Asymmetric Labor Markets, Southern Wages, and the Location of Firms

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Summary

This paper studies the behavior of firms towards weak labor rights in developing countries (South). A less than perfectly elastic labor supply in the South gives firms oligopsonistic power tempting them to strategically reduce output to cut wages. In an open economy, competitors operating in perfectly competitive labor markets meanwhile enjoy less aggressive competitors and raise output. Finally, competition effect reduces the ex-post output of a relocating firm. These effects reduce relative profitability of the South casting doubts on traditional beliefs that multinationals are attracted to regions with lower wages. Adopting a minimum wage unambiguously enhances Southern competitiveness and welfare.

Keywords: Labor standards, Labor market imperfection, Oligopsony, Location of firms, Minimum wages, Strategic behavior, Multinationals, Southern welfare

JEL Classification: J80, F23, J42, F12, R38, L13

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1. Introduction

The economic consequences of labor standards and the question whether WTO should have an active role in promoting regulatory standards in the South have been highly controversial issues in recent trade rounds.[1] Strong differences in opinions amongst major players have blocked attempts by industrialized nations (North), mainly the United States, to provide the WTO with the power to resolve issues dealing with labor standards. Officials from developing countries (South) view these efforts as nothing but attempts to take away the only competitive advantage of the South, namely abundant and relatively cheap labor. Although the Northern interest is claimed to be for humanitarian purposes, many suspect that the true motive behind it is egoistic, protectionist concerns. These concerns originate from a demand for 'fair trade' that itself originates from fears of an outflow of activity towards an artificially more competitive South and a subsequent loss of employment in Northern unskilled sectors.

There is a vast literature on labor standards that deals with their social, philosophical and economic aspects. Much of the economic literature such as Brown, Deardorff and Stern (1998) and Srinivasan (1997) reviews the issue in a non-analytical context and discusses the consequences of potential social clause tariffs used by the WTO to enforce labor standards. Maskus (1997) looks at core labor standards using basic microeconomic principles and proposes several policies to eliminate each problem. The conclusion often reached is that the indirect use of trade policy for this purpose harms precisely the people that the policy is intended to help.[2]

[1] Discussions on labor standards often refer to the five "core" labor standards, which consist of (1) elimination of exploitative use of child labor, (2) prohibition of forced labor, (3) elimination of discrimination in employment, (4) freedom of association, and (5) provision of the right to organize and bargain collectively. Here, we concentrate on "economic" labor standards by contrast dealing essentially with issues such as minimum wages and working conditions. See Irwin (2002).

[2] In contrast, Freeman (1994) and Krueger (1996) are two of few papers that have hinted their support for such policy initiatives.

Although these papers have suggested other direct policy measures to address the issue, a theoretical analysis to look at the crux of the problem has been missing in the economic literature. This paper studies the effect of the differences that exist between the labor markets of industrialized and developing countries. Namely it looks at the behavior of firms when they compete in a world product market while facing different labor market structures. The labor supply curve in the North is seen as fully elastic, resulting in perfectly competitive wages, whereas the Southern labor supply is assumed to be upward sloping due to the presence of abundant labor there. This of course gives firms that operate in the South market power in the labor market allowing them to pay workers a wage lower than the perfectly competitive level. This approach at the same time takes care of facts found in recent studies that multinationals, which relocate their production to the South, tend to pay higher than the market (reservation) wages (Brown, Deardorff and Stern, 2002).[3] This can be one explanation for the lack of labor standards in the South, or equally, the disadvantage experienced by labor symbolized by their lower wages. It also highlights the importance of the relationship between wages and the decision of Northern multinationals regarding their output and production location. Indeed, the ever-increasing ability of firms to carry jobs by choosing their production location has given rise to an

[3] It has often been argued that the labor supply in developing countries is perfectly elastic at the level of reservation survival wages, which could lie far beneath the perfectly competitive level. This is clearly the case in agricultural employment and the informal sector. This paper however focuses on the formal sector in the South as it is the latter that is usually related to competitive advantage concerns, fears of spillovers of the lower wages in the South, and possible job losses in the unskilled sectors in the North caused by the relocation of multinationals. As the workers doing the unskilled work in firms in the South are relatively more skilled than those working in farms and the informal sectors, it can be assumed that they create an upward sloping supply curve and thereby enjoy higher than reservation wages in the South. Working in the formal sector is hence still seen as a novelty for residents in the South regardless of their wages being much lower than that of their counterparts, namely the unskilled labor in richer countries.

important missing link between the labor market and the location of firms.[4] While this issue has rarely been discussed in labor literature, it has generally been taken for granted that firms always wish to move to regions where wages and labor rights are inferior in order to take advantage of lower marginal costs.

This paper explores this link by examining the strategic decisions of multinationals on output and location in response to labor policies in the South. It argues that, contrary to conventional wisdom, multinationals are not always attracted to regions with weak labor laws to take advantage of the lower labor costs. Even in the absence of social clause tariffs, potential monopsonistic/oligopsonistic market power in the South can actually make firms reluctant to base their production there. The results show that even in the absence of exogenous motives such as culture, politics, or stability that work against foreign investment in developing countries, the endogenous strategic behavior of firms can alone prevent delocation to the South. This theory shows one possible explanation for the paradoxical empirical findings of Rodrik (1996), which revealed that multinationals tend to locate more in countries where labor standards are enforced and hence marginal costs of labor are higher. [5]

To be more specific, firms decide on location by simply observing the profitability of each region, which is in turn determined by the strategic actions of firms in an open economy. In the absence of labor standards, a less than perfectly elastic labor supply in the South gives firms there an oligopsonistic position, which enables them to set wages through their choice of output. These

[4] Dewit, Leahy and Montagna (2003) is one of the few papers that point towards this direction. They study the location decision of firms with the asymmetry in the labor markets arising from the differences in employment protection laws in countries and therefore the flexibility with which firms can adjust output and employment in each region to the evolving economic conditions.

[5] This study was done on US multinationals and the receptivity of their locational decision on labor standards in force in host countries. Brown, Deardorff and Stern (2002) provide additional evidence to support the idea that the low standards are not a primary factor in investment decisions of multinationals.

firms at the same time compete in the product market, and in an open economy also with firms in the North that operate in a perfectly competitive labor market.[6] This dual market imperfection concept creates a link between the labor market and the product market. Firms located in the South tend to exploit their market power and suppress wages and employment by strategically reducing their output. This creates an indirect negative scale effect on profits that offsets or at least weakens the direct positive gains from lower wages. Firms remaining in the North can on the other hand free-ride on the presence of oligopsony in the South and strategically increase their output as they face less aggressive competitors. The combination of these effects along with the ex-post disadvantages of relocation to the South that arise from lower production and profits per firm (competition effect) could overshadow the attractiveness of lower wage in the South and make the North the more profitable region.

