

CEP 14-10

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Will There Be a Race to the Bottom?**

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September 2014

CARLETON ECONOMIC PAPERS



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Ottawa, Ontario, Canada
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Trade and Labour Standards: Will There Be a Race to the Bottom?

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July 29, 2014

Abstract

The objective of this paper is to investigate whether international rivalry will lead to a “race-to-the-bottom” (RTB) in labour standards. We derive the equilibrium levels of labour standards in an environment that is most conducive to a RTB, specifically the Brander and Spencer (1985) model of strategic trade in which each government has an incentive to lower the cost of a domestic firm. Our analysis suggests that strategic trade considerations do not lead to a RTB in labour standards. To the contrary, equilibrium labour standards are higher than those in the absence of government intervention. In the case where governments are free to choose the rate of an export subsidy, labour standards are inefficiently high. Binding global trade rules that reduce the subsidy rate would move the equilibrium labour standards closer to their efficient level, and a prohibition of the subsidy would eliminate the efficiency loss in labour markets.

JEL Classification: J8, F1

Key words: Labour standards, international trade, export subsidy

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1. Introduction

Developing countries are often accused of “social dumping” – that is, using cheap labour subject to poor working conditions to produce and export goods at “unfairly” low prices (Corden and Vousden 2001). Not surprisingly, this has led many to call for the tying of labour standards to trade agreements. According to the International Labour Organization (ILO), out of all trade agreements that entered into force between 1990 and 1999, only four percent were tied to labour provisions; between 2000 and 2004, the incidence of labour provisions had increased to almost one-third (Ebert and Posthuma, 2011). The growing prevalence of labour provisions in trade agreements highlights real-world concerns of a “race-to-the-bottom” (RTB) in labour standards as countries enter the world economy.

Labour standards encompass policies or laws that can, generally speaking, enhance working conditions (*e.g.*, through safer work environments) or improve compensation for work (*e.g.*, through higher wages and benefits). As such, these standards set minimum requirements for firms to hire and operate. By nature, the standards can be cost-increasing for firms. Thus, in the presence of trade, countries may be reluctant to raise labour standards for fear of losing their competitive advantage, and may have the incentive to use domestic policy tools to do otherwise. By reducing production costs of trading firms, for example, a country can impact relative prices and improve international competitiveness. This may trigger a race-to-the-bottom in cost-cutting policy, as countries attempt to undercut each other with the intention of gaining international market shares or profits. These cost-cutting policies could erode labour standards, particularly in countries where the appropriate legislation or enforcement mechanisms are lacking. Therefore, the concern is that without provisions to maintain labour standards, trade will induce national governments to lower these standards as a way to reduce the production

costs of domestic firms.

The objective of this paper is to investigate whether international rivalry in trade will indeed lead to a RTB in labour standards. Our theoretical model has two major elements. First, we adopt the strategic trade model of Brander and Spencer (1985), in which oligopolistic firms from different countries compete in quantity. It is well-known that in such a world, governments in these countries have an incentive to subsidize their domestic firms to improve their competitiveness in the international market. Since lowering labour standards would lead to reduced production costs, the Brander-Spencer model presents an environment that is most conducive to a RTB in labour standards.

The second major element in our model is that labour standards are endogenously determined. It is based on the premise that labour standards are there for a reason; specifically, we assume that labour standards are put in place to address a firm's monopsony power in the domestic labour market. Thus, our model captures the idea that depressed labour standards could be the result of employer power in the labour market.

To be more specific, our model consists of two firms located in two different countries. These two firms compete in quantity in a third country. Labour is the only input of production, and each firm has monopsony power in its domestic labour market. The government in each country maximizes the social welfare, as measured by the sum of surpluses accrued to firms and workers. In doing so, each government has at its disposal two types of policy instruments: a domestic policy and a trade policy. Specifically, the domestic policy involves labour standards. Since higher labour standards typically lead to higher labour costs for firms, we model these standards in the form of a minimum wage. The relevant trade policy is an export subsidy. We examine both the case where each government is free to set the subsidy rate and the case where

global trade rules place an upper bound on the subsidy rate.

