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Cooperation, harassment and involuntary unemployment: An insider-outsider approach

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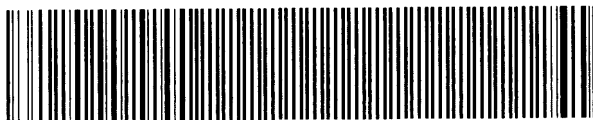
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DISCUSSION PAPER SERIES

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AND INVOLUNTARY UNEMPLOYMENT:
AN INSIDER-OUTSIDER APPROACH**

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Discussion Paper No. 196
July 1987

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Cooperation, Harassment, and Involuntary Unemployment:
An Insider-Outsider Approach

ABSTRACT

We present a theory of involuntary unemployment which explains why the unemployed workers ("outsiders") are unable or unwilling to find jobs even though they are prepared to work for less than the prevailing wages of incumbent workers ("insiders"). The outsiders do not underbid the insiders since, were they to do so, the insiders would withdraw cooperation from them and make their work unpleasant (i.e. "harass" them), thereby reducing the productivity and increasing the reservation wages of the underbidders. The resulting labour turnover costs create economic rent which the insiders tap in wage-setting and, as a result, involuntary unemployment may arise.

JEL classification: 023, 026, 131, 821

Keywords: unemployment, cooperation and harassment, insiders and outsiders

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NON-TECHNICAL SUMMARY

In order to understand how market economies may suffer from protracted spells of involuntary unemployment, it is important to explain why underbidding is not a preponderant feature of labour markets. In this context, we take "underbidding" to mean an agreement between a worker and a firm that a particular job be performed at less than the prevailing wage. Whether the low wage offer is made by the worker, the firm, or both, is immaterial in this regard. If underbidding would occur whenever unemployed workers were willing to work for less than the prevailing wages, then involuntary unemployment would either disappear or be accompanied by the empirically unobserved phenomenon of persistent wage deflation.

This paper examines how cooperation or harassment by incumbent workers with market power ("insiders") may give rise to involuntary unemployment. Our central idea is that, in order to preserve their jobs and maintain their wages, insiders may have an incentive to cooperate more with each other than with outsiders and to threaten to harass outsiders who are prepared to find jobs through underbidding. In so doing, the insiders generate a labour turnover cost for their firms: this cost generates economic rent which the insiders may be able to exploit in the process of wage determination. Insiders may therefore succeed in raising their wages above the level at which outsiders would be willing to work, but firms nevertheless lack the incentive to replace insiders by outsiders or to add outsiders to their workforces.

Our analysis suggests two reasons why involuntarily unemployed workers may be unwilling or unable to gain jobs by underbidding their employed counterparts:

- (1) Firms may refuse to replace incumbent employees with workers who wish to underbid because they have reason to expect that, if they do so, the remaining incumbents would refuse to cooperate with the underbidders in the process of production.

(2) Unemployed workers may not agree to underbid because they have reason to expect that, if they thereby succeeded in replacing some incumbents, their social relationships with the remaining incumbents would be unpleasant (i.e. they would be "harassed" by the incumbents).

Harassment has received little attention in the standard literature of the theory of labour markets, although the economic theory of teams recognizes employees' productivities to be interdependent. The distinctive feature of our analysis, however, is that cooperation and harassment activities do not occur automatically; rather, they lie within the discretion of the employees, especially the incumbents. In particular, we assume that insiders often have considerable latitude in choosing whether or not to cooperate with newly-hired employees in the process of production or whether or not to establish pleasant social relations with them. Thus, insiders are able to affect both new employees' productivities, via cooperation, in production and their disutility of work, via unfriendly attitudes (harassment). Firms generally find it impossible to monitor such cooperation and harassment activity perfectly and the wage contracts cannot be made contingent on them. We also assume that, in making their cooperation and harassment decisions, the insiders primarily take account of their own interests. Such cooperation and harassment give the insiders a stronger bargaining position than the outsiders, who have no say in the process of wage negotiation.