The paper further investigates a common complaint by labor unions and others in rich countries about the existence of no or unacceptably low minimum wages in the South, and the enforcement of such legislation there. It simultaneously studies objections made by Southern authorities regarding the adoption of such policies, which are claimed to adversely affect the competitiveness and welfare of the South. A minimum wage policy, namely a marginal increase in monopsony wages in the South, is therefore brought into the model to look at its impact on the competitiveness of the South and well being of labor there.[7] It will be seen in accordance with Martin and Maskus (2001) that adopting labor standards can actually increase the competitiveness of the South when the product market (demand) is taken into account. It also looks at the

[6] Monopsony has been a common argument used to model the lack of labor standards in the South. See for example Maskus (1997) and Corden and Vousden (2002). The demand side of labor emerging from a product market has however been left out of their analysis.

[7] As all core labor standards share the feature that workers are paid less than their value (marginal value product of their labor), wages can also be used as an indicator of the enforcement of standards in the region. Lim (2001) shows that higher wages are usually correlated with better labor standards.

implications of such policies on Southern welfare and shows that the South unambiguously gains from adopting a minimum wage law both on grounds of competitiveness in the product market and through a higher consumer and wage surplus experienced by its citizens.

The rest of this paper is organized as follows: Section 2 introduces the model and presents the asymmetry in the structure of the labor markets. The effects of lower wages in the South on output and the location of firms are then brought into the model in section 3. Section 4 looks at the competitiveness and the welfare effects of introducing a fixed minimum wage above the distorted market wages in the South. Section 5 concludes.

2. The Model: Asymmetric Labor Markets

There are two countries: the North and the South. The difference between the two regions lies in the toughness of competition in their labor market. The North is assumed to have a perfectly elastic labor supply, while abundant labor in the South causes a less than infinitely elastic labor supply giving firms exploitative market power. There are N firms in the world market of which n firms are located in the North and N-n in the South. Firms are fully mobile and can locate in either region. A single factor of production, labor, is used to produce the good. Workers are paid the market wage w_i, which is also the marginal cost of production. On the product side of the market, firms produce a homogeneous good for an integrated world market and compete in an open economy à la Cournot. Markets are assumed to be segmented with firms optimizing for their domestic and export markets independently. They incur unit trade costs τ on their exports to the other region. The game consists of two stages: firms decide on plant location in the first stage and engage in production in the second stage.

Demand takes the familiar linear form

$$p_i = a - y_i \qquad for \quad i = N, S, \tag{1}$$

where a represents the market size and is assumed to be identical for both regions and subscripts N and S stand for the North and the South. y indicates total production *for* each region and is

$$\begin{aligned} y_N &= q_{NN} + (n-1)\bar{q}_{NN} + q_{SN} + (N-n-1)\bar{q}_{SN} \\ y_S &= q_{NS} + (n-1)\bar{q}_{NS} + q_{SS} + (N-n-1)\bar{q}_{SS} \end{aligned}, \tag{2}$$

where q is the quantity produced and the bar indicates production by all other firms. The first subscript shows where the good is produced, while the second refers to the market it is intended for. The paper initially looks at a duopoly case in order to fully capture and display the effects of the labor market structure on the behavior of firms regarding their choices on output and location.[8] The rest of the main text refers to the two established firms: a Northern multinational, which chooses location, and a local Southern firm.[9]

The profit functions for the Northern and the Southern firm are respectively

$$\begin{aligned} \pi_N &= q_{NN}(p_N - w_N) + q_{NS}(p_S - w_N - \tau) \\ \pi_S &= q_{SN}(p_N - w_S - \tau) + q_{SS}(p_S - w_S) \end{aligned}, \tag{3}$$

where w_i is the wage paid to workers in each region.[10] Due to a fully elastic labor supply curve in the North, firms treat wages as exogenous and pay workers their marginal value product.[11] While the Northern labor market behaves competitively, the upward sloping supply curve in the South creates a monopsony/oligopsony form of market imperfection.[12] In other words, a firm in the South takes the labor supply into consideration when choosing output. It limits production as

[8] The model is shown in its full form with N firms in appendix II.

[9] The model is fully robust with respect to the identity of firms. The locational outcome as well as the welfare results remain unchanged for instance when both firms are footloose Northern multinationals.

[10] Unit trade cost t is normalized by the market size and is represented by τ so that $\tau=t/(a-w)$. This allows us to set $a-w$ (or $a-w_N$, when appropriate) to unity and eliminate it from all the upcoming equations.

[11] It is assumed throughout this paper that labor standards are always perfectly enforced in the North.

[12] Under the typical monopsony argument, the firm is the single employer and gains from infra-marginal reductions in wages for all workers whenever it cuts hiring. This generates a marginal cost curve for labor that lies above the labor supply curve. The firm maximizes profit by setting employment where the marginal cost of labor equals its marginal revenue product, causing a markup of marginal cost over wages.

more output means higher employment, which in turn increases wages due to the upward sloping labor supply curve. This results in wages lower than their competitive level. In an open economy, a monopsonist competing in the product market drives a wedge between foreign and domestic wages by limiting employment in its local labor market, even at fixed product prices. When there is more than one firm in the South, an oligopsony situation occurs as firms compete for labor with other local firms. Firms however retain some market power due to the less than perfectly elastic labor supply and still exploit workers by paying them a wage below their marginal value.[13]

Southern wage or the inverse labor supply function can be written as

$$w_N - w_S = \beta[Q_S^* - Q_S], \tag{4}$$

where Q_S^* and Q_S are the quantity produced in the South under perfect competition and distortion respectively.[14] β is the slope of the supply curve (inverse elasticity of supply). Note that the fact that output appears in the wage function of firms in the South creates a link between wages and output. Asymmetry between the two regions arises because moving to the South would internalize this wage function in the profit maximization problem of a firm. A higher quantity produced by a firm in the South decreases its profit margin in the South by increasing wages. Total profits however also depend on the firm's total production shown by q_{SN} and q_{SS} outside the parentheses in (3). Much of the previous literature on labor standards such as Maskus (1997) have used a constant elasticity of substitution form of labor supply function, namely $w_S=w/(1+1/\eta)$ where $1/\eta$ represents the inverse elasticity/slope of the labor supply curve, to show an imperfect labor market in the South. Their analysis is limited to labor supply curves with a maximum slope of 1, as $\eta \geq 1$ must hold to satisfy the second order condition of monopsony profits. The wage function in this paper is modelled in a linear manner and there are no restrictions on the slope of the labor supply curve (β) as the second order condition $\partial^2\pi_S/\partial q_S^2=-2(1+\beta)$ is negative for all

[13] See Bashkar, Manning and To (2002) for a thorough description of oligopsonistic labor markets.