Our analysis suggests that strategic trade considerations do not lead to a RTB in the labour standards. To the contrary, equilibrium labour standards are higher than those in the absence of government intervention. In the case where governments are free to choose the subsidy rates, they actually set the labour standards inefficiently high in the sense that they are above the level needed to eliminate the deadweight loss in the labour markets. Binding global trade rules that reduce the subsidy rates would move the equilibrium labour standards closer to their efficient level, and a prohibition of the subsidy would eliminate the deadweight loss in the labour markets.

The analysis uncovers an important linkage between labour standards and strategic trade policy that, to the best of our knowledge, has not been articulated and proven in the literature. When the labour supply curve is upward-sloping, reduced labour compensation as a result of lower labour standards would decrease the amount of labour supplied. This is in conflict with the goal of strategic trade policy designed to increase the market share and profit of the domestic firm. Since the expansion of output by the domestic firm entails the use of more labour, strategic trade policy calls for a rise, rather than a fall, in labour standards. It is for this reason that strategic trade considerations will not lead to a RTB in labour standards.

The literature on the interaction between strategic trade policy and labour standards is surprisingly scarce. Much of the literature that has examined the relationship between labour standards and international trade – including Alam (1992), Brown *et al.* (1996), Sapir (1995), Srinivasan (1996), Casella (1996), Maskus (1997), Martin and Maskus (2001), and Chau and Kanbur (2006) – uses the traditional paradigm of perfectly competitive goods markets (*e.g.*, the Heckscher-Ohlin model and Ricardian model).¹ As such, they do not deal with strategic trade

¹ See Dar-Brodeur (2013) for a more detailed review of these studies.

considerations. One exception is Jinji (2012), which also uses the Brander-Spencer (1985) model. However, the labour standard examined in Jinji (2012) is imposed by one country (“the North”) on the imports from another country (“the South”), and thus it does not address the possibility of a RTB in labour standards.

Our analysis is similar in spirit to Bagwell and Staiger (2001), which points out the possibility of a RTB in (environmental and labour) standards arising from trade liberalization. To be more specific, they show – in the context of a reduced-form model based on perfect competition – that an attempt to achieve greater level of market access through negotiated tariff reductions would lead governments subsequently to distort their domestic standard choices. The present paper differs from Bagwell and Staiger (2001) in a number of ways. First, we consider imperfect competition in both goods market and labour market, and these market imperfections provide motivations for the strategic trade policy and labour standards. Second, we explicitly consider the optimization decisions of firms and consumers. By endogenizing the interaction between trade policy and labor standards, we are able to uncover the conflict between expansion of exports and reduction in labour standards. In contrast to Bagwell and Staiger (2001), a trade agreement aimed at export subsidies in our model will reduce, rather than exacerbate, the distortion in the labour standards.

The remainder of this paper is organized as follows. The model is presented in section 2, and the subgame perfect equilibrium of this model is analyzed in section 3 under the assumption that governments are free to choose the subsidy rates. In section 4, we examine an alternative situation where world trade rules put an upper bound on the subsidy rate. Concluding remarks are offered in section 5.

2. The Model

Consider the Brander-Spencer (1985) model of Cournot international duopoly. There are two countries, Home (H) and Foreign (F), each with one firm producing a homogenous good that is exported to a third country (the “international market”). Let x (respectively, y) denote the quantity produced by the firm in H (respectively F). The inverse demand function for this good is represented by $p(x+y)$ with $p' < 0$. Then $R(x, y) = p(x+y)x$ and $R^*(x, y) = p(x+y)y$ are the revenues earned by firm H and firm F, respectively. To ensure that the best-response function of each firm is downward-sloping, we assume the following standard conditions: $R_{xy} = p' + xp'' < 0$ and $R_{yx}^* = p' + yp'' < 0$. These conditions mean that the marginal revenue of a firm falls as the output of its rival expands. They also imply that $R_{xx} < 0$, $R_{yy}^* < 0$ and $R_{xx}R_{yy}^* - R_{xy}R_{yx}^* > 0$.

