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International Outsourcing and Welfare Reduction: an Entry-deterrence Story

by

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Abstract

We show that international outsourcing may reduce welfare of the outsourcing country by deterring market-entry, thus showing a new effect which is different from the employment and the quality effects creating negative impacts of outsourcing. Entry deterrence under outsourcing reduces domestic welfare if both the profit extraction and cost saving from outsourcing are sufficiently small.

Outline

Non-Technical Summary

There have been great concerns that large number of job losses in the developed countries might occur as a result of international outsourcing of the unskilled and semi-skilled activities. There are also growing concerns about the effects on product quality of outsourcing. We identify a new source, viz., the competition effect, for policy concerns on international outsourcing.

We show that international outsourcing may reduce welfare of the outsourcing country by deterring market-entry, thus showing a new effect which is different from the employment and the quality effects creating negative impacts of outsourcing. Entry deterrence under outsourcing reduces domestic welfare if both the profit extraction and cost saving from outsourcing are sufficiently small.

1. Introduction

Outsourcing of productions from the USA to countries such as India, Brazil and China, has emerged as a popular topic of discussion both in the academia and the media. The impacts of outsourcing on employment and quality have been at the center of debate. There have been great concerns that large number of job losses in the developed countries might occur as a result of international outsourcing of the unskilled and semi-skilled activities, although recent studies have shown that, instead of outsourcing, recent job losses in the USA are primarily due to the rise in the manufacturing productivity (Schultze, 2004) and the structural transformation of the economy (Groshen and Potter, 2003). Even though negative employment effect need not be in place, there are growing concerns about the effects on product quality of outsourcing. For example, a recent survey by Manpower in the UK indicates that 56 percent of IT specialist reports lower quality of IT works under international outsourcing than it is under in-house production, and that 11 percent reports that outsourcing sets back the firm's production (see, http://www.manpower.co.uk/news/OutsourcingSurvey.pdf).

We identify a new source, viz., the competition effect, for policy concerns on international outsourcing. We show that entry deterrence under outsourcing reduces welfare of the outsourcing country if both profit extraction and cost saving from outsourcing are sufficiently small. The negative impact of outsourcing becomes more prominent with a higher domestic consumption of the product. It is needless to say that our argument differs from both the employment and product-quality effects. An immediate implication of our result suggests that public policies designed to encourage market-entry deserves greater attention in the presence of international outsourcing.

Our paper complements the recently growing literature on international outsourcing. Grossman and Helpman (2002 and 2003), Egger and Egger (2003), Shy and Stenbacka (2003) and Antràs and Helpman (2004) show contractual and strategic implications of outsourcing and the advantage of international outsourcing over other organizational structures such as vertical integration and foreign direct investment. Feenstra and Hanson (1999) estimate the impact of outsourcing on the relative wage within USA. Jones (2005) compares immigration and outsourcing since both tend to affect local wage. Pack and Saggi (2001) show the effects of knowledge spillover on the profitability of the outsourced firm. Glass and Saggi (2001), Sayek and Şener (2006) and Marjit and Mukherjee (2008a) show the implications of outsourcing on R&D. Marjit and Mukherjee (2008b) show that international outsourcing may reduce profits of the outsourced firms, and outsourcing may also be socially excessive. Stähler (2007) shows the trade-off between vertical foreign direct investment and outsourcing. In contrast to the above-mentioned papers, we emphasize the role of international outsourcing on the product-market structure, which has been overlooked in the existing literature.[1]

It is worth highlighting that, in our analysis, outsourcing helps to save the cost of entry by deterring entry, yet it may reduce welfare by creating higher market concentration. This is in contrast to the 'excessive entry' literature (e.g., Mankiw and Whinston, 1986; Anderson *et al*., 1995; Fudenberg and Tirole, 2000; and Mukherjee and Mukherjee, 2008) indicating that costly-entry in an imperfectly competitive market may be welfare-reducing.

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[1] Even if Pack and Saggi (2001) discusses the implications of entry, entry in their model is due to knowledge spillover in the foreign country and not because of international outsourcing *per se*. In contrast, there is no knowledge spillover in our analysis, and entry is affected by the outsourcing activity.

The remainder of the paper is organized as follows. Section 2 describes the model. Section 3 summarizes the main results. Section 4 concludes.

