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Trade Liberalisation, Subcontracting and Unionised Wage

By

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Abstract:

We develop a simple framework to show the effects of trade cost reduction on unionized wage, employment and domestic welfare when a domestic firm strategically chooses the amount of formal in-house production and subcontracting to the informal sector. We show that a lower trade cost increases unionized wage and domestic firm's formal production and employment, and reduces its informal production. Free trade maximizes domestic welfare if the trade cost represents a transportation cost. However, if the trade cost represents a domestic tariff, the domestic welfare maximizing tariff is positive.

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Outline:

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Non-Technical Summary

Reduction of international trade cost, either due to the policy choice or due to technological improvement, is an important phenomenon in today's world. However, there is always concern about the winners and the losers of a more liberal trade environment, which has created both theoretical and empirical literature analyzing the effects of trade liberalization on unionized wage and employment. While the theoretical literature analyzing the effects of trade liberalization on unionized wage and employment has focused on several important aspects, it has ignored an important empirical regularity, viz., the involvement of informal sector in the production process. It is often found, particularly in developing countries, that the firms undertake formal in-house production and also subcontract with informal producers in the country. Hence, while considering the wage and employment effects of trade liberalization, the strategic decision on formal and informal productions deserves attention. We address this issue in this paper.

We develop a simple framework to show the effects of trade cost reduction on unionized wage, employment and domestic welfare when a domestic firm strategically chooses the amount of formal in-house production and subcontracting to the informal sector. We show that a lower trade cost increases unionized wage and domestic firm's formal production and employment, and reduces its informal production. Free trade maximizes domestic welfare if the trade cost represents transportation cost. However, if the trade cost represents domestic tariff, the domestic welfare maximizing tariff is positive.

Trade Liberalisation, Subcontracting and Unionised Wage

1. Introduction

Reduction of international trade cost, either due to the policy choice or due to technological improvement, is an important phenomenon in today's world. However, there is always concern about the winners and the losers of a more liberal trade environment, which has created both theoretical and empirical literature analyzing the effects of trade liberalization on wage and employment. The effects of international trade liberalization on employment and factor prices can be dated back to Stolper and Samuelson (1941). However, in earlier days, this issue has been addressed under perfectly competitive labour market, which is not always the correct reflection of the real world. Often the labour markets are imperfectly competitive due to the presence of labour unions, and this has created a recent literature examining the effects of trade liberalization on unionized wage and employment.

Rodrik (1997) points out that globalization reduce the power of the trade unions and create an adverse wage effect. This concern is more prominent in Europe, where the labour market in most countries is strongly unionized.¹ For example, as documented in Niblett (2005), the negative perception in the European Union towards increased globalization is an important reason for the rejection of the European Constitution by French and Dutch voters. The theoretical results of Huizinga (1993) and Sørensen (1993), which show that unionized wage is higher under autarky than under free trade, confirm this concern.

However, empirical evidences do not support these findings always. There are several evidences showing that a trade cost reduction increases unionized wage.

¹ As mentiond in OECD (2004), on average, 67% of the workfoce in the European nations are covered by union agreements.

Feenstra (2007) finds a substantial improvement in wage earnings in the USA and Canada during 1980s and 1990s following tariff reduction. Cragg and Epelbaum (1996) observe a high growth of skill wage in Mexico in the phase of tariff reduction during 1990s. Aleman-Castilla (2006) shows that Mexican trade opening in the 1990s increased industry wage differentials and widened the formal–informal wage gap. Based on official information from Annual Survey of Industries and National Sample Survey Organisation in India, Maiti and Marjit (2009) register a sharp wage rise in both formal and informal sector, by more than three to four times, from 1989-90 to 2005-06 in the period of economic reform.

The theoretical works by Naylor (1998 and 1999), Munch and Skaksen (2002), Bastos and Kreickemeier (2009) and Bastos et al. (2009) justify the positive effects of trade reform on unionized wage. In two-country trade models, Naylor (1998 and 1999) show that two-way trade liberalization increases unionized wage. Bastos and Kreickemeier (2009) show the effects of two-way trade liberalization in a general equilibrium model with unionized and non-unionized sectors. Bastos et al. (2009) show that trade liberalization may increase unionized wage by affecting the disagreement utility of the firms if the union is an open shop, where all the workers are not union members.

