A REGIONAL INSIDER-OUTSIDER MODEL WITH COOPERATION AND HARASSMENT

by

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Abstract

In this paper we use a static two-region insider-outsider model with outsider search to test the robustness of Lindbeck and Snower’s cooperation and harassment result. By assumption, within one and the same region the general Lindbeck-Snower result applies: Insiders use their cooperation and harassment activities strategically to successfully counteract any underbidding attempt on the part of the outsiders. It is concluded that the introduction of a spatial element makes underbidding of insider wages possible at least theoretically, while at the same time challenging the standard view that worker migration will ultimately lead to wage equalization.

Keywords: insiders and outsiders, underbidding, labour mobility.
JEL classifications: J20, J30, J61, J64.
1. Introduction

Obviously the level of wages plays an important role in the optimizing choices that firms and individuals make. It might seem self-evident that firms prefer low- to high-wage workers, even when the former are slightly less productive. But firing the current high-wage workforce and replacing them with low-wage unemployed is not without cost. Lindbeck and Snower (1988) distinguish the costs of hiring, training and firing as well as turnover costs that are due to employees' effort responses to job (in-)security. The former is a direct cost that drives a wedge between the insider and outsider wages. The latter leads to productivity losses that might be larger (in money terms) than the wage gain achieved. The same argument applies to the insider threat not to cooperate with underbidding outsiders. But insiders can do even better than that; by threatening to harass the underbidders, they raise the latter's reservation wage above the prevailing insider wage. Certainly, Lindbeck and Snower do not claim that outsiders will never be hired. What they do claim though is that outsiders will not gain employment through underbidding of the current insider wage. Indeed underbidding seems to be absent in real labour markets, for it would either lead to involuntary unemployment disappearing or be accompanied by the empirically unobserved phenomenon of persistent wage deflation. In this paper we focus our attention on the turnover costs arising from cooperation and harassment activities as this is in our view the weakest part of the story.

The no-underbidding assumption has been attacked on its own 'logical' grounds by several authors. In Fehr (1990) it is shown that all insiders may be replaced by outsiders if they threaten to harass outsiders and if they set their wages according to the wage rule of Lindbeck and Snower. Elster (1989) also argues that the threat of harassment is not sufficient to deter underbidding and that a social norm is needed to sustain the insider-outsider model. In accordance with this view, Naylor (1995) states, by referring to the public goods nature of harassment activity, that the multi-person prisoners' dilemma aspect of the credibility problem can be overcome by the presence of a social rule among the population of incumbent workers. We abstract from this point below since Naylor's analysis is unsatisfactory for two reasons: Firstly, social rules need not remain stable over time and space. Furthermore, Naylor makes clear why insiders may stick to their harassment threat, while the more important question is why underbidding is unattractive to both outsiders and firms.

In this paper we add a spatial element to the cooperation and harassment version of the Lindbeck and Snower-model in order to test the robustness of both the harassment result and the claims traditionally made in migration models. On might suspect that within such a framework underbidding is potentially

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1 There may be a third reason for not considering social rules as a way to prevent underbidding from occurring. We simply refer to Brecht's well-known phrase: "Erst kommt das Fressen, dann kommt die Moral".
succesfull as underbidders from outside are less likely to know what may be considered fair wages. Also the wedge between the underbidding wage that entrants demand and the insider wage may then be large enough to make the exchange of workers worthwhile to firms and acceptable to outsiders. Thus, a regional wage differential à la Harris and Todaro (1970) that is fuelled by diverging insider power levels may induce migratory responses that could ultimately weaken insider power in the higher wage region lowering their wage and making outsider employment possible. Still, this does not mean that the prediction of traditional migration models that migratory responses to diverging wages ultimately lead to wage equalization will always hold.

This paper contains five parts. In the following section the basic model with its different components is described. Section 3 presents the static optimum. In section 4 some possible extensions of the static two-region model are discussed. Section 5 concludes.