Labour is the only input in production, and one unit of labour is required to produce one unit of output. To motivate the labour standards in our model, we assume that each firm has monopsony power in its domestic labour market.² Accordingly, each firm faces an upward-sloping supply curve in the labour market. The inverse supply curves are given by $w = \omega(x)$ and $w^* = \omega(y)$, where w and w^* are the “wage rates” paid by firm H and F respectively. Here we interpret the wage rates broadly to reflect all forms of labour compensation (*e.g.*, wages, medical insurance, housing subsidies) and working conditions (*e.g.*,

² Empirically, there is evidence that monopsony labour markets are characteristic of many developing or emerging economies. Brummund (2012), for example, finds that Indonesian employers have significant labour market power. Maskus (1997) also suggests that monopsony labour markets could be characteristic to Export Processing Zones (EPZs) that are dominated by one or few employers. For example, with expanding global production linkages and supply chains often comprised of intermediate input-producing developing countries, market power tends to remain with the dominant company or final assembler. As such, labour markets tied to these networks tend to exhibit monopsonistic characteristics (Bacchetta *et al.*, 2009).

safe and comfortable working environment, free lunches at work). We assume that an improvement in these areas will induce a larger supply of labour. In other words, $\omega' > 0$.

The government in each country maximizes the social welfare, measured by the sum of surpluses accrued to firms and workers. Therefore, the social welfare function in the home country is represented by

$$W = [xp(x+y) - wx] + \left[wx - \int_0^x \omega(l) dl \right] = xp(x+y) - \int_0^x \omega(l) dl, \quad (1)$$

and the social welfare function in the foreign country is given by

$$W^* = [yp(x+y) - wy] + \left[wy - \int_0^y \omega^*(l) dl \right] = yp(x+y) - \int_0^y \omega^*(l) dl. \quad (2)$$

Each government has at its disposal two types of policy instruments: a trade policy and a domestic policy. Specifically, the relevant trade policy is an export subsidy. As shown in Brander and Spencer (1985), a welfare-maximizing government has an incentive to offer an export subsidy to help its firm to gain market share and profits in the international market. The domestic policy involves labour standards, which is used to rectify the welfare loss caused by the exercise of monopsony power in the labour market.

Broadly speaking, core labour standards can be classified into five categories. They are: “(1) freedom of association, (2) the right to organize and bargain collectively, (3) freedom from forced labor, (4) a minimum age for employment, and (5) acceptable conditions of work, including a minimum wage, limitations on hours of work, and occupational safety and health rights in the workplace” (Brown *et al.* 1996). A higher standard in any of these categories can have the effect of raising the cost of labour services to firms. To be more specific, the formation of labour unions and collective bargaining are intended to help workers obtain higher wages and better working conditions. Freedom from forced labour means that firms have to

pay a high enough wage to attract workers, and a higher minimum age of employment reduces the size of labour force with the likely effect of higher equilibrium wages. Finally, a higher standard on acceptable conditions of work raises the costs of labour directly.

Since higher labour standards typically lead to higher labour costs for firms, we model these standards as a minimum wage. We use \hat{w} and \hat{w}^* to denote the minimum wage in H and F respectively.

Let s and s^* denote the subsidy per unit of output in H and F, respectively. We assume that the subsidies are financed by lump sum taxes, denote by T and T^* for home and foreign country, respectively. Then the government budget constraints imply $sx = T$ and $s^*y = T^*$.

The firms and governments in the two countries play the following two-stage game. In the first stage, the governments simultaneously set their labour standards and export subsidies. In the second stage the two firms choose their output levels simultaneously. The latter is equivalent to choosing the quantities of labour used in the production since labour is the only input. Regarding the subsidies, we will first consider a situation where the governments are free to set any level of subsidies. Then we will examine the effects of a global trade rule that imposes an upper bound on the level of subsidies. In both instances, we will focus on the subgame perfect equilibrium.

3. Equilibrium without Restrictions on Subsidies

In this section, we consider the situation where the governments are free to choose both the labor standards and subsidy rates. In stage 2 of the game, the firms take these policy variables as given when choosing their output levels. Below we present the analysis of stage 2 under the assumption that the labour standards chosen by the governments, \hat{w} and \hat{w}^* , are binding for the firms. It can be verified that the latter is indeed true in equilibrium.