The theoretical works reviewed above have addressed several important aspects of the contemporary world, yet they ignore an important empirical regularity, viz., the involvement of informal sector in the production process. It is often found, particularly in developing countries, that the firms undertake formal in-house production and also subcontract with informal producers in the country. For example, it is often the case in Latin American countries such as Brazil (Ulssea, 2010). The evidence of rising participation of the informal sector can also be found in other

recent works such as Schneider and Enste (2000), Boeri and Garibaldi (2005), Guha-Khasnobis and Kanbur (2006) and Mehrotra and Biggeri (2007). As an example, Bata, a well-known shoe manufacturer in India, produces in-house and also subcontracts with outside producers in the country. Such examples can also be found in other industries such as automobile, textile and IT. Hence, while considering the wage and employment effects of trade liberalization, the strategic decision on formal and informal productions deserves attention. To the best of our knowledge, there is no work which addresses this issue. This paper is a step to fill this gap.

We develop a simple framework where a domestic firm decides on formal in-house production and subcontracting with the informal producers. The in-house wage is determined by a labour union, while the informal wage is determined by the competitive condition. In this framework, we show the effects of a trade cost reduction on unionized wage, and formal and informal activities. We show that a trade cost reduction increases in-house unionized wage and domestic firm's formal production and employment, and reduces its informal production. This is due to the following two effects. Given the amount of subcontracting, a trade cost reduction increases the output of the foreign firm, and reduces the domestic firm's in-house production. Hence, given the amount of subcontracting, a lower trade cost reduces the union's labour demand, thus reducing the domestic firm's in-house unionized wage. This wage effect tends to increase the domestic firm's incentive for in-house production and reduces its incentive for subcontracting. The extent of the competition and wage effects determines the net effect of a trade cost reduction on the domestic firm's in-house production, employment and wage. We find that the wage effect, which increases production efficiency by reducing the marginal cost of production, dominates the competition effect, and a trade cost reduction increases unionized wage

and domestic firm's in-house production and employment, and reduces its subcontracting to the informal sector.

We also show that zero trade cost maximizes domestic welfare if the trade cost represents transportation cost. However, if the trade cost represents domestic tariff, the domestic welfare maximizing level of tariff is positive. This result is due to the standard rent shifting effect of domestic tariff, which balances the effects of competition (which affects domestic profit, consumer surplus and union utility) and domestic tariff revenue.

The remainder of the paper is organized as follows. Section 2 describes the model and shows the results. Section 3 concludes.

2. The model and the results

Assume that there are two countries, called domestic and foreign. Each country has one firm producing a homogeneous product and competing in the domestic country. The firm in the domestic country is called firm 1 and the firm in the foreign country is called firm 2. The inverse demand function in the domestic country is $P = a - Q$, where P is price of the product and Q is the total output.

We assume that production requires labour and the domestic firm's output can be produced in-house and/or in the informal sector.² For simplicity, we assume that one unit of labour is required to produce one unit of output, irrespective of in-house or informal production. We consider that there is a labour union which determines firm 1's in-house wage rate, w , while considering the competitive wage rate as the unionized workers reservation wage rate, which is assumed to be zero for simplicity.

² See, e.g., Ulyssea (2010) for a work where production process involves both formal and informal sectors.

The competitive wage, which is assumed to be zero, prevails in the informal sector, thus creating different labour market institutions in the formal and informal sectors. Hence, the labour cost for the informal production is zero. However, it is well documented that involvement of informal sector also creates transaction and/or administrative costs (Ulyssea, 2010). So, the effective unit cost of production in the informal sector is the summation of competitive labour cost and the transaction and administrative costs. We assume that the constant per-unit transaction and administrative costs for informal production is c . Therefore, the effective unit cost of production in the informal sector is c . Hence, the trade off for the domestic firm is clear. Subcontracting to the informal sector helps to bypass the unionized wage, w , but it attracts the transaction and administrative costs (i.e., c) related to informal production.