2. The Basic Model

2.1. Regions

Two regions, $A$ and $B$, are placed on the closed interval $X \subset \mathbb{R}$, i.e. on the real line. They are separated from each other by a border $x \in X$ such that $x$ is a unique reference point. Then we define $Y = X \setminus \{x\}$. $A$ and $B$ are placed along the half-open intervals $A \subset Y$ and $B \subset Y$ respectively such that $A \cap B = \emptyset$ and $A \cup B = Y$.

2.2. Individuals

Either region is populated with a large number $N$ of individuals that are uniformly distributed on the sub-intervals $A$ and $B$. Total population $P$ is assumed to be stable over time, thus

$$\frac{dP}{dt} = \frac{d}{dt} \left( \sum_{i=1}^{n} P_i \right) = \sum_{i=1}^{n} \frac{dP_i}{dt} = 0,$$

with $i \in \{A,B\}$ denoting region and $t$ denoting time, but not necessarily across regions;

$$\left| \frac{dP_i}{dt} \right| \in \mathbb{N}.$$
Changes in the population are thus strictly symmetric in a spatial sense. Populations are composed of $N_i$ insiders, $N_e$ entrants and $N_o$ outsiders with $N_i \gg N_e, N_o > 0$. Thus

$$P_{L,i} = N_{i,i} + N_{e,i} + N_{o,i},$$

with the first subscript denoting employment status and the second denoting region. The insiders, whose numbers we assume to be 'intermediate' in the terminology of Lindbeck and Snower, are the experienced employees who are able to engage in the full range of cooperation and harassment activities, while the entrants have no access to these activities. Outsiders are the unemployed workers. Insiders, entrants and outsiders are assumed to be homogeneous groups. Without much loss of generality, it is supposed that each individual is always willing to be employed. There is thus no explicit labour supply decision nor any voluntary quitting on the part of the employed. Therefore in both regions there is equality between the labour force and the population which we normalize to one: $L_i = P_i = 1$. Then employment is given by $E$, with $0 \leq E \leq 1$.

When working, insiders provide $a_i$ efficiency units (given the level of cooperation among insiders), while entrants provide only $a_E$ efficiency units of labour (given the level of cooperation between insiders and entrants). It can be shown that the insider wage $w_i$ will exceed the reservation wage by some positive factor that is not greater than the differential in the efficiency units of labour provided by the insiders and entrants, thus $R < w_i \leq R (a_E/\alpha)$. Assuming that cooperative activity has no direct utility cost to the insiders, it is in the insiders' interest to make this disparity as large as possible. They do this by fully cooperating with one another but refusing to cooperate with entrants. In other words, $a_{E*} = 1$ and $a_{i*} = \alpha$ whenever $1 \leq a_i, a_E \leq \alpha$ with $\alpha$ being a constant strictly greater than unity. Observe that the bargaining process may yield an insider wage that exceeds the reservation wage by more than the ability-related marginal product differential, so that the outsiders are involuntary unemployed.

Harassment activities can achieve a similar purpose; harassment directed at entrants is at the level $h_{E*} = H$ whenever $0 \leq h_E \leq H$ with $H$ being a nonnegative constant. We observe that employees are able to affect each other's disutility of work, without firms being able to monitor such activities perfectly and make the wage contracts contingent on them. Insiders can keep unemployed workers from underbidding by creating the credible expectation that underbidders will be harassed. As a result, outsiders have a higher reservation wage than the insiders. In the absence of any turnover costs except those generated through harassment activities, it can be shown that the insider wage will be greater than the insiders' reservation wage but will not exceed the entrant's reservation wage: $R_i < w_i \leq R_E$.

The insider reservation wage is taken to be equal to 1. Outsiders are assumed to be perfect competitors
for jobs, which means that the individuals' entrant wage is equal to his reservation wage \((= 1 + H)\). Thus, \(R_i = 1 < w_i \leq R_E = 1 + H\).