If such harassment is present in the workplace, persistent involuntary unemployment may exist in the following sense. The inherent difference in ability between an insider and an outsider stems exclusively from their different individual abilities to provide cooperation to their colleagues. The corresponding difference in their marginal products may be evaluated as the amount by which their marginal products would differ under identical external conditions of employment, i.e. identical

cooperation for their colleagues. We show that the wage negotiation process may yield an insider wage that exceeds the reservation wage by more than the above marginal product differential, so that the outsiders are involuntarily unemployed. Nevertheless, firms may have no incentive to replace the insiders, since insiders and outsiders do not face identical external conditions of employment: the insiders receive cooperation whereas the outsiders (through no fault of their own) do not. Thus the firms do not find it worthwhile to hire outsiders and consequently the unemployment persists.

By the same token, laid-off workers may be able to retain their jobs by offering to work for lower wages. Specifically, suppose that there is a business downturn and that firms respond by laying off a number of employees. It can then be shown that it is in the best interests of the remaining employees to withdraw cooperation from the laid-off workers and thereby prevent underbidding.

Harassment activities can achieve a similar purpose. We observe that employees are free to decide how friendly or unfriendly they should be to their fellow workers. This allows insiders to affect the disutility attached to work by outsiders or laid-off workers. Firms usually cannot obtain complete, verifiable, objective information about such harassment. Insiders can keep unemployed and laid-off workers from underbidding by creating the credible expectation that underbidders will be harassed. As a result, outsiders have a higher reservation than that of insiders.

If the outsider were able to avoid harassment, they would be willing and able to do the insiders' work for less than the insiders' wage. Yet they do not have this option. Their choice set, even allowing for their abilities, is less favourable than that of the insiders, and thus they may be considered involuntarily unemployed. Given that the outsiders find themselves with lower productivity and higher disutility of work

than the insiders, there may exist no wage which both induces firms to hire outsiders and induces outsiders to work.

The empirical implications of our analysis do not square with those of the natural rate hypothesis, since within our framework employment is not uniquely determined by preferences, endowments, and production technologies. Rather, our analysis suggests that the size of the incumbent workforce may be an important determinant of the level of employment, since insiders may have market power over wages whereas outsiders do not. If the incumbent workforce is "large", then insiders receive their reservation wage and the firm employs the maximum sustainable incumbent labour force. No outsiders are hired because none are willing to work at the insiders' reservation wage: harassment makes working for the firm unpleasant and outsiders' reservation wages exceed those of insiders. At "intermediate" levels the incumbent workforce is small enough so that its marginal product exceeds the insiders' reservation wage but large enough so that the marginal product of new entrants falls short of the entrants' reservation wage. The insider seeks the highest possible wage, subject to the constraint that the firm still finds it profitable to employ the insider. With a "small" incumbent labour force there are so few insiders that the marginal products of both insiders and some entrants exceed their reservation wages. Insiders cannot completely exclude outsiders from jobs and insiders' wages are constrained by the need to remain more profitable to the firm than outsiders would be. The insider wage is then a mark-up over the outsiders' reservation wage. The firm retains its incumbents and hires outsiders until their marginal product falls to the level of the reservation wage.

Our analysis also suggests that business upswings will tend to generate fewer jobs in countries with a high level of insider power than in countries where insiders are weak. Even though insiders may be able to prevent outsiders from getting jobs, our analysis does not imply that the insiders can prevent employment

from recovering after a recession.

To see this consider how our model economy responds to an upswing in each of the three scenarios. If the incumbent workforce is "large" (before and after the upswing), then the insider wage remains unchanged and more insiders are retained on account of the upswing. If the incumbent workforce is "intermediate" (before and after the upswing), the insiders raise their wage by the full amount of the upward shift of the insider demand curve (without thereby encouraging entry of new employees) and, as a result, employment remains unchanged. Finally, if the incumbent workforce is "small" (before and after the upswing), the insiders are unable to raise their wage, for otherwise they would induce the firm to replace them by entrants. Consequently, the insider wage remains unchanged and the firm hires more entrants on account of the upswing.

In short, when the incumbent workforce is "large" or "small", insiders do not prevent employment from rising in an upswing, but they do have this effect in the intermediate case.