With the binding labour standards, the firms will set their wage rates at exactly \hat{w} and \hat{w}^* . After the subsidy, the net labour cost per unit of output is $w = \hat{w} - s$ for the home firm and $w^* = \hat{w}^* - s^*$ for the foreign firm. They solve the following profit maximization problems:

$$\max_x \pi = xp(x+y) - wx, \quad (3)$$

$$\max_y \pi^* = yp(x+y) - w^*y. \quad (4)$$

Then the Cournot equilibrium in stage 2 is determined by the following first-order conditions:

$$xp'(x+y) + p(x+y) = w, \quad (5)$$

$$yp'(x+y) + p(x+y) = w^*. \quad (6)$$

Conditions (5) and (6) have the standard interpretation that the marginal revenue product of labour (the left-hand side) is equal to the net labour cost per unit (the right-hand side). The solution to (5) and (6) yields the firms' quantities $x(w, w^*)$ and $y(w, w^*)$. Clearly, the output level of each firm depends not only on its own labour cost but also that of its international rival. Standard comparative static exercises on (5) – (6) indicate that $\partial x / \partial w < 0$, $\partial x / \partial w^* > 0$, $\partial y / \partial w > 0$, and $\partial y / \partial w^* < 0$. In other words, a firm would reduce its quantity in response to a rise in its own net labour cost, but it would expand its quantity in response to an increase in the net labour cost of its rival.

We now consider the governments' decisions on the standard and subsidy in stage 1. Since the two countries are symmetric, we will focus our discussion on home country. The optimization problem of the government in H is to choose \hat{w} and s to maximize the social welfare function (1). In doing so, it has to take into consideration the labour supply function, $\hat{w} = \omega(x)$. Mathematically, it is simpler to use $w = \hat{w} - s$ to express the government's optimization as choosing (w, s) instead of (\hat{w}, s) . That is, we write the home government's

optimization problem as follows:

$$\max_{w,s} W = x(w, w^*)p(x(w, w^*) + y(w, w^*)) - \int_0^{x(w, w^*)} \omega(l)dl \quad (7)$$

subject to

$$w + s = \omega(x(w, w^*)). \quad (8)$$

The social welfare function in (7) is independent of s , because the government expenditure on the subsidy and the revenue from the lump sum tax cancel each other. Thus, this optimization problem can be solved by choosing w to maximize (7) and then using (8) to determine s . With the aid of (5), we write the first-order condition associated with (7) as:

$$\frac{\partial W}{\partial w} = xp' \frac{\partial y(w, w^*)}{\partial w} + [w - \omega(x)] \frac{\partial x(w, w^*)}{\partial w} = 0. \quad (9)$$

Condition (9) determines government H's optimal choice of w for any given w^* .

By symmetry, we derive the first-order condition associated with government F's choice of w^* :

$$\frac{\partial W^*}{\partial w^*} = yp' \frac{\partial x(w, w^*)}{\partial w^*} + [w^* - \omega(y)] \frac{\partial y(w, w^*)}{\partial w^*} = 0. \quad (10)$$

Then (9) and (10) jointly determine the firm's net labour costs in equilibrium, denoted by w_n

and w_n^* (with subscript "n" indicating Nash equilibrium). Using these and the labour supply

functions, we calculate the equilibrium subsidy rates s_n and s_n^* . From $\hat{w} = w + s$ and

$\hat{w}^* = w^* + s^*$, we find the equilibrium labour standards in the two countries, \hat{w}_n and \hat{w}_n^* .

Since the two countries are symmetric, the equilibrium values of every variable are the equal in these countries, *i.e.*, $w_n = w_n^*$, $s_n = s_n^*$ and $\hat{w}_n = \hat{w}_n^*$.

We are now in a position to assess the properties of this equilibrium. The first thing we will note is that in equilibrium both countries offer a positive subsidy, *i.e.*, $s_n = s_n^* > 0$. From (9)

we see quite readily that $w < \omega(x)$ since $xp' \frac{\partial y(w, w^*)}{\partial w} < 0$ and $\frac{\partial x(w, w^*)}{\partial w} < 0$. Then

$s_n = \hat{w} - w = \omega(x) - w > 0$. This result is not surprising since we know from Brander and Spencer (1985) that the governments in this situation have incentives to subsidize their domestic firms. The more relevant issue for us is whether the governments choose the “right” labour standard in the sense that it completely eliminates the deadweight loss associated with the monopsony power.

