of values for $\sqrt{\beta}$ for which leadership equilibrium exists. The value of the quadratic function is minimized when $\sqrt{\beta} = 0.085(a-c)$ and the minimum value of $H = H_{Min} = -0.694(a-c)^2 < 0$. Also, when $\sqrt{\beta} = 0$, the value of $H = -0.0139(a-c)^2$. Figure 3 is the graph of the quadratic function of $\sqrt{\beta}$ and it illustrates that there is no admissible value of $\sqrt{\beta}$ for which H can have a positive value. Proposition 3 summarizes of these observations.

Proposition 3

If the high-income country's firm plays a leadership game, the total sales and exports of the low-income
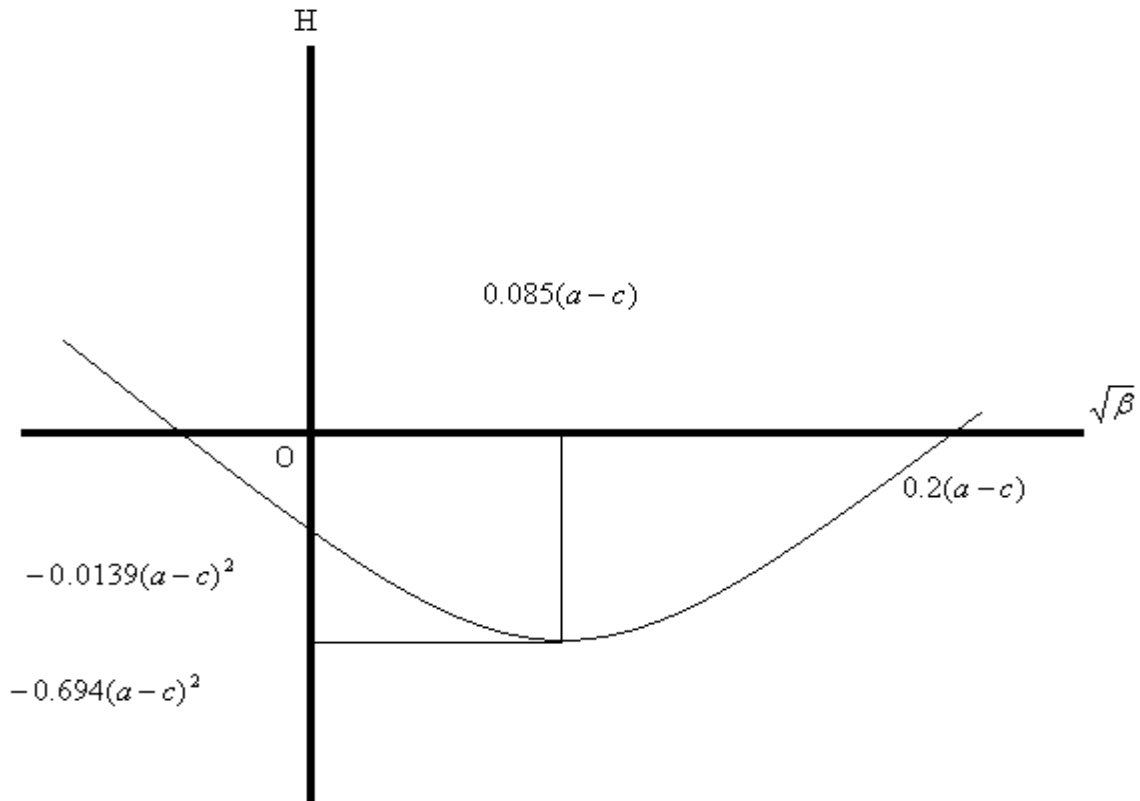
Figure 3: Leadership Game *versus* Joint Venture

country's firm will fall below the Cournot sales and exports. However, if the high-income country's firm is able to restrict the profit of the low-income country's firm to its Cournot profit, then it will always opt for a joint venture and will never play a leadership game.