2. The model and the results

Consider a world economy with two countries, a domestic country and a foreign country. There is an incumbent final goods producer (firm 1) and an entrant final goods producer (firm 2) in the domestic country. Production requires a critical input, and each of them can produce the critical input in the domestic country at the constant marginal cost, $c > 0$. We assume that firm 2 needs to incur a fixed entry cost E, if it enters the market.

We assume that firm 1 can outsource input production to the foreign country, where the inputs are produced by an input supplier at the constant marginal cost, d, which is lower than c. For simplicity, we assume that $d = 0$. We further assume that, under outsourcing, the price of paid by firm 1 to acquire the inputs from the foreign input supplier is determined through a generalized Nash bargaining process, with α and $(1 - \alpha)$ representing the respective bargaining power of firm 1 and the foreign input supplier.

Final goods are sold in the domestic country and the inverse market demand function in the domestic country is:

$$P = a - q, \tag{1}$$

where P is price, q is quantity, and $a > c > 0$.

Since outsourcing by only firm 1 will be a crucial factor for our result, it is worth spending some time on this issue before going further. It is well documented that international outsourcing often involves significant costs (see, e.g., Glass and Saggi, 2001; Pack and Saggi, 2001; Grossman and Helpman, 2003). There are often

significant amount of hidden costs of outsourcing, such as the cost of selecting a vendor, the cost associated with the transition of work from the outsourced firm to the vendor (which involves, for example, the costs of training the overseas employees, the costs of building overseas infrastructures, etc.), the cost of layoffs in the outsourced firm, the costs of managing contracts and the cultural costs (Overby, 2003). It has also been shown that if the firms have the option for outsourcing and domestic production, the most productive firms do outsourcing (Mitra and Ranjan, 2008). Hence, assuming that the cost of outsourcing is asymmetric for firms 1 and 2, a sufficiently higher cost of outsourcing faced by firm 2 (compared to firm 1) makes outsourcing unprofitable for firm 2, yet outsourcing is profitable for firm 1. These asymmetric costs of outsourcing may be the outcome of different organizational structures of the firms and/or lower efficiency of firm 2 compared to firm 1.[2] For simplicity, we normalize firm 1's cost of outsourcing to zero.

It is also worth mentioning that the assumption of homogeneous products in our analysis abstracts away the quality effect. Further, the assumption of constant marginal costs, which implicitly assumes a perfectly competitive labor market, helps us to consider that the workers who are not employed in these firms get alternative jobs at the same wage rate. Hence, this assumption helps us to eliminate the negative employment effects of outsourcing in our analysis. It should be noted that it is not our intention to deny the importance of the employment and the quality effects of outsourcing. Rather, by eliminating these effects from our analysis, we can focus only on the competition effect, which is the purpose of this paper.

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[2] It should be noted that the entry-deterrence role of outsourcing by firm 1 remains even if lower efficiency of firm 2 creates a higher marginal cost of firm 2 (compared to firm 1), instead of a higher fixed cost of outsourcing for firm 2.

We consider the following three-stage game. At stage 1, the outsourcing decision is taken. At stage 2, firm 2 decides whether to enter or not. At stage 3, the outputs are determined and the profits are realized. We solve the game through backward induction.

2.1. No outsourcing

Let us first consider the situation with no outsourcing at stage 1. If entry occurs at stage 2, the equilibrium outputs of firms 1 and 2 can be found as

$$q_1^{no,e} = q_2^{no,e} = \frac{a-c}{3}. \tag{2}$$

The equilibrium profits of firms 1 and 2 are respectively

$$\pi_1^{no,e} = \frac{(a-c)^2}{9} \qquad \text{and} \qquad \pi_2^{no,e} = \frac{(a-c)^2}{9} - E. \tag{3}$$

It follows, from (3), that if firm 1 does not outsource, firm 2 enters the market provided that

$$\frac{(a-c)^2}{9} > E. \tag{4}$$

Clearly, if $\frac{(a-c)^2}{9} < E$, firm 2 does not enter the market even if firm 1 does not outsource. In this situation, firm 1 becomes a monopoly, and its profit is

$$\pi_1^{no,ne} = \frac{(a-c)^2}{4}. \tag{5}$$

Under no outsourcing by firm 1, welfare of the domestic country, which is the sum of consumer surplus and net total profits of firms 1 and 2, is

$$W^{no,e} = \frac{4(a-c)^2}{9} - E, \qquad \text{for } \frac{(a-c)^2}{9} > E. \tag{6a}$$

$$W^{no,ne} = \frac{3(a-c)^2}{8}, \qquad \text{for } \frac{(a-c)^2}{9} < E. \tag{6b}$$