We assume for simplicity that the constant marginal cost of production of the foreign firm is zero, yet it needs to incur the per-unit trade cost t , due to transportation cost and/or tariff imposed by the domestic country. Hence, the effective unit cost of the foreign firm is t .

Following Crene and Davidson (2004), which show that a multi-division firm can stagger its output decision among different divisions, we consider that the domestic firm can stagger its output decision among in-house production and outsourcing to the informal sector. More particularly, we consider that the domestic firm chooses its output under subcontracting before its in-house production. However, the domestic firm and the foreign firm compete like Cournot duopolists. That is, the foreign firm cannot observe the output decision of the domestic firm, either under subcontracting or under in-house production, yet the foreign firm knows of the

domestic firm's sequence of output decision. Hence, we consider the following strategies:

(1) The foreign firm, i.e., firm 2, chooses q_2 to maximize its profit given its Cournot conjecture about the domestic firm's, i.e., firm 1's, output decision under in-house production, q_1 and subcontracting to the informal sector, which is define by k .

(2) Firm 1 chooses k to maximize its total profit given its Cournot conjecture about firm 2's output choice q_2 and the effect of k on the output choice q_1 .

(3) After the output decision k , firm 1 decides on q_1 to maximize its total profit given its Cournot conjecture about firm 2's output choice q_2 .

(4) The labour union in firm 1 decides wage, w , after firm 1's decision on k but before its decision on q_1 . Hence, firm 1's decision on k influences the unionized wage in firm 1, thus providing the rationale to firm 1' decision for dealing with the informal sector, i.e., determining k , before its dealing with the in-house labour union, which affects its in-house wage and production.

In terms of our analysis, the strategic variables will be determined in the following order. Given w , k and q_1 , firm 2 will determine q_2 to maximize its profit, and given w , k and q_2 , firm 1 will determine q_1 to maximize its profit. These profit maximizing calculations will determine the labour demand faced by the in-house labour union, which will determine w to maximize union utility after taking into account this labour demand function. Firm 1 will choose k to maximize its profit by considering the effect of k on w , q_1 and q_2 .

Firms 1 and 2 maximize the following expressions to determine q_1 and q_2 respectively:

$$\pi_1 = (a - q_1 - q_2 - k - w)q_1 + (a - q_1 - q_2 - k - c)k \quad (1)$$

$$\pi_2 = (a - q_1 - q_2 - k - t)q_2 . \quad (2)$$

The equilibrium values can be found as

$$q_1 = \frac{a - 3k + t - 2w}{3} \quad (3)$$

$$q_2 = \frac{a - 2t + w}{3} . \quad (4)$$

Equation (3) provides the labour demand for the in-house labour union. The labour demand function or firm 1's in-house production is inversely related to the amount of subcontracting and the union wage but directly related to the trade cost. Equation (4) shows that firm 2's output is directly related to the unionized wage in the domestic firm and inversely related to the trade cost. It is interesting to note that the amount of subcontracting by the domestic firm does not have direct impact on foreign output. This is because the foreign firm considers the total output of the domestic firm, which is $(k + q_1)$, as given while taking its output decision.

Now we shall determine the union wage. We consider a right-to-manage model of labour union such as in Vannini and Bughin (2000), López and Naylor (2004) and Mukherjee (2008), to name a few.³ We assume that the labour union maximizes the following expression to determine w :

$$Max_w \frac{w(a - 3k + t - 2w)}{3} . \quad (5)$$

The equilibrium wage can be found as

$$w = \frac{a - 3k + t}{4} . \quad (6)$$

³ The "efficient bargaining" model, which stipulates that the firms and unions bargain over wages and employment, is an alternative to the right-to-manage model. See, Layard et al. (1991) for arguments in favor of right-to-manage models.

The expression (6) confirms that firm 1 can reduce the unionized wage by increasing the amount of subcontracting to the informal sector. Equation (6) also shows that given the amount of outsourcing, a trade cost reduction reduces the unionized wage.