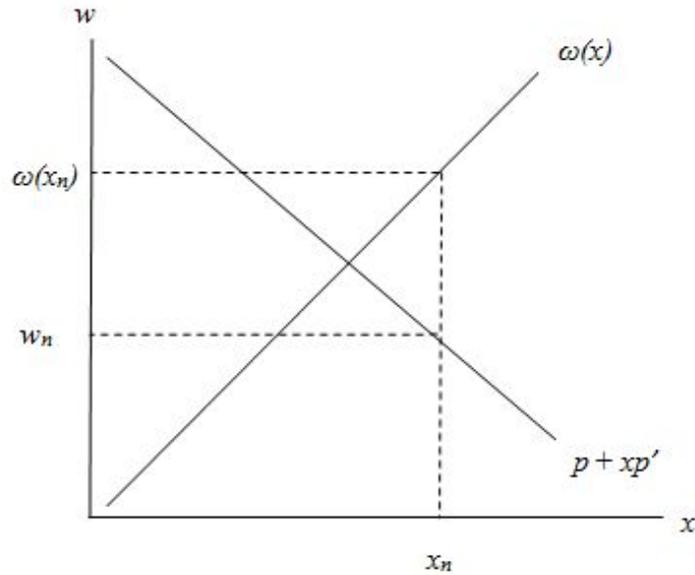
Proposition 1: In equilibrium, each government sets the labour standard at a level above what is needed to eliminate the deadweight loss caused by monopsony power, *i.e.*,

$$\hat{w}_n > x_n p'(x_n + y_n) + p(x_n + y_n) \quad \text{and} \quad \hat{w}_n^* > y_n p'(x_n + y_n) + p(x_n + y_n).$$

Proof: To eliminate the deadweight loss of monopsony, the opportunity cost of labour, as represented by $\omega(x)$, has to be equal to the marginal revenue product of labour. Equation (5) implies that $w_n = x_n p' + p$. On the other hand, (9) implies that $w_n < \omega(x_n)$. Taken together, we have $\hat{w}_n = \omega(x_n) > x_n p' + p$. In other words, the labour standard is higher than the marginal product of labour in equilibrium. ■

From the standard microeconomics, we know that there would be no deadweight loss in the labour market if the quantity of labour hired in equilibrium is determined by the intersection of the labour supply and labour demand curves. The labour demand in the present case is represented by the marginal revenue product, as given in the left-hand sides of (5) and (6). Proposition 1 implies that in equilibrium, each government will set the labour standard so high that the amount of labor hired exceeds the level determined by the intersection of labour demand and labour supply curves, as illustrated in Figure 1.

Figure 1: Equilibrium in Labour Market



We now turn to the central question of this analysis, that is, will international rivalry lead to a race-to-the-bottom in labour standards? To answer this question, we compare the equilibrium with a situation where the governments in the two countries refrain from intervening in the output and labour market. In so doing, we want to find out whether the pursuit of strategic trade policy by each government to help its firm gain a competitive advantage will lead to lower labour standards.

In the absence of any government intervention, the firms would be monopsonists in the labour markets and Cournot oligopolists in the output market. Their profit-maximization problems would be:

$$\max_x \pi = xp(x + y) - \omega(x)x; \quad (11)$$

$$\max_y \pi^* = yp(x + y) - \omega(y)y. \quad (12)$$

Notice that the difference between (11) – (12) and (3) – (4) is that, in the absence of labour standards, the firms would face upward-sloping labour supply curves. This leads to the

following first-order conditions:

$$xp'(x+y) + p(x+y) = \omega(x) + \omega'(x)x; \quad (13)$$

$$yp'(x+y) + p(x+y) = \omega(y) + \omega'(y)y. \quad (14)$$

On the right-hand sides of (13) and (14) are the marginal costs of labour facing the monopsonists.³ Thus, these equations state that the marginal revenue product of labour equals the marginal cost of labour. Let x_c and y_c denote the solution to the system (13) – (14). Using these quantities, we find the wages that would prevail in the absence of government intervention, $w_c = \omega(x_c)$ and $w_c^* = \omega(y_c)$.

Proposition 2: Each government sets the labour standard above that in the absence of government intervention; that is, $\hat{w}_n > w_c$.

Proof: We evaluate the first-order condition (13) at the output levels that prevail under government intervention, $x = x_n$:

$$\frac{\partial \pi}{\partial x} \Big|_{x=x_n} = w_n - \hat{w}_n - \omega'(x_n)x_n < 0, \quad (15)$$

where the negativity of (15) follows from the fact that $w_n - \hat{w}_n < 0$ and that $-\omega'(x_n)x_n < 0$.