2.2. Outsourcing

Now consider outsourcing by firm 1, at stage 1. If entry occurs at stage 2, the respective equilibrium outputs of firms 1 and 2 can be obtained as

$$q_1^{o,e} = \frac{a+c}{3}, \quad \text{and} \quad q_2^{o,e} = \frac{a-2c}{3}. \tag{7}$$

We assume that $c < \dfrac{a}{2}$, which ensures positive output of firm 2 if it enters under outsourcing by firm 1. The equilibrium profit of firm 2 is

$$\pi_2^{o,e} = \frac{(a-2c)^2}{9} - E. \tag{8}$$

It is immediate from (8) that if firm 1 does outsourcing, firm 2 enters the market if

$$\frac{(a-2c)^2}{9} > E. \tag{9}$$

Proposition 1: *Outsourcing (compared to no outsourcing) by firm 1 reduces firm 2's incentive for market-entry.*

Proof: A comparison of Equations (4) and (9) proves the result. Q. E. D.

Intuitively, outsourcing increases the cost efficiency of firm 1, thus reducing the competitiveness of firm 2, and creating lower incentive for entry by firm 2. Nonetheless, entry cost matters. If $\dfrac{(a-2c)^2}{9} > E$, firm 2 enters the market irrespective of the outsourcing decision by firm 1. If $E \in \left(\dfrac{(a-2c)^2}{9}, \dfrac{(a-c)^2}{9} \right)$, firm 2

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enters only when firm 1 does not engage in outsourcing. If $E > \dfrac{(a-c)^2}{9}$, firm 2 never

enters regardless of firm 1's outsourcing decision.

It may worth mentioning that if firm 2 is symmetric to firm 1 with respect to

outsourcing, i.e., getting the same benefit from outsourcing and incurring the same

cost of outsourcing, it is easy to check that, in our analysis, outsourcing by firm 1

does not prevent entry of firm 2 whenever entry by firm 2 is profitable under no

outsourcing by firm 1. Hence, the asymmetry between the firms with respect to

outsourcing is crucial for the above result.

So far we did not determine the price of outsourcing, which will have

significant implications for the domestic welfare. It is important to note that the price

of outsourcing depends both on the entry decision of firm 2 and on the profit of firm 1

under no outsourcing, since both the factors affect the disagreement payoff of firm 1.

Let us first consider the situation where firm 2 enters the market under

outsourcing, i.e., $\dfrac{(a-2c)^2}{9} > E$. In this situation, the price of outsourcing, F, is

chosen to maximize the following expression:

$$\underset{F}{Max}\left(\frac{(a+c)^2}{9} - F - \frac{(a-c)^2}{9}\right)^{\alpha} F^{1-\alpha}, \tag{10}$$

where $\dfrac{(a+c)^2}{9}$ is the profit of firm 1 under outsourcing, and $\dfrac{(a-c)^2}{9}$ is the profit of

firm 1 under no outsourcing.

The optimal value of F is

$$F^* = (1-\alpha)\left(\frac{(a+c)^2}{9} - \frac{(a-c)^2}{9}\right). \tag{11}$$

The profit of firm 1 under outsourcing is

$$\pi_1^{o,e} = \frac{(a-c)^2}{9} + \alpha\left(\frac{(a+c)^2}{9} - \frac{(a-c)^2}{9}\right) = \frac{(a-c)^2 + 4ac\alpha}{9}. \tag{12}$$

Welfare of the domestic country under outsourcing by firm 1 and entry by firm 2 is

$$W^{o,e/e} = \frac{2(a-c)^2 + 8ac\alpha + 2(a-2c)^2 + (2a-c)^2}{18} - E. \tag{13}$$

Next, examine the case of $E \in \left(\frac{(a-2c)^2}{9}, \frac{(a-c)^2}{9}\right)$, which suggests that firm

2 does not enter the market if firm 1 outsources. Therefore, firm 1 produces as a

monopolist under outsourcing, and the profit of firm 1 is $\frac{a^2}{4}$. However, note that firm

2 enters the market under no outsourcing by firm 1. Hence, under no outsourcing by

firm 1, the profit of firm 1 is $\frac{(a-c)^2}{9}$. Hence, we determine F by solving the

following expression:

$$\underset{F}{Max}\left(\frac{a^2}{4} - F - \frac{(a-c)^2}{9}\right)^{\alpha} F^{1-\alpha}. \tag{14}$$