[14] The term perfect competition here only refers to the labor market.

values of β. A labor supply function of this form gives a vertical intercept of $w_N - \beta Q_S^*$. Figure 1 represents the Southern labor market. It can be seen that a lower elasticity of labor supply entails lower wages and production.

To first derive competitive output Q_S^*, we look at a case in which the labor market in the South is perfectly competitive. This creates a symmetric case, where firms in both regions are wage-takers, leaving no strategic relationship between output and wages. Wages in the two regions would hence be equal. Total quantity produced in the South would be

$$Q_S^* = \frac{(a-w)(2-\tau)}{3} \tag{5}$$

and the equilibrium distribution of firms across the two regions

$$n^* = N/2 \tag{6}$$

in presence of the smallest form of trade or transport costs τ.[15]

3. Decisions of Firms

3.1. Production

In the second stage, firms compete in quantity in an open economy. If the Northern firm remains at home, profit maximizing output of the Northern and the Southern firm for each region is

$$\begin{aligned}
q_{NN}(\beta) &= \frac{a - 2w_N + \tau + w_S(Q_S)}{3} = \frac{10\beta + 3 + \tau(7\beta + 3)}{3(3 + 8\beta)} \\
q_{NS}(\beta) &= \frac{a - 2w_N - 2\tau + w_S(Q_S)}{3} = \frac{10\beta + 3 - \tau(17\beta + 6)}{3(3 + 8\beta)} \\
q_{SN}(\beta) &= \frac{a - 2w_S(Q_S) - 2\tau + w_N}{3} = \frac{4\beta + 3 - 2\tau(7\beta + 3)}{3(3 + 8\beta)} \\
q_{SS}(\beta) &= \frac{a - 2w_S(Q_S) + \tau + w_N}{3} = \frac{4\beta + 3 + \tau(10\beta + 3)}{3(3 + 8\beta)}
\end{aligned}, \tag{7}$$

where $\tau \leq \frac{10\beta + 3}{17\beta + 6}$ and $\tau \leq \frac{4\beta + 3}{2(7\beta + 3)}$ for q_{NS} and q_{SN} to be positive respectively. As the

[15] As the derivations for this case are trivial, details have been reduced to appendix I.

Southern firm is the sole producer in the South, total production in this case is $Q_S=q_{SS}+q_{SN}$. Using (7) to substitute for Q_S in (4), the Southern wage becomes

$$w_S = w_N - \frac{4\beta^2(2-\tau)}{3(3+8\beta)}. \tag{4'}$$

Alternatively, if the Northern firm moves production to the South, quantity produced by both firms becomes

$$\begin{aligned} q_{SN}{}^D(\beta) &= \frac{a-\tau-w_S(Q_S)}{3} = \frac{2\beta+3-\tau(4\beta+3)}{9(2\beta+1)} \\ q_{SS}{}^D(\beta) &= \frac{a-w_S(Q_S)}{3} = \frac{2\beta+3+2\tau\beta}{9(2\beta+1)} \end{aligned}, \tag{7'}$$

where superscript D denotes delocation. Should the Northern multinational decide to delocate to the South, total production in the South Q_S turns to $2(q_{SS}{}^D+q_{SN}{}^D)$. Replacing for Q_S in (4) from (7'), the oligopsony wage after delocation becomes

$$w_S{}^D = w_N - \frac{\beta(2\beta-3)(2-\tau)}{9(1+2\beta)}. \tag{4''}$$

By differentiating the optimal quantities of a Southern firm in (7) and (7') with respect to β, we can see how firms react to different degrees of labor supply elasticity by changes in output. As $\frac{\partial q_{SS}}{\partial \beta} \le 0$ and $\frac{\partial q_{SN}}{\partial \beta} \le 0$ in both scenarios, we can conclude that the quantity produced by a firm located in the South is lower the more inelastic is the labor supply curve (higher β). Cutting output by one unit reduces wages by more when labor supply is more responsive to wages. This gives a bigger market power to firms in the South inducing them to further reduce wages by cutting production and employment. When the monopsonist in the South competes in the product market with a firm located in the North, a strategic environment is created and the latter responds to the practice of market power by the monopsonist. The multinational operating in the North as a result moves up its reaction curve and expands production because it faces a less aggressive

competitor. Hence $\frac{\partial q_{NN}}{\partial \beta} \geq 0$ and $\frac{\partial q_{NS}}{\partial \beta} \geq 0$ show that output by a firm in the North is always increasing in β.[16] The number of firms in each region is the other factor that influences firms' output and plays a key role on profits. As the multinational moves into the South, quantity produced by each firm falls also due to the competition effect.

The rest of the paper abstracts from trade costs in order to clearly highlight the effects of the difference in the labor markets of the two regions and enhance the tractibility of the model. Figure 2 shows the output level for each locational scenario. It is easy to see that the output of the multinational is always higher if it stays at home than when it relocates to the South. Tariffs in this case simply decrease exports and increase domestic production in both regions without a bias.

3.2. Location

Firms decide on production location in the first stage of the game. If the South offers higher profits than the North, the Northern firm delocates to the more profitable region. Substituting the optimal quantities back into the profit functions, optimal profits of locating in the North and the South are

$$\pi_N = q_{NN}(\beta)^2 + q_{NS}(\beta)^2 = \frac{2(10\beta+3)^2}{9(8\beta+3)^2}, \tag{8}$$

$$\pi_S = (2\beta+1)[q_{SN}(\beta)^2 + q_{SS}(\beta)^2] = \frac{2(4\beta+3)^2(2\beta+1)}{9(8\beta+3)^2}, \tag{9}$$

while the profits of each firm if they both operate in the South are

[16] It is interesting to note that the essence of the results remain the same if the model is extended to a Bertrand environment with differentiated products. The Southern monopsonist reduces wages and is able to charge a lower price. The Northern firm also lowers its price as a response but to a lesser degree. This has the similar effect as the Cournot case above of making delocation less attractive due to the lower prices charged in the South.