By symmetry, we obtain the same conclusion regarding (14) for firm F. Thus, the output levels that satisfy (13) – (14) must be lower than x_n ; that is, $x_c < x_n$. By the monotonicity of $\omega(\cdot)$, we have $\omega(x_c) < \omega(x_n)$, which means that $w_c < \hat{w}_n$. ■

Proposition 2 implies that there is no RTB in labour standards, as strategic trade considerations actually lead the governments to raise the labour standards. The reason for the absence of a RTB is that strategic trade policy in this context promotes output expansion by the

³ Clearly, $\omega(x) + \omega'(x)x > \omega(x)$. This implies that the marginal cost of labour curve for a monopsonist lies above the labour supply curve. This is why the equilibrium labour standards in Proposition 1 are binding for the firms.

domestic firm. The latter entails the hiring of more labour. To raise employment in the presence of an upward-sloping labour supply curve, a higher labour standard is needed to induce more supply. In other words, there is an inherent conflict between the strategic trade policy and the lowering of labour standard. One cannot achieve the objective of the strategic trade policy with lower labour standards. Those who are concerned about a RTB in labour standards appear to have failed to recognize this endogenous link between the strategic trade policy and labour standards.

We end this section with an examination of the welfare effects of government intervention. Here we compare the equilibrium with what would occur in the optimal cooperative solution. Consider the maximization of joint welfare between Home and Foreign:

$$\max_{w, w^*} G = W + W^* = [x(w, w^*) + y(w, w^*)]p[x(w, w^*) + y(w, w^*)] - \int_0^{x(w, w^*)} \omega(l)dl - \int_0^{y(w, w^*)} \omega^*(l)dl. \quad (16)$$

Analysis of the equilibrium in light of (16) yields the following.

Proposition 3: Starting from (\hat{w}_n, s_n) and (\hat{w}_n^*, s_n^*) , joint welfare will increase if each government reduces the labour standard and subsidy rate.

Proof: The first-order conditions associated with (16) can be written as:

$$\frac{\partial G}{\partial w} = xp' \frac{\partial y(w, w^*)}{\partial w} + [w - \omega(x)] \frac{\partial x(w, w^*)}{\partial w} + yp' \frac{\partial x(w, w^*)}{\partial w} + [w^* - \omega^*(y)] \frac{\partial y(w, w^*)}{\partial w} = 0, \quad (17)$$

$$\frac{\partial G}{\partial w^*} = xp' \frac{\partial y(w, w^*)}{\partial w^*} + [w - \omega(x)] \frac{\partial x(w, w^*)}{\partial w^*} + yp' \frac{\partial x(w, w^*)}{\partial w^*} + [w^* - \omega^*(y)] \frac{\partial y(w, w^*)}{\partial w^*} = 0. \quad (18)$$

For notational simplicity, we use subscripts to denote derivatives, *e.g.*, $x_w \equiv \partial x(w, w^*) / \partial w$ and

$\pi_{xy} \equiv \partial^2 \pi / \partial x \partial y$. We evaluate (17) at the equilibrium wages (w_n, w_n^*) :

$$\frac{\partial G}{\partial w} \Big|_{\substack{w = \hat{w}_n \\ w^* = \hat{w}_n^*}} = x_n p' y_w + y_n p' x_w = y_n p' x_w \left[1 - \left(\frac{x_n}{y_n} \right) \frac{\pi_{yx}^*}{\pi_{yy}^*} \right]. \quad (19)$$

The second equality in (19) is obtained using the results from comparative statics on (5) – (6). In equilibrium, $x_n / y_n = 1$ because the countries are symmetric. Since $\pi_{yx}^* = y_n p'' + p'$ and $\pi_{yy}^* = y_n p'' + 2p'$, we obtain $\pi_{yx}^* - \pi_{yy}^* = -p' > 0$. Thus, $\pi_{yx}^* / \pi_{yy}^* > 1$ in (19). These, along with $y_n p' x_w > 0$, imply that the sign of (19) is negative. Therefore, it follows from (19) and its foreign counterpart that a reduction in the labour standard from \hat{w}_n and \hat{w}_n^* will increase joint welfare. Since $s_n = \hat{w}_n - w_n$, a reduction in the labour standard thus translates into a reduction in the subsidy. Similarly, a decrease in the subsidy itself directly reduces the labour standard. Therefore, we conclude that a reduction in the subsidy from s_n and s_n^* also increases joint welfare. ■

Proposition 3 implies that the equilibrium under which each country unilaterally chooses the subsidy rate and labour standard is sub-optimal, with welfare gains possible from a lower labour standard and subsidy. It is worth emphasizing that despite the sub-optimality, we do not have a race-to-the-bottom in labour standards in the absence of cooperation. In the preceding analysis, we have shown that the governments actually set the labour standards too high in equilibrium.