Moreover, firms may be unwilling to hire outsiders at less than the prevailing wage because, given the insiders' unwillingness to cooperate with underbidders, it is not profitable for the firms to accept underbidding. That firms have no incentive to agree on low-wage bids in the presence of involuntary unemployment may be easily explained by referring to efficiency wage considerations. We shall abstract from these here and focus on the underbidding process from the outsiders' perspective.

The order of decisions is as follows:

1. Firstly, the insiders in both regions set their wage and the levels of cooperation and harassment, taking into account how these decisions affect employment, but restricted to their own region. This implies that they take the own-region APC, i.e. \(w_i \leq \alpha F'(\alpha L_i)\), and RPC, i.e. \(w_i \leq \alpha(1 + H)\), as constraints\(^2\). The entrant wages are determined as well. On the basis of this information, the outsiders in both regions decide where to offer their work and try to gain employment through underbidding;

2. Secondly, the firms make their employment decisions, taking the insider and entrant wages, as well as the cooperation and harassment levels, as given.

A typical individual maximizes\(^3\)

\[
U_s = \sum_{t} u(w_t - l_t) \exp[-\theta(t - s)], \quad \text{for } s = 0, 1, 2, ... \text{ and } t = 1, 2, 3, ...
\]

with \(\theta\) the individual's rate of time preference. Utility is defined over wages \(w\) (which also comprises reservation wages) and labour \(l\) (in units of time) and assumed to be additively separable over (discrete) time. We further assume the utility function to be strictly linear in its arguments. Individuals are either employed or unemployed, i.e. labour is taken to be a discrete activity, with \(l = 1\) for an employed worker and \(l = 0\) for an unemployed one. They are homogeneous in every other respect, also in terms of preferences. We thus find the following utility functions for the three types of workers that we discerned:

\(^2\) APC and RPC refer to the absolute and relative profitability constraints.

\(^3\) It might be argued that time subscripts can be omitted from our equations since the analysis is static in character. It is helpful to be able to differentiate between \(t = 0\) and \(t = 1\) though, as we shall in the following.
\[ U_{i,s} = \sum_t (w_{i,t} - 1) \exp[-\theta(t-s)], \]

(5)

\[ U_{E,s} = \sum_t (w_{E,t} - 1 - H) \exp[-\theta(t-s)], \]

(6)

\[ U_{o,s} = \sum_t (R_t) \exp[-\theta(t-s)]. \]

(7)

In these expressions the first subscript denotes employment status, while the second denotes time. The variable \( H \) refers to the utility loss that entrants suffer because of the harassment inflicted upon them.

2.3. Firms

In either region there are also a large number \( M \ll N \) of identical firms all producing one and the same output. There is no entry or exit of firms, so the number of firms is constant and exogenous. For simplicity we set \( M = 1 \). The firm’s technology is described by a neoclassical production function that is strictly concave and satisfies the Inada conditions. We assume that there are constant returns to scale. Firms demand labour in order to produce output\(^4\). Labour demand \( L(w) \) depends negatively on the wage (both insider and entrant wages), \( dL(w)/dw < 0 \). Regional output markets are assumed to be perfectly competitive, thus the price of output is the same in the two regions and is normalized to one. Output \( Y \) in both regions \( i \in \{A,B\} \) could then be defined as:

\[ Y_{i,s} = F(L_{i,s}(w_{i,s}, w_{e,s})), \]

(8)

with \( L_{i,s} = \lambda_s L_{i,s} + \lambda_{E,s} L_{E,s} \). Firms are profit maximizers at each point in time. The profit function for a typical firm is:

\[ \Pi_{i,s} = Y_{i,s} - w_{i,s} L_{i,s}(w_{i,s}, w_{e,s}) - w_{e,s} L_{E,s}(w_{i,s}, w_{e,s}). \]

(9)

The profit function satisfies the usual properties of first degree homogeneity, convexity and continuity in prices and wages. Firms thus maximize:

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\(^4\) The role of capital in the production process is not considered, since this is not relevant to the analysis.
\( V_s = \sum \Pi_t \exp[-\delta(t-s)] \),

where \( V_s \) is the firm’s value function and \( \delta \) denotes the firm’s discount factor.