Global Join Venture and Export Performance Requirement

In a multi-firm global joint venture, the n low-income country have n firms, all facing quality problems and one high-income country's firm, which produces the best quality product in the world market. Initially there is Cournot competition among $n+1$ firms in the market and then they form a global joint venture. The paper shows that joint venture is feasible only if n does not exceed three. If the world market size is sufficiently large, it may be possible for a single low-income country's firm to maintain its joint venture export sales at the Cournot level.Equation (1) is the world market demand function but now $Q = \sum_{i=1}^{n+1} q_i$. Equation (19) represents the demand function the first firm faces. The jth firm of the low-income country faces a demand curve represented by (20).

(19) $$p_1 = a - \sum_{i=2}^{n+1} q_i - q_1$$

(20) $$p_j = a - q_1 - \alpha_j q_j - \sum_{i \neq j}^{n+1} \alpha_i q_i \qquad j = 2,...... n$$

Equation (4a) is the revised quality production function. The ith firm's expenditure on quality improvement is represented by the variable e_i. We assume that all developing country firms have the same quality production function.

(4a) $$\alpha_i(e_i) = 1 + \frac{\beta}{e_i} \qquad 0 \leq \beta \leq \infty, \ i = 2,....... n$$

Equation (21) is the high-income country's firm's profit function, with c representing the constant average cost of production.

(21) $$Max \ \prod_1 = [\ a - \sum_2^{n+1} q_i - q_1]q_1 - cq_1 \quad w.r.t \ \{q_1\}$$

The first firm's first order condition for maximizing profits is:

(22) $$a - \sum_2^{n+1} q_i - 2q_1 - c = 0$$

Equation (23) is the profit function of the jth firm of the low-income country.

(23) $Max\Pi_j = [a - q_1 - \sum_{i \neq j} \alpha_i q_i - (1 + \beta / e_j) q_j] q_j - c q_j - e_j$

w.r.t.{q_j, e_j}The jth firm's first order conditions for maximizing profits are,

(24) $a - q_1 - \sum_{i \neq j} \alpha_i q_i - 2(1 + \beta / e_j) q_j - c = 0$

(25) $\beta q_j^2 / e_j^2 = 1$

For any two firms, j and k, of a low-income country, we can use (24) and (25) and write the following equations,

(26) $2q_j + q_k = d$

(27) $q_j + 2q_k = d$,where

$d \equiv a - q_1 - \sum_{i \neq j,k} \alpha_i q_i - 3\sqrt{\beta} - c$

The solution of (26) and (27) shows that, $q_j = q_k = d/3$. Since $e_j = q_j\sqrt{\beta}$, all low-income country firms will produce the same quality of output and spend the same amount of money on quality.   Equations (28) – (31) are the symmetric Cournot solutions of the model with n+1 firms.

(28) $q_1 = \dfrac{a - c + n(n+1)\sqrt{\beta}}{n+2}$

(29) $q_j = \dfrac{a - c - 2(n+1)\sqrt{\beta}}{n+2}$ $j = 2,......n+1$

(30) $\overline{\Pi}_1 = \left[\dfrac{a - c + n(n+1)\sqrt{\beta}}{n+2}\right]^2$

(31)

$\overline{\Pi}_j = \left[\dfrac{a - c - 2(n+1)\sqrt{\beta}}{n+2}\right]^2$ $j = 2,........n+1$

It is easy to verify that for n=1 these solutions in (28) – (31) are the same as those in (10). The Cournot equilibrium exists if, $\sqrt{\beta}<(a-c)/2(n+1)$. In a global joint venture $Q= (a-c)/2$, $p=(a+c)/2$ and profit $\overline{\Pi}^J =(a-c)^2/4$.
Therefore, the first firm's joint venture profit, assuming that all other firms' profits are kept at the Cournot level is
(32)