The optimal value of F is

$$F^* = (1-\alpha)\left(\frac{a^2}{4} - \frac{(a-c)^2}{9}\right). \tag{15}$$

The profit of firm 1 under outsourcing is

$$\pi_1^{o,e} = \frac{(a-c)^2}{9} + \alpha\left(\frac{a^2}{4} - \frac{(a-c)^2}{9}\right) = \frac{4(a-c)^2 + \alpha(5a-2c)(a+2c)}{36}. \tag{16}$$

Welfare of the domestic country under outsourcing by firm 1 is

$$W^{o,ne/e} = \frac{8(a-c)^2 + 2\alpha(5a-2c)(a+2c) + 9a^2}{72}. \tag{17}$$

Finally, consider the case of $E > \dfrac{(a-c)^2}{9}$, where entry does not occur regardless of the outsourcing decision of firm 1. In this situation, firm 1 becomes monopoly under both outsourcing and no outsourcing, and its profits under outsourcing and under no outsourcing are respectively $\dfrac{a^2}{4}$, and $\dfrac{(a-c)^2}{4}$. Hence, F can be obtained by solving the following expression:

$$\underset{F}{Max} \left(\frac{a^2}{4} - F - \frac{(a-c)^2}{4} \right)^{\alpha} F^{1-\alpha} . \qquad (18)$$

The optimal value of F is

$$F^* = (1-\alpha)\left(\frac{a^2}{4} - \frac{(a-c)^2}{4} \right). \qquad (19)$$

The profit of firm 1 under outsourcing is

$$\pi_1^{o,e} = \frac{(a-c)^2}{4} + \alpha\left(\frac{a^2}{4} - \frac{(a-c)^2}{4} \right) = \frac{(a-c)^2 + \alpha c(2a-c)}{4}. \qquad (20)$$

Welfare of the domestic country under outsourcing by firm 1 is

$$W^{o,ne/ne} = \frac{2(a-c)^2 + 2c\alpha(2a-c) + a^2}{8}. \qquad (21)$$

3. The main Results

The results shown below in Proposition 2 follow immediately from (11), (12), (15), (16), (19) and (20).

Proposition 2: *(i) The profit of the input supplier in the foreign country is highest if entry of firm 2 occurs only under no outsourcing, i.e., if* $E \in \left(\dfrac{(a-2c)^2}{9}, \dfrac{(a-c)^2}{9} \right).$

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(ii) The profit of firm 1 under outsourcing is highest if entry of firm 2 never occurs,

i.e., if $E > \dfrac{(a-c)^2}{9}$.

The intuition for the above result is as follows. The input supplier's profit depends on the surplus created by outsourcing, and this surplus and, thus, the input supplier's profit, is maximal when entry occurs only under no outsourcing. If entry occurs only under no outsourcing, it helps to create maximal surplus under outsourcing by reducing firm 1's profit under no outsourcing and by creating maximum gross profit under outsourcing. Hence, this situation generates the highest price for outsourcing, which is the profit of the input supplier. However, the profit of firm 1 under outsourcing is the profit in the product-market net of the price paid for outsourcing, and this is maximized if entry of firm 2 does not occur irrespective of outsourcing by firm 1. The profit in the product-market under outsourcing is maximized if entry of firm 2 is deterred under outsourcing. Even if the minimum price paid by firm 1 may occur either under 'never entry by firm 2' or under 'always entry by firm 2', the higher market concentration under the former situation always creates higher net profit for firm 1.

Proposition 3: *Consider $E \in \left(\dfrac{(a-2c)^2}{9}, \dfrac{(a-c)^2}{9} \right)$.*

(i) If $\alpha = 1$, domestic welfare is higher under outsourcing even if outsourcing prevents entry of firm 2.

(ii) If $\alpha = 0$ and $c > c^* \equiv \dfrac{a(\sqrt{30} - 4)}{4}$, domestic welfare is higher under outsourcing

even if outsourcing prevents entry of firm 2, where $0 < c^* < \dfrac{a}{2}$.