### 2.4 Search

Individuals and firms meet on both the input and output markets. Focusing on the input market we assume wages to be set individualistically by the workers. Thereupon firms make their employment decisions. There is thus no explicit bilateral bargaining in the labour market. The unemployed receive an exogenous unemployment compensation of either \( R_A \) or \( R_D \). Firms are passive actors, so search behaviour is restricted to individuals. We make the further restriction that of all individuals only the unemployed search for a job; there is no on-the-job insider search. Following Filges and Larsen (1998) we assume that search intensity is exogenously given, but the insiders are assumed to be more efficient while searching than the outsiders\(^5\). The efficiency of search is given by a function \( \mathcal{T}(e,s) \), where \( e \) is the efficiency parameter and \( s \) the search intensity. This function is defined in the domain \( e \in [0,\bar{e}] \) and \( s \in [0,\bar{s}] \). The search efficiency function fulfills the following restrictions:

\[
\begin{align*}
0 \leq \mathcal{T}(e,s) &\leq 1, \forall e,s \\
\mathcal{T}(e,0) = 0, \mathcal{T}(e,\bar{s}) = 1 \\
\mathcal{T}_e &> 0 \\
\mathcal{T}_e \geq 0, \mathcal{T}_s(e,0) > 0, \mathcal{T}_s(e,\bar{s}) = 0, \mathcal{T}_{ss} \geq 0
\end{align*}
\]

where subscripts denote partial derivatives. The transition rate from unemployment to employment, \( p_v \), depends both on the search efficiency and total employment \( E \): \(^6\)

\[
p_v(e,s,E) = (e,s) \cdot E
\]

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\(^5\) With respect to search efficiency, we do not differentiate between insiders and entrants. This implies that transition rates are equal for both types of workers as well. See the discussion on transition rates below.

\(^6\) In the original formulation of Filges and Larsen the term \( E \) is represented by \( V/U \), i.e. the number of vacancies relative to the number of unemployed job-seekers. We do not allow for job-creation and vacancies in a literal sense though. This is rationalized by the fact that for outsiders considering gaining employment through underbidding, the relevant parameter is really insider employment.
The term $E$ is perceived as a constant by the individual workers. Equation (12) shows that the transition rate is a linear transformation of the search efficiency function $\mathcal{F}(e,s)$. Thus, for a given search intensity, the search efficiency function and hence the transition rate is higher for the high efficiency workers, i.e. the insiders: $\mathcal{F}(I,s) > \mathcal{F}(O,s)$, implying $p_e(I,s,E) > p_e(O,s,E)$. Since insiders are assumed not to search, this may be translated into saying that the probability for insiders of keeping their job is higher than the probability for outsiders of finding one: $(1-p_e)(I,s,V/U) > p_e(O,s,V/U)$. In these expressions $p_e$ is the transition probability from employment to unemployment and vice versa for $p_e$.

Initially we assume that our economy (comprising both regions) is in equilibrium, in the sense that the existing wages and transition probabilities reproduce themselves given optimal decisions by individuals and firms. A specific distribution of insiders and outsiders is carried forward from the previous time period, i.e period $t-1$. Then at $t = 0$ a regional shock of unspecified nature occurs that increases insider power in region $A$. As wages are an increasing function of worker power, the insider wage gets higher there, i.e. $w_{I,A} > w_{I,B}$. In addition, following Solow (1985) ["Insiders gain from keeping their numbers small"] we conclude that the resulting ratio of insiders to outsiders is lower in region $A$.