$$\pi_S{}^D = (2\beta+1)[q_{SN}{}^D(\beta)^2 + q_{SS}{}^D(\beta)^2] = \frac{2(2\beta+3)^2}{81(2\beta+1)}. \quad (9')$$

Equation (8) clearly shows that profits of locating in the North are higher when there is a labor market distortion in the South and to a higher degree the more inelastic is Southern labor supply (higher β). This is due to the strategic increase in output that stems from the lower output in the South. On the other hand, equations (9) and (9') show that β can make profits of locating in the South go either way. In the absence of labor standards, a higher β brings about two effects: there is a direct positive effect on profits as a higher β leads to lower wages and the latter entails higher marginal profits. There is also an indirect strategic effect as firms produce less to cause these lower wages. This has a negative effect on total profits as the firm lowers its scale of production. Whether Southern profits increase or decrease with monopsony/oligopsony depends on which of these two effects dominate. The number of firms in the South is also important as it influences the magnitude of the scale effect. When there are more firms in the South, production per firm is lower not only due to oligopsony, but also because of the competition effect. This magnifies the effect of reduced quantity on profits, making the loss more likely to outweigh the gains from lower wages. The combination of these effects and increased profits in the North from higher output determines whether lack of labor standards in the South raises or lowers its profitability.

The optimal profits of each firm can be found for both scenarios by replacing the appropriate optimal quantities back into the profit function. Figure 3 shows the profits earned from each region for all locational scenarios. Profit of a firm located in the North is always increasing in β because of increased production. For a firm located in the South on the other hand, profits decrease with β as a result of lower output up to a critical value of β and start rising thereafter. After this level of β the direct gain of locating in the South from lower wages dominates the

indirect loss from the strategic reduction in output.[17] The β where profits of a firm in the South is at its minimum increases as firms move to the South indicating that the scale effect dominates for a larger range of β with more firms in the South. This happens as the competition effect reduces output, increasing the net cutback in quantity brought about by a firm's monopsony power.

In summary, a monopsonist in the South must compete in the product market with firms operating in a perfectly competitive Northern labor market when the economy is opened to the world market. This gives rise to the importance of strategic changes in output when calculating the profitability of each region. The direct gain in marginal profits from lower wages and the indirect loss in total profits due to a strategic cut in the scale of production determine whether or not profitability of locating in the South increases with weaker labor rights. The combination of these two effects along with the strategic increase in output of a firm located in the North as a reaction towards a less aggressive competitor determines which region is more profitable as a base for production.

3.3. Equilibrium Outcome

Looking at the problem from a game theoretic perspective, figure 3 can be divided into four regions. It can easily be seen that delocation to the South is always dominated by other outcomes in areas I, II and III. In area I, a firm unconditionally earns higher profits by locating in the North as the effect of lower production in the South from the oligopsony effect always dominates. This would also give the Southern firm incentives to locate in the North if it were mobile as its profits

[17] Note that these traits indicate a normal case where the term in brackets in (4) is positive so that a higher β signifies lower wages. With a low enough β and a high number of firms in the South ($\beta<3/2$ in the duopoly case), total quantity produced in the South is higher than its level under a perfectly competitive labor market making the term in the brackets negative. This gives the awkward result that wages in the South are higher than competitive wages prevailing in the North. This situation is not an area of interest and is ignored in the analysis, as it is in any case never an equilibrium outcome.

after moving would still be higher than what it would earn in the South. The profitability of locating in the North is unconditionally higher when profits of a firm in the symmetric case are higher than the profits of the Southern firm with one firm in each country. The critical value of β up to which this occurs is $\overline{\beta} = \sqrt{3}/4$.

In areas II and III both firms have higher profits if they locate in separate regions. Profits of locating in the North are higher than that of the South up to $\widetilde{\beta} = 3/2$ where the profitability of the two regions with one firm in each is equal. $\overline{\beta} < \beta < \widetilde{\beta}$ represents area II where the free-riding effect dominates so that the strategic increase in output by a firm in the North increases the relative profitability of locating there. The Northern firm thus decides to forgo the market power it could acquire by relocating.

In area III where $\widetilde{\beta} < \beta < \beta''$, the multinational is tempted to move to the South to take advantage of the negligible wages there as the Southern firm makes higher profits. However, the competition effect plays the dominant role in this area as if it relocates to the South, output and hence profits of all firms in the South fall below what the firm could earn by staying in the North. Thus in this area lower wages are attractive, but not sufficient to induce the Northern firm to move production.

When β reaches high levels, its direct linear effect on wages gains more significance as its marginal effect on quantity gradually diminishes. For a quasi-vertical Southern labor supply curve in area IV (very high values of $\beta > \beta''$) the Northern firm moves to the South as the ex-post profits of relocating to the South is higher than profits of staying in the North.

Note that for a significant range of slopes of the labor supply curve considered in previous literature ($\beta \leq 1$), the locational equilibrium would be agglomeration in the North when mobility of the Southern firm is allowed for. Although the analysis for the South in this paper is extended to consider highly inelastic labor supply curves, very high values of β are of small significance.

Smaller values of β are of greater interest as impact of limited standards on Southern wages are likely to be small in the context of a quasi-elastic labor pool near reservation wages (Maskus, 1997). It is also worth noting that this represents the worst-case scenario, namely the situation where delocation is most likely to occur. While adding tariffs leaves $\overline{\beta}$ and $\widetilde{\beta}$ unchanged, it increases β'' as $\frac{\partial \beta''}{\partial \tau} > 0$. This indicates that a higher tariff reinforces the results by pushing back delocation to the South and making it unattractive for an even larger range of β.[18]

We can conclude that the negative strategic scale effect of oligopsony on profits weakens the profitability of lower wages in the South. Therefore, the North can, regardless of the higher marginal costs associated with it, be more attractive or at least as attractive as the South for a significant range of β with the help of its strategic increase in output and the competition effect. In fact, the analysis shows that for a large range of β lack of labor standards does not attract multinationals to the South and may even drive them away. This is contrary to conventional wisdom which believes that weak labor standards will always lead to social dumping in developing countries. The strategic behavior of firms and the resulting outcome in quantity produced can be an explanation why multinationals forgo lower wages and tend to locate in the North, where labor standards are fully implemented. This also takes away any justification for worries by the North over loss of jobs due to transfer of activity to the South. We saw that firms in the North not only hesitate to relocate to the South, but even increase domestic activity, i.e. production, as a strategic reaction towards lower Southern output.