4. Equilibrium under Global Trade Rules

Proposition 3 implies that the two countries should have an incentive to cooperate and enter into an agreement to restrict the levels of labour standard and export subsidy. Here we consider a traditional scenario where global trade rules are put in place to limit a country's freedom to set its trade policies but impose no such limitation on domestic policies. In the context of our model, this means that each government faces a restriction on the export subsidy but it is free to set its labour standard.

To be more specific, suppose that global trade rules prohibit a country from offering a

subsidy higher than \hat{s} . Mathematically, this means that when the home government chooses \hat{w} and s to maximize (7), it faces constraint (8) as well as a new constraint: $s \leq \hat{s}$. To make the analysis interesting, we focus on the case where \hat{s} is below the equilibrium subsidy rate in section 3 (where the governments are free to choose any subsidy rate); that is, $\hat{s} < s_n$.

Proposition 4: In the presence of a binding restriction on the subsidy rate \hat{s} , a more stringent rule (*i.e.*, a smaller \hat{s}) leads to a lower labour standard in equilibrium and a smaller deadweight loss in the labour market. In particular, the prohibition of export subsidies (*i.e.*, $\hat{s} = 0$) leads to labour standards that completely eliminate the deadweight loss caused by monopsony power.

Proof: We use the Kuhn-Tucker method to solve the governments' optimization problems. Let λ and μ be the multipliers associated with (8) and $s \leq \hat{s}$, respectively. Then the Lagrangian for the home government is:

$$\mathcal{L} = x(w, w^*)p(x(w, w^*) + y(w, w^*)) - \int_0^{x(w, w^*)} \omega(l)dl + \lambda[w + s - \omega(x(w, w^*))] + \mu(\hat{s} - s). \quad (20)$$

The Kuhn-Tucker conditions are:

$$\frac{\partial \mathcal{L}}{\partial w} = xp' \frac{\partial y}{\partial w} + [w - \omega(x)] \frac{\partial x}{\partial w} + \lambda \left[1 - \omega'(x) \frac{\partial x}{\partial w} \right] = 0, \quad (21)$$

$$\frac{\partial \mathcal{L}}{\partial s} = \lambda - \mu = 0, \quad (22)$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = w + s - \omega(x(w, w^*)) = 0, \quad (23)$$

$$\frac{\partial \mathcal{L}}{\partial \mu} = \hat{s} - s \geq 0, \mu[\hat{s} - s] = 0, \mu \geq 0. \quad (24)$$

For brevity, we omit the foreign counterparts to (21) – (24).

It is easy to verify that if $\hat{s} > s$ and hence $\mu = 0$, (21) is equivalent to (9). Thus, the

equilibrium labour standard would be $s_n = s_n^*$ if $\hat{s} > s_n$.

Now suppose $\hat{s} < s_n$, and we use subscript “e” to denote the equilibrium associated with this case. By (24), we have $\mu > 0$ and $s_e = \hat{s}$. Then (22) implies $\lambda = \mu > 0$. Thus, (23) determines w (as a function of w^*) and (21) determines λ . By symmetry, the foreign counterpart to (23) is:

$$w^* + s^* - \omega(y(w, w^*)) = 0. \quad (25)$$

Setting $s = s^* = \hat{s}$, we conduct comparative statics on (23) and (25) to find:

$$\frac{\partial w_e}{\partial \hat{s}} = -\frac{1 + \omega'(x)x_{w^*} - \omega'(y)y_{w^*}}{1 - \omega'(x)x_w - \omega'(y)y_{w^*}} < 0. \quad (26)$$