The probability structure that we assume for our individuals is as follows:

1. The employed in region $A$ ($B$) lose their jobs with probability $p_{u,A}$ ($p_{u,B}$), while they keep them with probability $1-p_{u,A}$ ($1-p_{u,B}$). The unemployed become insiders with probability $p_{e,A}$ ($p_{e,B}$) and remain unemployed with probability $1-p_{e,A}$ ($1-p_{e,B}$). Since there is employment persistence, $1-p_{u,A} > p_{e,A}$ and $1-p_{u,B} > p_{e,B}$. The probability of obtaining an insider in a random drawing at $t=0$ is equal to $N_i/(N_i + N_o) = N_i/N$ in both regions. Thus $p(I) = N_i/N$, while $p(O) = N_o/N$, with the term between parentheses denoting employment status. After $t$ periods these probabilities are $[(1-p_e)N_i + (p_e)N_o]/N$ and $[(1-p_e)N_i + (1-p_e)N_o]/N$ respectively;

2. Since by assumption $w_{I,A} > w_{I,B}$, the number of insiders in region $A$ is smaller than in region $B$. Thus $N_i,N_o < N_i,N_o$ and $p_{e,A} < p_{e,B}$, $p_{u,A} < p_{u,B}$. Both wages and the probability of finding a job cannot be higher in region $A$ at the same time (cf. Weiss, 1991). Lower probabilities are compensated for by a higher wage but not proportionally. If we were to have heterogeneous individuals and jobs, we would find a continuous wage distribution with corresponding transition probabilities. This distribution is bound to be normal and the curve $p_{u,w}$ as a function of $w$ will be concave. This basically means that there exists a domain of wages at which the product term $p_{e,A}w_{I,A} (p_{e,B}w_{I,B})$ is decreasing in wages;
3. The foregoing implies:

a. \( p_{e,A} < p_{e,B} < 1 - p_{u,B} < 1 - p_{u,A} \) for the transition from the two employment states in both regions to the final state 'employed';

b. \( p_{u,A} < p_{u,B} < 1 - p_{e,B} < 1 - p_{e,A} \) for the transition from the two employment states in both regions to the final state 'unemployed'.

2.5. \( \textit{Migration} \)

The employed earn a wage \( w_{l,A} \) in region \( A \) and \( w_{l,B} \) in region \( B \), with \( w_{l,A} > w_{l,B} \) as off \( t=0 \). The employed are paid their marginal productivities. If wages between regions are unequal, as they are in our model, individuals move according to the wage differential taking employment probabilities explicitly into account. We assume free mobility that takes no time to come into effect. This results in a cost \( K(d|Y_A - Y_B|) > 0 \) with the term in brackets denoting Euclidian distance between the pre- and post-migration location point; \( K \) includes search and information costs which we assume to increase with distance. We let \( M'_{jk} \) denote the number of individuals of type \( i \) who migrate from region \( j \) to region \( k \) in period \( t \). Total labour supply of individuals of type \( i \) with migration in region \( j \) in period \( t \) is thus given by

\[
L'_i = L'^{-1}_i + M'_{ij} - M'_{jk},
\]

with \( i \in \{I,O\} \) and \( j,k \in \{A,B\} \). A migration equilibrium is defined as a steady-state with production in both regions where the migration incentive vanishes for the marginal migrant. The spatial search behaviour of some individuals does not lead to externalities that might (positively or negatively, cf. Michel, Perrot and Thisse (1996)) have utility effects, since their numbers are infinitesimally small compared to \( N \). We have some intuition as far as the migration pattern is concerned:

1. The unemployed, i.e. the outsiders, are more likely to move than the insiders because the cost of movement for them is less. Since there is by assumption no on-the-job search, insiders never move: not between jobs within regions nor between regions;

2. The probability that a given worker migrates is higher if the worker lives in the high-unemployment region. This is because job placement probabilities are lower there. In the
following we will assume that if there is any migration at all, it will be from the low- to the high-wage region (or alternatively, from the high- to the low-unemployment region).

We do not intend to test these statements empirically; the interested reader is referred to Pissarides and Wadsworth (1989).