Proposition 1

Lack of labor rights in the South unconditionally makes the North the more attractive region for $0 < \beta < \overline{\beta}$ *where the 'oligopsony effect' dominates in profits. Lower wages in the South are also*

[18] A unilateral social clause tariffs can also be applied here, but it would lower the profitability of the South to an even greater extent and further discourage delocation.

not sufficient to make Northern firms relocate to the South for a large range of β when $\beta \geq \overline{\beta}$. The monopsony situation in the South induces Northern firms to remain in the North to 'free-ride' on the existence of less aggressive competitors in the South up to $\widetilde{\beta}$. Even after $\widetilde{\beta}$, where lower wages make the South more profitable than the North, a Northern firm is better off by operating at home to avoid the 'competition effect' it would create by relocating to the South. Only for very high values of $\beta > \beta''$, where wages approach zero, does the lower marginal cost (quasi-free production) in the South become a significant attraction for multinationals.

4. Minimum Wage, Southern Competitiveness and Welfare

After proving that lower wages in the South do not necessarily attract more multinationals to the region, it is essential to find out if a minimum wage policy in the South actually helps improve Southern standards of living. Means of implementing standards in the South can take several forms, but they all point towards higher marginal costs of production in the South. This could be interpreted as partially taking away the market power of multinationals that exploit workers in the South by reducing output and wages. Therefore, this section looks at an exogenous marginal increase in wages in the South towards of the competitive level as means of reducing the monopsony power of firms operating there.[19] Recalling the location results that the Northern firm does not move to the South unless the labor supply curve in the South is highly inelastic shows that relocated multinationals are not the only firms affected by higher wages. When the South upgrades its standards, local Southern firms are also forced to abide by the new set of standards in force. This creates concerns that the South may lose in terms of welfare as local firms could undergo huge, maybe unrecoverable, losses when forced to increase wages.

[19] This rules out the introduction of unions as a means of introducing labor standards unless they are specifically designed to increase wages without limiting employment.

Once again concentrating on the case of free trade, a minimum wage can be introduced as a small exogenous increment in Southern wages:[20]

$$w_S^{\min} = w_S + \varepsilon = w_N - \frac{8\beta^2}{3(3+8\beta)} + \varepsilon \,. \tag{10}$$

$\varepsilon \le \frac{8\beta^2}{3(3+8\beta)}$ must be satisfied to assure that wages in the South do not surpass those in the North.[21] Firms change their level of output accordingly with this increase in wages and maximize profits using the constant w_S^{min} instead of the wage function $w_S(Q_S)$. The wage used hence no longer contains the quantity produced by the firm, depriving the latter from its monopsony power. In figure 1, the monopsonist moves up the labor supply curve and increases output up to the point where the latter meets the minimum wage. The quantity produced by each firm after the implementation of the policy becomes

$$\begin{aligned} q_{Ni}{}^{\min}(\beta) &= \frac{1+\varepsilon}{3} - \frac{8\beta^2}{9(3+8\beta)} \\ q_{Si}{}^{\min}(\beta) &= \frac{1-2\varepsilon}{3} + \frac{16\beta^2}{9(3+8\beta)} \end{aligned}, \tag{11}$$

where $i=N,S$. It can easily be seen that a minimum wage policy reverses the sign of the changes in output with respect to β as $\frac{\partial q_{Ni}{}^{\min}}{\partial \beta} \le 0$ and $\frac{\partial q_{Si}{}^{\min}}{\partial \beta} \ge 0$. Keeping ε constant, a more inelastic labor supply still means a lower wage in the South prior to the policy.[22] Yet, as wages are no longer dependent on output, a lower wage does not entail an oligopsony effect and is nothing but a marginal cost advantage over the Northern firm. The more inelastic the labor supply, the higher is this cost advantage and in turn Southern production. In a Cournot environment, the Northern

[20] ε is an increment in wages normalized by the market size *(a-w)* as with τ for the simplicity of notation.

[21] In other words, a higher increment is allowed for when labor supply is less elastic (wages are lower).

[22] Changes in ε are irrelevant in this paper as we are interested in introducing a minimum wage policy as a one-time change in the labor market structure as opposed to analyzing changes in the minimum wage.

firm now reacts to a more aggressive competitor and reduces output accordingly. Adjusted quantities for both firms are shown by the dotted line in figure 2. Profits of each firm also change accordingly and are found by substituting quantities produced from (11) into (3):

$$\pi_N^{\min} = q_{NN}{}^{\min}(\beta)^2 + q_{NS}{}^{\min}(\beta)^2 = \frac{2[3(1+\varepsilon)(3+8\beta)-8\beta^2]^2}{81(3+8\beta)^2}, \tag{12}$$

$$\pi_S^{\min} = q_{SN}{}^{\min}(\beta)^2 + q_{SS}{}^{\min}(\beta)^2 = \frac{2[3(1-2\varepsilon)(3+8\beta)+16\beta^2]^2}{81(3+8\beta)^2}. \tag{13}$$

The effect of minimum wages on profits is identical to that on output with β drastically increasing the profits in the South while decreasing that in the North. Profits after the introduction of minimum wages are shown by the dotted line in figure 3. Note that the Northern firm is driven out of the market when the South has a very high wage advantage of $\beta \geq \frac{3}{2}(1+\varepsilon)+\frac{3}{4}\sqrt{2(2\varepsilon+3)(\varepsilon+1)}$. It can therefore be concluded that minimum wages actually increase the competitiveness of the South by eliminating on one side the negative oligopsony effect on output and profits in the South, and on the other side the free-riding opportunity of firms located in the North.