Substituting (6) into (3) and (4), we get that

$$q_1 = \frac{a - 3k + t}{6} \quad (7)$$

$$q_2 = \frac{5a - 3k - 7t}{12}. \quad (8)$$

Finally, firm 1 maximizes the following expression to determine k :

$$\text{Max}_k [(a + 3k + t)(a - 3k + t) + 3(5a - 3k + 5t - 12c)k] / 36. \quad (9)$$

The equilibrium amount of subcontracting can be found as

$$k^* = \frac{5a + 5t - 12c}{12}. \quad (10)$$

Equation (10) shows that a lower trade cost reduces the amount of subcontracting by firm 1 to the informal sector. Hence, a trade cost reduction creates the following trade off. Given k , a lower t reduces w . However, a lower t also reduces k , which tends to increase w . The net effect will depend on these effects.

Using the equilibrium value of k , we get the equilibrium w , q_1 and q_2 as

$$w^* = \frac{12c - a - t}{16} \quad (11)$$

$$q_1^* = \frac{12c - a - t}{24} \quad (12)$$

$$q_2^* = \frac{5a - 11t + 4c}{16}. \quad (13)$$

Note that $w^* < c$.

Lemma 1: *The prohibitive trade cost is $t^* = \frac{5a+4c}{11}$, i.e., firm 2 exports if $t < t^*$.*

Proof: It follows from (13) that $q_2^* > 0$ if $t < \frac{(5a+4c)}{11}$ and $q_2^* = 0$ if $t \geq \frac{(5a+4c)}{11}$.

Therefore, the prohibitive trade cost is $t^* = \frac{(5a+4c)}{11}$ and firm 2 exports if $t < t^*$. ■

Proposition 1: *Assume that $c > \frac{5a}{12}$. Firm 1 does not subcontract if $t < \frac{(12c-5a)}{5}$ and*

it does not produce in-house if $t > 12c - a$. Firm 1 produces in-house and also

subcontracts if $\frac{(12c-5a)}{5} < t < (12c - a)$.

Proof: If $c > \frac{5a}{12}$, the results follow immediately from (10), (12) and (13). ■

The reason for the above result is as follows. If t is sufficiently high, the domestic firm faces less competition from foreign firm and captures larger market share. In this situation, the high demand for labour increases the in-house unionized wage significantly, thus making in-house production unprofitable compared to subcontracting, and firm 1 subcontract completely. On the other hand, if t is very small, the lower market share of firm 1 creates low demand for labour and reduces the unionized wage significantly. In this situation, firm 1 prefers to produce in-house, since the cost under subcontracting is higher than the in-house cost. For intermediate values of t , firm 1 produces in-house and also subcontracts to balance the unionized wage and the cost of subcontracting.

The implication of the assumption $c > \frac{5a}{12}$ is that, if it does not hold, all three possible production strategies of firm 1, which is shown in Proposition 1, cannot

occur in equilibrium. For example, if $c < \frac{5a}{12}$, no subcontracting by firm 1 cannot be an equilibrium outcome. In the following analysis, we assume that $\frac{5a}{12} < c < a$.

Proposition 2: *A trade cost reduction increases both in-house output (and therefore, employment) of firm 1 and the in-house unionized wage.*

Proof: The results follow immediately from (11) and (12). ■

The reason for the above result is as follows. If t declines, given the amount of subcontracting to the informal sector, it increases output of the foreign firm, and lowers the in-house production of the domestic firm. As a result, given the amount of subcontracting, a lower t reduces the labour demand faced by the union, thus reducing the unionized wage. Hence, the *competition effect* following a trade cost reduction creates a *wage effect*, which increases the domestic firm's incentive for in-house production and reduces its incentive for subcontracting. This wage effect tends to increase firm 1's in-house labour demand and the unionized wage. We find that the wage effect dominates the competition effect, and the net effect of a lower t is to increase the labour demand faced by the in-house labour union, thus increasing in-house employment and the unionized wage. Hence, an implication of our result is that trade liberalization increases formal employment by reducing domestic firm's informal activity.

At this point, it may worth discussing the reason for considering the particular sequence of firm 1's production in our analysis. It follows from the above analysis that if firm 1 determines the amount of subcontracting before the in-house production, it can reduce the unionized wage below c . However, if firm 1 considered in-house

production before subcontracting, the unionized wage rate could be reduced up to c , since, in this situation, c could act as firm 1's alternative marginal cost of production. Hence, by considering the amount of subcontracting before in-house production, firm 1 could strengthen the unionized wage reducing effect of subcontracting.