$\overline{\Pi}_1^J = \dfrac{(a-c)^2}{4} - \dfrac{n}{(n+2)^2}[a - c - 2(n+1)\sqrt{\beta}]^2$

The joint venture is feasible if and only if the first firm's joint venture profit in (32) is no less than its Cournot profit in (30).   The equation, $\overline{\Pi}_1^J - \overline{\Pi}_1 = 0$ is quadratic function of $\sqrt{\beta}$ and is re-written as,

(33) $-\dfrac{n(n+1)^2(n+4)}{(n+2)^2}(\sqrt{\beta})^2 + \dfrac{2n(n+1)(a-c)}{(n+2)^2}\sqrt{\beta} + \dfrac{n^2(a-c)^2}{4(n+2)^2} = 0$

Equation (33) has two roots, $r_1 = -n(a-c)/[2(n+1)(n+4)]<0$ and $r_2 = (a-c)/[2(n+1)]>0$. The positive root is the maximum admissible value of $\sqrt{\beta}$ for which the Cournot equilibrium exists. The quadratic function is maximized when $\sqrt{\beta} =n(a-c)/[(n+1)(n+4)]<(a-c)/[2(n+1)]$ for n<4. The maximum value of the function is $3n^2(a-c)^2(4-n)/[(n+2)^2(n+4)]$, which is positive if n<4. When $\sqrt{\beta}$ =0, $\overline{\Pi}_1^J - \overline{\Pi}_1$ = $n^2(a-c)^2/[4(n+2)^2]<3n^2(a-c)^2(4-n)/[(n+2)^2(n+4)]$ for n<4. Figure 4 illustrates the graph of the function in (33). There is a range of admissible values of $\sqrt{\beta}$ for which the join venture is feasible, if the number of firms in the low-income country is less than four. Since n is an integer, global joint venture is feasible only if the there are no more than three technologically backward firms in the low-income country. We now return to the issue of the export performance requirement. Is it possible for a single firm of the low-income country to maintain its Cournot level of export revenue in the global joint venture? The Cournot price at which j^{th} firm sells its product is,

(34) $p_j = a - \dfrac{n+1}{n+2}(a - c) - \dfrac{n}{n+2}\sqrt{\beta}$

If the jth firm of the low-income country sells quantity $\overline{q}_j$ in the joint venture to maintain the Cournot export earnings, the export performance criterion is,

(35) $\dfrac{a+c}{2}\overline{q}_j \geq p_j q_j$

Using (29) and (34), the export performance criterion is re-written as,

(36) $\overline{q}_j \geq \dfrac{2\{a(n+2) - (n+1)(a-c) - n\sqrt{\beta}\}\{a - c - 2n(n+1)\sqrt{\beta}\}}{(a+c)(n+2)^2}$

At minimum value of $\overline{q}_j$, the jth firm's profit from selling $\overline{q}_j$ in the joint venture is,

(37) $\tilde{\Pi}_j = \dfrac{1}{2}(a - c)\overline{q}_j$

The first firm will allow the jth firm to sell $\overline{q}_j$ only when $\tilde{\Pi}_j \leq \Pi_j$.

The quadratic equation in $\sqrt{\beta}$, from $\tilde{\Pi}_j - \Pi_j = 0$ is,

(38)
$-2n(n+1)\{n(a+3c) + 2(a+c)\}(\sqrt{\beta})^2 + (a-c)\{(a(n+2) - c(2n^3 + 2n^2 - 3n - 2)\}\sqrt{\beta} + nc(a-c)^2 = 0$