If the initial situation is oligopsony ($\beta>\beta''$), effects of a minimum wage policy are similar to those explained above as the desire to reduce output with a higher β disappears. Recall however that the minimum wage should be higher in the oligopsony case as Southern wages are already higher due to a lower concentration of firms. The increment in this case is added to (4'') instead and gives a minimum wage of

$$w_S{}^{D\min} = w_N - w_S{}^{D} + \varepsilon = w_N - \frac{2\beta(2\beta-3)}{9(1+2\beta)} + \varepsilon \tag{10'}$$

The increment ε must satisfy the condition $\varepsilon \leq \frac{2\beta(2\beta-3)}{9(2\beta+1)}$ for the wage to remain lower than that in the North. The quantity produced by both firms and their profits become

$$q_{Si}^{D\min}(\beta) = \frac{(2\beta+3)^2}{27(2\beta+1)} - \frac{\varepsilon}{3}, \tag{11'}$$

$$\pi_S^{D\min} = q_{SN}^{D\min}(\beta)^2 + q_{SS}^{D\min}(\beta)^2 = \frac{2[(2\beta+3)^2 - 9\varepsilon(2\beta+1)]^2}{729(2\beta+1)^2}. \tag{13'}$$

where $i=N,S$. Output and profits are increasing in β for both firms equally. The change in output and profits are also illustrated for this case in figures 2 and 3. Notice that due to the oligopsony situation here, the positive effect of a minimum wage on output is less significant than when there is one firm in the South. This is because rival employers must also increase their wages to respect the new minimum wages and increase output.[23]

Turning our attention now to total Southern welfare, we must also take into account the impact of the policy on consumer and worker surplus in the South. Note that the latter is the triangle under the wage level and above the labor supply curve in figure 1. Southern welfare can be written as

$$W_S = \pi_S + WS_S + CS_S \quad where \quad WS_S = \frac{\beta Q_S^{\,2}}{2}, CS_S = \frac{(Q_N + Q_S)^2}{4}, \tag{14}$$

whereas in the case of a minimum wage it turns to

$$W_S^{\min} = \pi_S^{\min} + WS_S^{\min} + CS_S^{\min} \quad where \quad WS_S = \frac{\beta Q_S^{\min}(Q_S^{\min} + \varepsilon)}{2}, CS_S^{\min} = \frac{(Q_N^{\min} + Q_S^{\min})^2}{2}, \tag{14'}$$

with $Q_i^{min} = q_{iN}^{min} + q_{iS}^{min}$ representing the total output for each region. The same concept applies for the delocation case using the corresponding values for profits and total output.[24]

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[23] Bashkar and Toe (2002) demonstrates the impact of minimum wages in an oligopsonistic model in detail. It explains that due to the presence of multiple employers, a minimum wage also shifts the supply and with it the marginal cost curve to the left as the supply curve faced by a firm also depends on rival wage rates. As all employers must increase wages, labor market competition increases. They conclude that a minimum wage moderately set above the market wage still increases employment through greater labor participation.

[24] As the impact of a minimum wage with delocation is similar to that for FDI, this case will not be discussed any further.

The welfare effects of implementing a minimum wage policy can immediately be seen as $\pi_S^{min} > \pi_S$, $Q_S^{min} > Q_S$ and $\varepsilon > 0$ from the above discussion and $Q_N^{min} + Q_S^{min} > Q_N + Q_S$ from (7) and (11). The inequalities imply that along with the increased competitiveness of the South, wage surplus increases due to higher wages and employment, and consumer surplus increases due to a higher output. As a result a minimum wage policy unambiguously enhances Southern welfare. The results are fully robust for all non-negative, feasible values of trade costs.[25]

These findings suggest that improving labor standards can raise welfare in the South. It increases output and with it employment, raises wages and can even make the South a more attractive region for production than when the authorities in the South turn their back on labor standards. The results can give grounds in favor of taking international action for enforcing policies that aim at increasing *economic* labor standards in the South. In fact, the desired outcomes are shown to be achievable even through an often skeptically perceived minimum wage policy.

Proposition 2

Introducing a minimum wage policy in the South boosts output, profits, and hence the competitiveness of firms in the South. It eliminates the oligopsony and the free-riding effect in the South and the North respectively. The more inelastic is Southern labor supply, the greater is the marginal cost advantage. Wage surplus and consumer surplus also increase due to a rise in wages, output and hence employment towards their competitive level. Thus adopting a minimum wage policy improves Southern welfare unambiguously.

5. Conclusion

This paper builds a simple model to study the relationship between regional differences in labor markets and the location of firms. Specifically, it explains the strategic behavior of firms towards the lack of labor rights in the South when firms compete in an open economy with asymmetric labor markets. The framework shows the linkage between the product and the labor market

[25] Calculations are available from the author upon request.

caused by the market imperfection in the South and highlights the importance of this link in firms' decisions on output and location. It attempts to answer commonly asked questions about labor standards and the action of multinationals such as: Do firms react to low labor standards in the South and relocate to produce with lower labor costs (social dumping) as claimed in industrialized countries? Does the South lose in terms of competitiveness and welfare by adopting tougher labor standards as claimed by developing countries?

Due to the capacity of firms to influence wages through their choices of location and output, both decisions turn strategic towards the labor market. A strategic cut in production subsequent to the potential market power a firm can gain by moving to the South makes the latter a less attractive region to locate production. Meanwhile, the North becomes even more profitable as firms located there free-ride on the presence of less aggressive oligopsonists in the South by increasing their production. Total production and therefore profits per firm also fall after delocation as a result of the competition effect that emerges from having one more firm in the South. These effects induce firms to remain in the North and can even at times tempt a Southern firm to leave the South regardless of the lower wages there. The new paradoxical results build a theoretical background for the empirical suggestion that multinationals do not necessarily choose production location on a basis of weaker labor standards. Present fears in the North of losing jobs to a more competitive South are thus not legitimate as a weaker labor standard regime in the South increases production and profits in the North and induces firms to stay in the North.

The paper also delivers a policy message by demonstrating that a minimum wage policy as means of improving labor standards in the South can make the latter better off in every aspect. It shows that a small increment in the Southern wage eliminates the monopsony/oligopsony market distortion, drastically increasing production and with it the competitiveness of the South in the world market. Higher wages, output and employment at the same time raise both wage and consumer surplus in the South resulting in an unambiguous improvement in Southern welfare. This gives a hint of justification for those who see such efforts as a humane act. More detailed

work remains to be done on the issue to include the impact of social clause tariffs and the efficacy of threats to apply them in case of non-compliance. As this paper showed that the South always benefits from adopting labor standards anyway, such punishments would be deemed unnecessary and inefficient to bring about a change if governments were to act rationally. Yet if substantiating these benefits does not prove useful in convincing the representatives of the South, leaving the job to a trade-related organization with the power of enforcement such as the WTO may be the only credible solution to assure long-term prosperity and growth in the poorer regions of the world.