Proof: If $E \in \left(\dfrac{(a-2c)^2}{9}, \dfrac{(a-c)^2}{9} \right)$, firm 2 enters only under no outsourcing by firm

1. In this situation, welfare of the domestic country is given by (6a) and (17) for no

outsourcing and for outsourcing by firm 1, respectively. A comparison of (6a) and

(17) shows that welfare is higher under no outsourcing if

$$\frac{24(a-c)^2 - 2\alpha(5a - 2c)(a + 2c) - 9a^2}{72} > E. \tag{22}$$

Note that the left hand side (LHS) of (22) is an increasing function of E. Hence, if

$\alpha = 1$, it is evident that (22) cannot hold for $E_{min} \equiv \dfrac{(a-2c)^2}{9}$, since (22) boils down

to

$$-3a^2 - 32ac > 0, \tag{22a}$$

which never holds. This proves part (i).

If $\alpha = 0$, we obtain that (22) does not hold for $E_{min} \equiv \dfrac{(a-2c)^2}{9}$ if

$$7a^2 - 8c^2 - 16ac < 0$$

or $\qquad\qquad c > c^* \equiv \dfrac{a(\sqrt{30} - 4)}{4}. \tag{22b}$

This proves part (ii). Q.E.D.

Since LHS of (22) is a decreasing function of α, Corollary 1 follows

immediately from Proposition 3 and shows the main result of the paper.

Corollary 1: *If both α and c are sufficiently small, outsourcing reduces domestic welfare if it deters market-entry by firm 2.*

The intuition for the above result is as follows. On one hand, if α and c are sufficiently small, firm 1's profit extraction from outsourcing and the cost saving from outsourcing are both small. Hence, the positive effect of outsourcing on domestic welfare due to the higher domestic profit is not very strong. On the other hand, outsourcing eliminates entry, thus creating higher product-market concentration, which affects consumer surplus negatively. On the balance, the loss of consumer surplus dominates the profit-gain from outsourcing, thus creating lower domestic welfare under outsourcing compared to no outsourcing. Note that even if outsourcing helps to save the entry cost, the higher market concentration may become the dominant factor to create lower domestic welfare under outsourcing compared to no outsourcing.

It may worth mentioning that Corollary 1 holds even if firm 1 and the foreign input supplier have the same bargaining powers. If $\alpha = .5$ and $E = E_{\min} \equiv \dfrac{(a - 2c)^2}{9}$, condition (22) becomes $a^2 - 2c^2 - 12ac > 0$, which holds for $c < \dfrac{a(\sqrt{38} - 6)}{2}$.

Proposition 3 explores the situation where international outsourcing prevents domestic entry. However, if firm 2's entry decision is not affected by outsourcing by firm 1, i.e., if firm 2 either enters or does not enter irrespective of outsourcing by firm 1, outsourcing always increases domestic welfare compared to no outsourcing.

It is worth pointing out that the consumption of entire outputs in the domestic country may not be important for our qualitative result. If the outputs are sold in the world market and only a fraction of the total output is sold in the domestic country,

the negative impact of outsourcing on domestic welfare due to entry deterrence is reduced, yet domestic welfare may be lower under outsourcing than under no outsourcing. For example, in the extreme situation where no outputs are sold in the domestic country, if $\alpha \to 0$, domestic welfare under no outsourcing is $\frac{2(a-c)^2}{9} - E$, which is greater than the domestic welfare under outsourcing, which tends to $\frac{(a-c)^2}{9}$. If the bargaining power of firm 1 is sufficiently small, outsourcing by firm 1 creates lower domestic welfare under outsourcing compared to no outsourcing by reducing the *total* domestic profit under the former situation compared to the latter.

As final remark, we would like to mention that, we consider a duopoly market structure to show our results in the simplest way. However, it is easy to understand that our qualitative results hold even if there are multiple incumbents and multiple entrants, where outsourcing is not an economically viable option to some of the entrants. Outsourcing by some firms may deter entry by the non-outsourcing entrants by reducing their competitiveness, and may, in turn, reduce domestic welfare by increasing market concentration.

4. Conclusion

The job loss created by international outsourcing has been a major concern in the policy circle, though empirical findings do not always support this view. We have identified competition effect as an alternative source leading towards a grave policy concern over international outsourcing. We show that international outsourcing may create lower domestic welfare by affecting the product-market structure. In particular, if the firms are asymmetric in terms of the economic viability of international outsourcing, outsourcing (as compared to no outsourcing) may reduce domestic

welfare by deterring entry in the domestic country. Hence, the effects on market structure deserve greater attention in assessing the influences of international outsourcing.

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