The form of equation (38) is: $a^*(\sqrt{\beta})^2 + b^*\sqrt{\beta} + c^* = 0$. The sign of the coefficient of $\sqrt{\beta}$ is indeterminate, but it will
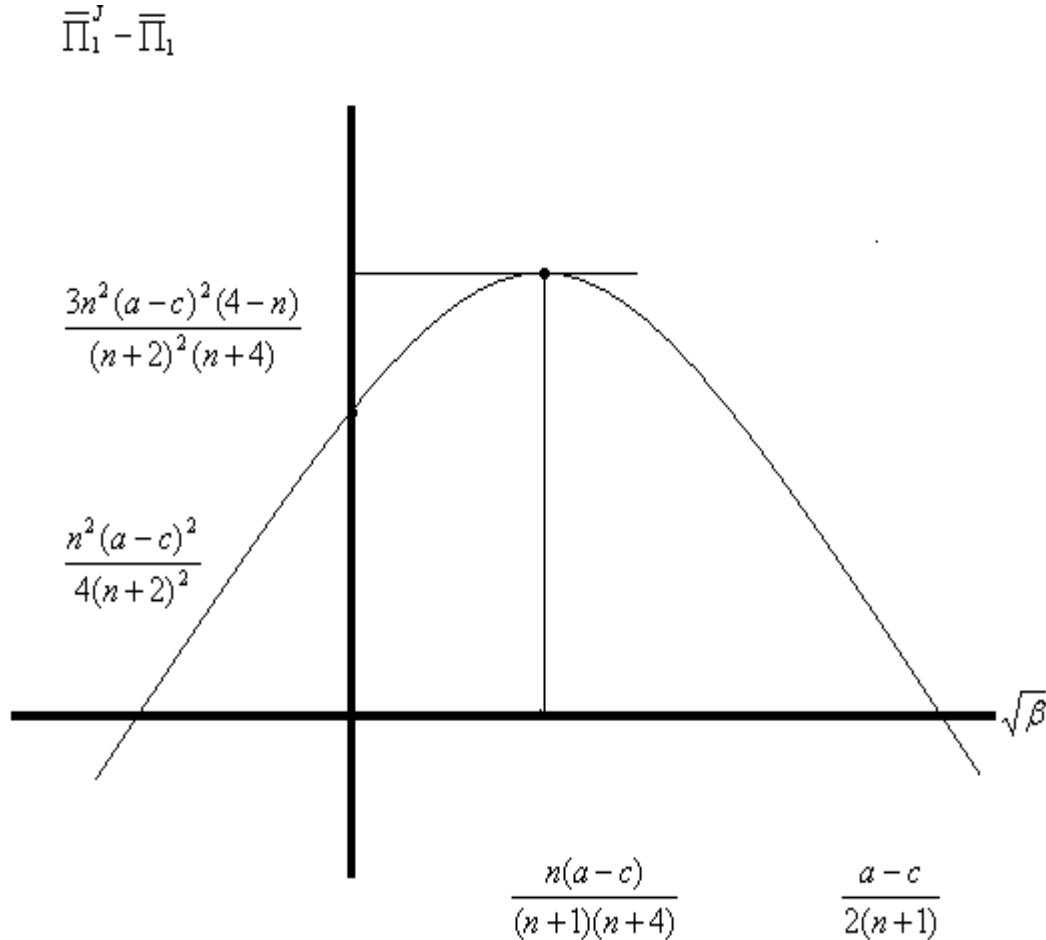
$$\overline{\Pi}_1^J - \overline{\Pi}_1$$

$$\frac{3n^2(a-c)^2(4-n)}{(n+2)^2(n+4)}$$

$$\frac{n^2(a-c)^2}{4(n+2)^2}$$

$$\sqrt{\beta}$$

$$\frac{n(a-c)}{(n+1)(n+4)}$$

$$\frac{a-c}{2(n+1)}$$

Figure 4: Global Multi-firm Joint Venture

be positive if the market size is large or if the average cost is small. We assume that the coefficient of $\sqrt{\beta}$ is positive. Since $b^{*2} - 4a^*c^* > 0$, the equation in (38) has at least one real and positive root. Proposition 4 summarizes the results of this section.

Proposition 4

A global joint venture with one technologically advanced firm of a high-income country and no more than three technologically backward firms of a low-income country is feasible. In this case, it may be possible one firm of the low-income country to maintain its export performance at the competitive level.