3. The static optimum

As we have already noted, the insiders in either region make their optimizing choices taking into account only the own-region effects these decisions have on employment. This implies that within one and the same region the Snower-Lindbeck result applies: the cooperation and harassment levels are set at $a_r^* = 1$, $a_r^* = \alpha$ and $h_r^* = H$ such that the employment of underbidding outsiders is successfully prevented. In a model with two regions characterized by diverging insider wage levels, underbidding behaviour may be successful. For this to happen, the following condition will have to be met, stated in the form of a proposition:

**PROPOSITION 1:** For underbidding to be successful, $\alpha(1+H) < w_I$ needs to hold in a spatial sense.

**PROOF:** Considering only cooperation behaviour, insiders and outsiders have a common reservation wage $R$ and the insiders set their wage according to

$$R < w_I \leq \alpha R,$$

with $\alpha = a_I / a_E > 1$.

Considering only harassment behaviour, insiders and outsiders have different reservation wages $R_i$ and $R_E$ respectively and the insiders set their wage as:

$$R_i < w_I \leq R_E.$$

We have seen above that the entrants receive just their reservation wages and that these will be higher to compensate for the disutility of being harassed. But then surely the insider wage cannot be larger than the entrant (reservation) wage. Thus

$$R_i < w_I \leq w_E = 1+H.$$

With both cooperation and harassment, the following holds:
This is the RPC that assures that insiders are at least as profitable as the marginal entrant. For underbidding to be successful, we just reverse the inequality sign to find:

\[ \alpha(1+H) < w_1. \]

There is no way in which outsiders/entrants could ever influence either \( \alpha \) or \( H \). Thus the only way in which underbidding might succeed is by noting that insider wages differ between regions. The insider wage in region \( A \) is strictly larger than in region \( B \), \( w_{i,A} > w_{i,B} \). We normalize \( w_{i,B} \) to 1 and take \( w_{i,A} \) to be \((1 + \beta)\), with \( \beta > 0 \). For insider and entrant reservation wages we assume the following: \( R_{i,B} < R_{i,A} \), \( R_{e,B} = w_{e,B} < R_{e,A} = w_{e,A} \). Then within either region, assuming outsider underbidding can be prevented, the following holds:

\[
\begin{align*}
& w_{i,A} \leq \alpha w_{e,A} \\
& (1 + \beta) \leq \alpha w_{e,A} \\
& (1 + \beta) / \alpha \leq w_{e,A} \text{ in region } A \\
\end{align*}
\]

\[
\begin{align*}
& w_{i,B} \leq \alpha w_{e,B} \\
& I \leq \alpha w_{e,B} \\
& I / \alpha \leq w_{e,B} \text{ in region } B. \\
\end{align*}
\]

Since \( w_{e,B} < w_{e,A} \), by combining the two above expressions we immediately see \( I / \alpha \leq w_{e,B} < w_{e,A} \), which means that if the own region \( B \) outsiders are not able to successfully underbid the region \( B \) insider wage, then the outsiders from region \( A \) will not either. For the region \( B \) outsiders to underbid the region \( A \) insider wage, we need \( w_{e,B} < (1 + \beta) / \alpha \). At the same time, \( w_{e,B} \) has to be larger than \( I / \alpha \), since otherwise they would underbid the own region \( B \) insider wage without having to incur the migration costs, thus \( I / \alpha \leq w_{e,B} < (1 + \beta) / \alpha \). This is reminiscent of the result found by Vetter and Andersen (1994) that underbidding is more aggressive and thus more likely to succeed if the rents to be shared from employment are higher. Since in our model the number of insiders in region \( A \) is smaller than that in region \( B \) and thus the corresponding wage is higher, this would mean that region \( B \) outsiders are far more likely to underbid the region \( A \) insider wage than vice versa. This is in
accordance with what we found above. We then state without proof the following corollary to our proposition 1:

COROLLARY: For underbidding to be successful, the underbidding wage that region B outsiders demand in region A, \( w_U \), has to settle somewhere in the half-open interval \( \lceil 1/\alpha \cdot (1+\beta/\alpha) \rceil \). We term this the underbidding interval \( U \). Furthermore, the underbidding wage should not be so high as to make entrants unprofitable to the firm, that is \( w_U \) has to satisfy the APC.