Appendix I: The Perfectly Competitive Labor Market Case

Profits per firm in each country are

$$\begin{aligned}\pi_N &= q_{NN}(p_N - w) + q_{NS}(p_S - w - t)\\ \pi_S &= q_{SN}(p_N - w - t) + q_{SS}(p_S - w)\end{aligned} \tag{A.1}$$

Note that w is the competitive wage that here applies to both regions. Firms take production by all other firms as given and maximize profits by solving for their optimal output for each region. Optimal quantities by each firm in the case of perfectly competitive labor markets assuming symmetry are

$$\begin{aligned}q_{NN}^* &= \frac{[1+(N-n)\tau]}{N+1}\\ q_{NS}^* &= \frac{[1-(N-n+1)\tau]}{N+1}\\ q_{SN}^* &= \frac{[1-(n+1)\tau]}{N+1}\\ q_{SS}^* &= \frac{1+n\tau}{N+1}\end{aligned} \tag{A.2}$$

where the star denotes harmonized labor standards. Replacing optimal quantities back into firms' profit functions and setting profits from locating in the North and the South equal, the equilibrium distribution of firms can be found:

$$n^* = N/2 \tag{A.3}$$

In the presence of the smallest form of trade/transport costs, firms prefer to locate close to their consumers. The only possible equilibrium with equal market sizes is when half the total number of firms locate in each region. This yields total production in each region, which is

$$\begin{aligned}Q_N^* &= \frac{N}{2}(q_{NN}^* + q_{NS}^*)\\ Q_S^* &= \frac{N}{2}(q_{SN}^* + q_{SS}^*)\end{aligned} \tag{A.4}$$

for the North and the South respectively. Profitability of the two regions is equal and can be seen in figure 3 as the horizontal line.

Appendix II: Location of Firms in a Multi-Firm Case

This appendix extends the model to a multi-firm case to show the dynamics of multinationals' movements as a result of asymmetric labor markets in a more general setting. With *N* firms in the world market, total production in the South equals

$$Q_S = q_{SN} + (N-n-1)\bar{q}_{SN} + q_{SS} + (N-n-1)\bar{q}_{SS} \tag{A.5}$$

where the bar above quantity produced indicates production by all other firms.

Recall from section 2 that the number of firms in each region with symmetric labor markets (Q_S*) is *N/2*. With asymmetric labor markets, the inverse labor supply function in the South is (A.2) in text where with many firms (A.5) is used as the total production in the South. I look at the case where trade costs are approaching zero as adding the latter does not change the nature of the results.

The profit maximizing quantity produced by each of the *n* firms in the North and the *N-n* in the South are respectively

$$\begin{aligned} q_{NN}(n,N) = q_{NS}(n,N) &= \frac{N+1+2\beta N(N-n)-3\beta n+4\beta N+\beta}{(N+1)[N+1+3\beta N(N-n)-2\beta n+3\beta N+\beta]} \\ q_{SN}(n,N) = q_{SS}(n,N) &= \frac{N+1+\beta N(n+1)}{(N+1)[N+1+3\beta N(N-n)-2\beta n+3\beta N+\beta]} \end{aligned} \tag{A.6}$$

When a multinational that initially resides in the North has to make its decision on location, it must compare the profits of not moving to the ex-post profits that will prevail after it relocates to the South. After a Northern firm moves to the South, *n-1* firms remain in the North while the number of firms in the South increases to *N-n+1*. The ex-post optimal quantity that will be produced by firms in each region after the move becomes

$$\begin{aligned} q_{NN}(n-1,N) = q_{NS}(n-1,N) &= \frac{N+1+2\beta N(N-n)-3\beta n+6\beta N+4\beta}{(N+1)[N+1+3\beta N(N-n)+4\beta n]} \\ q_{SN}(n-1,N) = q_{SS}(n-1,N) &= \frac{N+1+\beta Nn}{(N+1)[N+1+3\beta(N-n)+4\beta n]} \end{aligned} \tag{A.7}$$

Using the optimal quantities from (A.6) in (A.1), optimal profits of remaining in the North can be found:

$$\pi_N(n,N) = q_{NN}(n,N)^2 + q_{NS}(n,N)^2 \quad \text{(A.8)}$$

The profits of the same firm if it moves to the South would become

$$\pi_S(n-1,N) = [1+\beta(N-n+2)][q_{SS}(n-1,N)^2 + q_{SN}(n-1,N)^2] \quad \text{(A.9)}$$

where (A.7) is used to substitute for the optimal quantity produced by each firm in (A.1). Figure 4 simulates these profits for *N=10* and calculates the threshold β for all possible initial values of *n* where the profitability of the two regions is equal. The multinational keeps production in the North if β is below this level and chooses to relocate otherwise. This value of β is equivalent to the intersection of the two curves π_N and π_S^D in figure 3 for the duopoly case. It is decreasing in *n* signifying that when there are more firms in the South, a higher value of β is required for a firm to move to the South to take advantage of lower wages. This occurs as the competition effect brought about by having an extra firm in the South leads to lower production and less profits per firm. The competition effect in turn reinforces the scale effect and causes the oligopsony effect and the subsequent strategic reaction of the Northern firms to outweigh the effects of lower wages on profits for a larger range of β. Therefore, delocation becomes less likely as the flow of Northern firms to the South continues with the equilibrium number of firm in each region determined by the prevailing elasticity of labor supply in the South. In summary, as oligopsony power is strongest when the *concentration* of firms is highest, a lower number of firms in the South strengthens the oligopsony effect, increasing the potential gains attained from delocation. At the same time, a higher number of firms in the North makes delocation more attractive by creating a competition effect in the North and diminishing the free riding effect that is shared by all Northern firms. It can also be seen that a higher number of firms in the world market weakens the general effect of oligopsony as more competition for labor is created.