Summary and Conclusions

It is not the purpose of this paper to revive the old version of export pessimism found in the writings of Joan Robinson (1951) or Hirschman (1958). The earlier version of export pessimism basically proposes that a country with low trade elasticities will not be able to promote export by currency devaluation or export subsidization. This form of export pessimism had led to inward-looking policies of economics development. Subsequent empirical papers have disproved this thesis and it is now well established in the literature that the trade elasticities were underestimated due to wrong econometric specifications. It is also not our purpose to reiterate another kind of export pessimism, which is due to Linder (1961), who emphasizes the possibility of greater trade among low-income countries with similar consumer preferences and less trade between the high-income and the low-income countries with widely divergent consumer preferences. However, a part of the Linder Hypothesis is relevant for our study because the lack of quality consciousness of the consumers of low-income counties is responsible for the poor quality of exportable manufactures in all South Asian and African countries. Export pessimism of this paper follows from the creation of product market monopolies, which is invariably associated with joint ventures.

There is on interesting hypothesis in the last equation of (10) that deserves empirical investigation. It is shown

that when the low-income country's firm competes with the high-income country's firm in the world market, the former is handicapped due to the poor quality of its product. The low-income country's firm can improve the market perception of its quality by giving financial market signals, such as raising funds through issue of debentures and commercial papers instead of shares. There are some direct product market signals like international quality certification (ISO9000). Being a member of a reputed business group is also conducive to better performance in the product market. In a panel regression the significance of these signals in explaining firm-level export performance can be tested. Our model does not distinguish between the domestic market and the export market and assumes that a constant proportion of output is exported. In many developing countries, the domestic consumers are less sensitive to quality than international consumers. In other words, quality matters much more in exports than in domestic sales. In an econometric analysis it will be possible to see if the product and financial market signals operate differently for exports and domestic sales.

The main focus of our paper is on export pessimism and we conclude that business collaborations with foreign firms may not always promote exports of a low-income country. We realize the underlying limitations of our model, which is static in nature. By export pessimism we do not mean that the low-income countries of South Asia and Africa can never expand their exports. Growth of market size (increase in parameter a) will lead to expansion of sales in any market structure. What we suggest is that direct competition may be preferred to mergers with foreign monopolists; and that there are ways in which firms in low-income countries can improve their export performance without losing their identity.

Policies to reduce technological backwardness and enhance market reputation will help the low-income country's firm bargain for a better deal in the joint venture agreement with the foreign multinational.

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Endnotes

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[1]The countries are classified according to 2006 Gross National Income (GNI) per capita, calculated using the World Bank Atlas method. To simplify the analysis, we focus on two groups: low-income countries, with GNI $905 or less and high-income countries with GNI $11,116 or more.

2 'Contradictions of China's transformation: international', Monthly Review, 01-July-2004, Goliath.

[3] The export performance clause requires the firms of low-income countries increase their exports after signing the joint venture agreement with firms of high-income countries.

[4] The governments are generally choosy about foreign collaborations and delay giving approvals for tie-ups with foreign firms.

[5] We claim that a reduction in the value of β may be the only way in which the low-income country firm can improve its product market performance.

[6] See Ekholm et al (2007), Dai and Lahiri (2007) and Barry and Bradly (1997).

[7] It is not unreasonable to assume that the low-income country firm will accept only the Cournot profit in the joint venture agreement. The static structure of our model does not allow us
to introduce dynamic concepts. One can visualize the possibility of the low-income country's firm agreeing to the
joint venture agreement in order to copy the high quality technology from its foreign partner in the first period and breaking the agreement in the second period. Chowdhury and Chodhury (2001) discuss such joint venture life cycles.

[8] β is the quality parameter

[9] Treating (15) as an equation, the solution of $\sqrt{\beta}$ is: *-c(a-c)/(3a+5c)<0*.