If the wage were to settle in this range, it would be profitable to accept underbidding at least for the representative firm. But this is only part of the story, since the outsiders too must find this wage satisfactory. As wage-setting is on the part of the individuals, entrants will ask the highest possible wage in the underbidding interval, i.e \( w_U = \sup (U) \), which is just below \( (1+\beta/\alpha) \). Then underbidding is an attractive strategy for region B outsiders to pursue, i.e. they move to region A, iff:

\[
\begin{align*}
[p_eA \cdot u(w_{U} - 1 - H) + (1 - p_eA) \cdot u(R_{E_A})] \exp(-\theta) - K & \ge \\
[p_eB \cdot u(w_{E_B} - 1 - H) + (1 - p_eB) \cdot u(R_{E_B})] \exp(-\theta)
\end{align*}
\]

since the wage in region A for the underbidding entrants is \( w_{E_A} = w_U \). From the RHS of this inequality it is clear that we still assume there is a probability \( p_e \) for outsiders to gain employment, although strictly speaking this is not possible since underbidding in the own region is always prevented by the insiders so they should be getting their reservation wages with probability one. But outsiders do not know exactly what the insiders plan to do at any moment in time.

Now since utility is simply a monotonic transformation of its arguments and the harassment level \( H \) is the same in both regions, equation (16) may be simplified as follows:

\[
\begin{align*}
[p_eA \cdot u(w_{U}) + ((1 - p_eA) \cdot R_{E_A})] \exp(-\theta) - K & \ge [p_eB \cdot u(w_{E_B}) + ((1 - p_eB) \cdot R_{E_B})] \exp(-\theta) \\
- & [p_eA \cdot u(w_{U}) - (p_eB \cdot u(w_{E_B}))] + [((1 - p_eA) \cdot R_{E_A}) - ((1 - p_eB) \cdot R_{E_B})] \ge K \exp(\theta).
\end{align*}
\]

The sign of the first term on the LHS is indeterminate; certainly \( w_U \) is larger than \( w_{E_B} \) but at the same time \( p_eA \) is smaller than \( p_eB \). In order to be able to sign the difference, we introduce the following definition:

\footnote{Note that there is no problem in signing the second term on the LHS of the inequality since both \( R_{E_A} > R_{E_B} \) and \( (1-p_eA) > (1-p_eB) \), so the difference is always strictly positive.}
Definition: Labour market dominance: A labour market \( A \) is said to weakly dominate a labour market \( B \) if \( p_{c,A} w_A \geq p_{c,B} w_B \) for all combinations of transition probabilities and wages while \( p_{c,A} w_A > p_{c,B} w_B \) for at least one combination. A labour market \( A \) is said to strongly dominate a labour market \( B \) if \( p_{c,A} w_A > p_{c,B} w_B \) for all combinations. Geometrically the latter means that in \( \mathbb{R}^1 \) the plane \( \mathcal{F}_A(w_A,p_{c,A}) \) is always above \( \mathcal{F}_B(w_B,p_{c,B}) \).

We assume the labour market in region \( A \) strongly dominates that in region \( B \). Then the LHS of equation (17) is strictly positive; it must be equal to or larger than \( K \exp(\theta) \) in order for the inequality to hold. We take this to be the case for a fraction \( \gamma \) of the outsiders \( N_0 \) in region \( B \), probably those living closest to region \( A \) in a Euclidian sense since the associated costs are smaller for them. This means that these \( \gamma N_0 \) individuals will offer their labour services in region \( A \), thus \( M_{obs} = \gamma N_0 \) following equation (13). We then state without proof our main result:

**PROPOSITION 2:** For underbidding to be successful, the following conditions will have to be simultaneously satisfied:

1. The underbidding wage that region \( B \) outsiders demand in region \( A \) is just below \((1+\beta)/\alpha\), i.e. \( w_U = \sup(U) \). This condition assures that the RPC is satisfied\(^8\); 

2. From the firm’s perspective: the underbidding wage should not be so high as to make entrants unprofitable to the firm, that is \( w_U \) has to satisfy the APC that it be smaller than or equal to the marginal product;

3. From the individual’s perspective: the labour market where underbidding occurs has to strictly dominate the other market. Furthermore, the gain in expected income from underbidding in another region has to be larger than or equal to the expected cost of migration. In short, inequality (17) will have to be satisfied.