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Figure 1: Monopsony

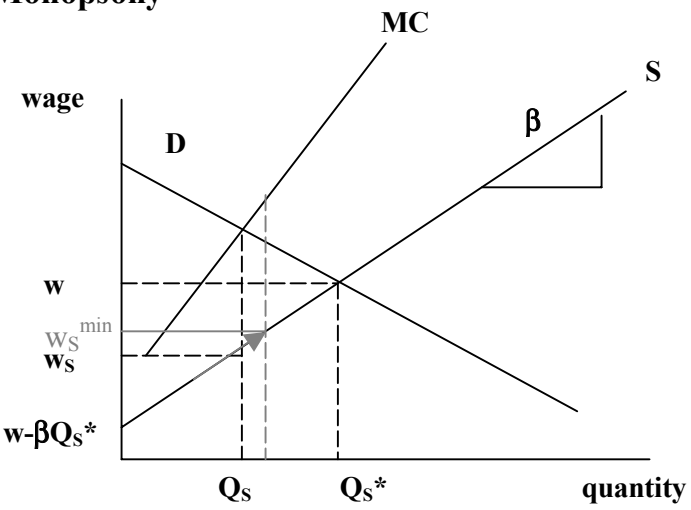


Figure 2: Production

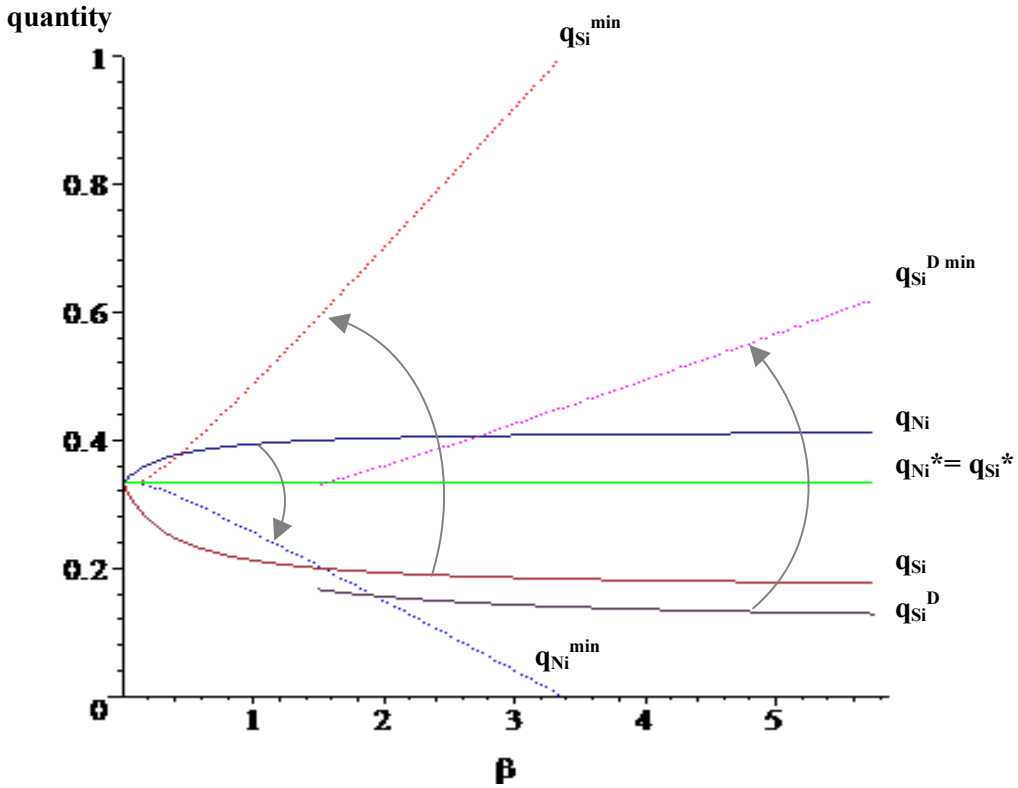


Figure 3: Profits and the Location of Firms

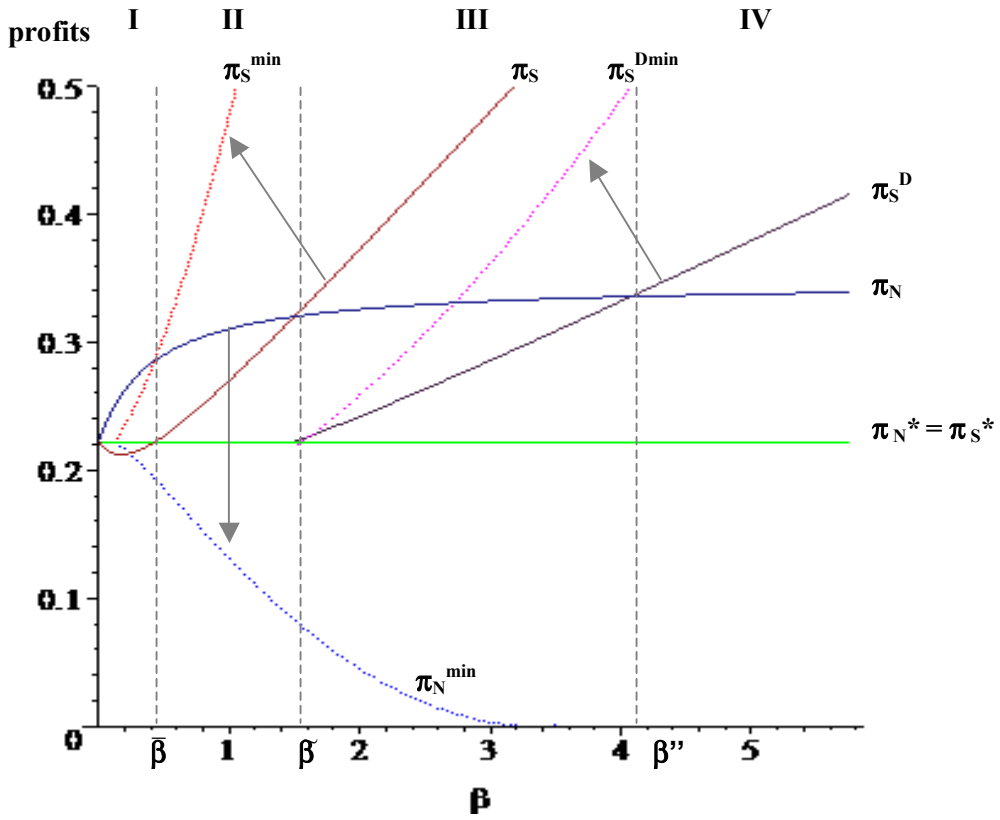
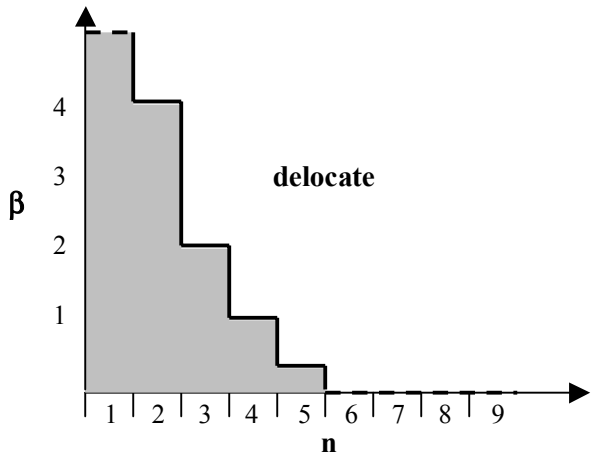


Figure 4: Location of Firms in the Multi-Firm Case



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