The negative sign of (26) implies that with $\hat{s} < s_n$, $w_e > w_n$. Then (9) implies that the value of λ solved from (21) is indeed positive. Recalling $\hat{w} = w + s$, we use (26) to derive:

$$\frac{\partial \hat{w}_e}{\partial \hat{s}} = \frac{\partial w_e}{\partial \hat{s}} + 1 = -\frac{\omega'(x)(x_w + x_{w^*})}{1 - \omega'(x)x_w - \omega'(y)y_{w^*}} > 0. \quad (27)$$

The sign of (27) is determined by noting that $x_w + x_{w^*} < 0$. The positive sign of (27) implies that a smaller \hat{s} leads to a lower labour standard in equilibrium. By symmetry, $\partial \hat{w}_e^* / \partial \hat{s} = \partial \hat{w}_e / \partial \hat{s} > 0$. Then $\partial x_e / \partial \hat{s} = (x_w + x_{w^*}) \partial \hat{w}_e / \partial \hat{s} < 0$. The latter suggests that the quantity of labour hired by each firm falls with a smaller \hat{s} . This moves the equilibrium point closer to the intersection of the labour demand and labour supply curves, and thus reduces the deadweight loss in the labour market.

In the extreme case of $\hat{s} = 0$, from (23) we have $w_e = \omega(x_e) = \hat{w}_e$. This and (5) imply $\omega(x_e) = x_e p'(x_e + y_e) + p(x_e + y_e)$. Thus, in this case there is no deadweight loss in the labour market. ■

Proposition 4 is interesting because it is in sharp contrast to an important finding in Bagwell and Staiger (2001) that international agreement on tariff reduction leads to distortions in domestic standards and the resulting possibility of a RTB. In our model, a trade agreement aimed at export subsidies will reduce, rather than exacerbate, the distortion in the labour standards. If the subsidies are completely abolished, the governments choose the efficient level of labour standard, despite the pressure of international rivalry. Once again, there is no RTB in labour standards – they are higher than those in the absence of government intervention. Therefore, our analysis complements Bagwell and Staiger (2001) by presenting an alternative setting where the interaction between trade policy and domestic policy leads to a qualitatively different outcome.

5. Concluding Remarks

In this paper we have attempted to address real-world concerns that trade may lead to a race-to-the-bottom in labour standards. This is in light of the fact that there is a growing prevalence of social clauses in trade agreements, and a general concern that a country's competitive advantage from say, cheap labour, is deemed morally illegitimate, and therefore “unfair” (Bhagwati 1995). Starting from the premise that labour standards are put in place to address monopsony power in labour markets, we have shown in a simple theoretical framework that strategic trade considerations may actually lead to countries setting higher labour standards

The major implication from our model is that international rivalry in product markets does not necessarily lead to a RTB in labour standards. This result stems from monopsonistic labour markets, where welfare-maximizing governments actually have the incentive to raise the labour standards in an attempt to increase employment and output of firms. Therefore, to the extent that a race-to-the bottom in labour standards is a real problem, it is caused not by international

rivalry in product markets, but by the failure of governments to maximize their domestic welfare.

In reality, weak institutions could result in such failure. Though labour standard policies may exist in many developing countries, for example, it is possible that they are poorly or sporadically enforced. Indeed, evidence seems to suggest that minimum wage non-compliance is pervasive in developing countries (Basu *et al.* 2010). On the other hand, our result that there need not be a RTB in labour standards appears to be echoed in the empirical literature that is rampant with varied findings.⁴ Empirically, it remains to be seen whether employer power in the labour market can lead to a RTB in labour standards under international competitive pressures.

Finally, it is perhaps obligatory for an analysis involving strategy trade policy to address the question, what would happen if firms compete in prices instead of quantity? It has been shown in Eaton and Grossman (1986) that the policy recommendation in the case of price competition is the opposite of quantity competition: an export tax should be used instead of an export subsidy. However, we believe that our main conclusion, that international rivalry in trade does not lead to a RTB in labour standards, would continue to hold even if firms compete in prices *à la* Eaton and Grossman (1986). The reason is that lower labour standards enable firms to reduce their labour costs. Under price competition, the governments have incentives to raise the firms' costs as opposed to lower them. Thus, the strategic trade policy consideration by itself should not motivate the governments to reduce labour standards. The verification of this conjecture, however, is left for future research.

⁴ See, for example, Kucera and Sarna (2006), Dehejia and Samy (2004, 2011), and Bonnal (2010).

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