Under these conditions we would find successful underbidding without the two effects mentioned in the introduction necessarily materializing: involuntary unemployment would not disappear nor would we observe persistent wage deflation. Furthermore, in our framework outsider migration would not lead to an equalization of regional wages; outsider underbidding behaviour may lower wages in region \( A \), but interregional wages may differ by at least as much as the migration costs \( K \).

\(^8\) Strictly speaking, our RPC only includes the ‘costs’ induced by insider cooperation and harassment behaviour. Firms will take other costs in account as well though (cf. our introduction). Our condition (1) above could be easily adapted accordingly.
4. Model extensions

In the foregoing we have checked the robustness of the Lindbeck and Snower cooperation and harassment result in a static two-region world. We basically concluded that underbidding is achievable at least theoretically. Now we look at the comparative static properties of this proposition. Extending the spatial element by allowing a multi-region world (i.e. more than two regions) increases the probability that underbidding of insider wages is successful. Regions could in principle be arranged in order of insider power and insider wages. To see this, assume there are \( n \) regions with insider wages \( w_{1,A}, w_{2,B} > \ldots > w_{n,n} \). Then if the outsiders in region \( B \) can successfully underbid the region \( A \) insider wage, the outsiders in regions \( C, \ldots, n \) can do so even more. We cannot say on beforehand exactly how the underbidding process will run. Probably outsiders in all regions would want to underbid the region \( A \) wage since it is the highest, but surely this affects the probability of successful underbidding, so they may choose to underbid in another region. We are then basically back at our definition of labour market dominance, but now extended to be able to determine a dominance order for all \( n \) regions. We also stress the importance of how exactly regions are located relative to each other, in particular whether they are central or peripheral. In the former case underbidding from other regions is more likely for two reasons: firstly, such regions are surrounded by more other regions and secondly, the migrations costs to that region are lower since Euclidian distance is smaller. This increases the wedge between the expected benefits and costs of moving.

Our model could also be extended in time. This would make underbidding more likely since the expected gains would be enjoyed over a longer period of time while the migration costs would be discounted over the same longer period of time. Our equation (17) could easily be amended accordingly. One needs to be aware though of the fact that in a dynamic setting the transition probabilities would become endogenous, since underbidding and migration changes the composition of insiders and outsiders within regions as well as the distribution over regions. We shall not pursue this point any further here.

We have assumed throughout that jobs are homogeneous. Still it is to be expected that underbidding is more likely in one type of job than in others. Also individuals are bound to have different opinions as to whether or not underbidding is an acceptable way of behaving. We have abstracted from such considerations before and shall do so now as we do not expect that allowing for job and worker heterogeneity will greatly affect our results.

Our story could also be told from the firm's perspective. Firms could take advantage of diverging regional wages by relocating to the lowest-wage region. Still we feel that this is much less likely to happen than individuals migrating; the expected gain is certainly higher (maybe not in a relative sense)
as compared to that for the individual since it is the sum over those workers that are replaced by outsiders. At the same time though the costs are much higher, and probably proportionally so. To conclude, firms may have many reasons to relocate, but taking advantage of regional wage differences is not bound to be an important reason, if one at all.

5. Conclusions

In this paper we constructed a static two-region insider-outsider model to test the robustness of the general Lindbeck-Snower result on cooperation and harassment behaviour. Within either region, the result is easily corroborated. We have shown that in a spatial model successful underbidding may no longer be excluded per se.

At the same time though we do not find either the disappearance of involuntary unemployment nor persistent wage deflation. Furthermore, there may exist stable migration equilibria without interregional wages necessarily being equalized. Finally, we briefly indicated how the model might be extended both in time and space; the general results are not expected to fundamentally change.
References