Let us now consider the effects of a trade cost reduction on domestic welfare.

Proposition 3: Consider $c > \frac{5a}{12}$.

(i) If the trade cost represents transportation cost, domestic welfare is maximized at $t = 0$.

(ii) If the trade cost represents domestic tariff, domestic welfare is maximized at $\bar{t} = \frac{255a - 116c}{801}$, where $\bar{t} \in [0, t^*]$.

Proof: (i) If the trade cost represents transportation cost, welfare of the domestic country consists of the profits of firm 1, consumer surplus and union utility, and is given by

$$W = \frac{[(3a - 4c + 3t)(12c - a - t) + (5a - 12c + 5t)^2]}{192} + \frac{(11a - 5t - 4c)^2}{512} + \frac{(12c - a - t)^2}{384}. \quad (14)$$

We get that domestic welfare is convex with respect to t , attaining a minimum at

$\bar{t} = \frac{308c - 15a}{255}$. Since, we consider $c > \frac{5a}{12}$, which ensures that all three production

strategies of firm 1 can be the equilibrium outcomes, straightforward calculation

shows that $\bar{t} > t^*$ for $c > \frac{45a}{74}$. Hence, a lower transportation cost increases domestic

welfare for $t \in [0, t^*]$ if $c \in (\frac{45a}{74}, a)$, implying that domestic welfare is maximized at $t = 0$.

However, if $c \in (\frac{5a}{12}, \frac{45a}{74})$, we get $\bar{t} < t^*$, and a lower transportation cost reduces welfare for $t \in (\bar{t}, t^*)$. We find that domestic welfare at $t = 0$ is greater than the domestic welfare at $t = t^*$, which implies that domestic welfare is maximized at zero transportation cost.

(ii) If the trade cost represents domestic tariff, the tariff revenue would also affect domestic welfare. In this situation, domestic welfare is

$$W = \frac{[(3a - 4c + 3t)(12c - a - t) + (5a - 12c + 5t)^2]}{192} + \frac{(11a - 5t - 4c)^2}{512} + \frac{(12c - a - t)^2}{384} + \frac{t(5a - 11t + 4c)}{16} \quad (15)$$

We get that domestic welfare is concave with respect to t , attaining a maximum at $\bar{t} = \frac{255a - 116c}{801}$, where $\bar{t} \in [0, t^*]$. Hence, if the trade cost represents domestic tariff, the domestic welfare maximizing tariff is positive. ■

Intuitively, the above result can be explained as follows. For Proposition 3(i), if t falls, domestic competition increases, which increases consumer surplus and union utility⁴ but reduces the domestic firm's profit. We get that the significant gains in consumer surplus and union utility help to maximize the domestic welfare at $t = 0$. Proposition 3(ii) is due to the standard reason for optimal tariff in an imperfectly

⁴ Consumer surplus and union utility are given by $\frac{(11a - 5t - 4c)^2}{512}$ and $\frac{(12c - a - t)^2}{384}$ respectively.

competitive product market. Since the tariff revenue is a component of the domestic welfare, the rent shifting effect of domestic tariff makes the domestic welfare maximizing tariff positive. The optimal tariff balances the effect of tariff on competition (which affects consumer surplus, domestic profit and union utility) and tariff revenue.

3. Conclusion

There are two important developments in the contemporary world. On the one hand, the growth of trade cost reduction creates the concern about its effects on wage and employment in the liberalized country. On the other hand, it is found that firms, particularly in developing countries, are engaged in both formal and informal activities. So far, the literature did not pay attention to these aspects together. This paper fills this gap in the literature, and shows the strategic effects of a trade cost reduction on unionized wage, employment and informal activity.

We show that trade cost reduction increases unionized wage and domestic firm's formal production and employment, and reduces its informal production. The factor attributable to our results is the domestic firm's strategic output choice between formal production and subcontracting to the informal sector, which has been overlooked in the literature. We also show that the domestic welfare maximizing trade cost depends on whether the trade cost represents transportation cost or domestic tariff.

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