The degree to which an upswing leads to higher wages versus higher employment may depend on the size of this upswing. Consider, for example, a labour market suffering from unemployment and stuck in the intermediate case. If the upswing is "small" so that the labour market remains in this scenario, then employment will continue to stagnate while insider wages rise. Yet, if the upswing is "large", so that the labour market moves into the "small" scenario, then insider wages rise to a particular markup over entrants' reservation wages and employment expands (the larger the upswing, the greater the expansion). Here we observe that a large business stimulus reduces the level of unemployment whereas a small stimulus is unable to do so.

In addition the movement of wages and employment in an upswing and a downswing may not be symmetric. A downswing may be

characterized by stable insider wages and a contraction of the incumbent workforce through retirements and lay-offs, while an upswing may take the form of rising insider wages and only modest (if any) increases in employment.

In order to understand how free-market economies may suffer from protracted spells of involuntary unemployment, it is important to explain why underbidding is not a preponderant feature of labor markets. In this context, we take "underbidding" to mean an agreement between a worker and a firm that a particular job be performed at less than the prevailing wage. (Whether the low wage offer is made by the worker, the firm, or both, is immaterial in this regard). If underbidding would occur whenever unemployed workers were willing to work for less than the prevailing wages (normalized for any productivity differences), then involuntary unemployment would either disappear or be accompanied by the empirically unobserved phenomenon of persistent wage deflation.

In the absence of government intervention, underbidding failures can be rationalized by showing

(a) why firms have no incentive to agree on low wage bids in the presence of involuntary unemployment, or

(b) why workers lack this incentive.

The recent theoretical literature on unemployment has pursued both of these routes. The efficiency wage theories (e.g. Akerlof (1982), Bulow and Summers (1986), Malcomson (1981), Shapiro and Stiglitz (1984), and Weiss (1980)) have focused on route (a), and much of the labour union literature which has bearing on unemployment and layoffs (e.g. McDonald and Solow (1981), Oswald (1982)) takes route (b).

This paper attempts to provide a rationale for what many people regard as well-established social norm, namely, that workers should not "steal" jobs from their fellow workers by agreeing to work for lower wages, and that employers should not permit such "job theft."

Our analysis pursues the two routes above in the following way:

Route (i): Firms may refuse to replace incumbent employees with workers

who wish to underbid because they realistically expect that, if they would do so, the remaining incumbents would withdraw cooperation from the underbidders in the process of production.

Route (ii): Unemployed workers may not agree to underbid because they realistically expect that, if they thereby succeeded in replacing some incumbents, their personal relations with the remaining incumbents would be unpleasant (i. e. they would be "harassed" by the incumbents).

In the standard literature on the theory of labor markets, harassment has received little attention, while the theory of teams (e.g. Alchian and Demsetz (1972), Marschak and Radner (1972)) recognizes employees' productivities to be interdependent. However, the crucial, distinctive feature of our analysis is that cooperation and harassment activities do not occur automatically; rather, they lie within the control of the employees, especially the incumbents.

In describing the causes and consequences of incumbents' cooperation and harassment activities, we adopt an "insider-outsider" approach to the labor market. The basic idea underlying this general approach is that there are labor turnover costs that generate economic rent which incumbent workers ("insiders") manipulate and exploit in the process of wage determination. In doing so, the insiders primarily take account of their own interests. The unemployed workers are disenfranchised in the process of wage negotiation and, as shown below, involuntary unemployment may occur. It is worth emphasizing that the distinction between "insiders" and "outsiders" is not merely one between employed and unemployed workers, but rather between groups of workers with different employment opportunities: the insiders face more favorable opportunities than the outsiders due to the insiders' ability and willingness to use turnover costs to drive up their wages.

The insider-outsider approach has been outlined in general terms in Lindbeck and Snower (1984a, 1985b, 1986a,c). Shaked and Sutton (1984) provide a bargaining rationale (one of many conceivable ones) for insider market power. The approach has been extended to a two-period framework by Solow (1985) and its implications for time-dependence of unemployment (i.e. dependence of current unemployment on past unemployment) were developed by Blanchard and Summers (1986), Gottfries and Horn (1986), and Lindbeck and Snower (1986b). Gregory (1986) has given some preliminary empirical support (from Australia) for the notion that wages are influenced more by firms' internal conditions than by external conditions in the labor market.

In this paper, the insiders are assumed to create a special, potentially important, variety of labor turnover cost by withdrawing cooperation from, and by harassing the entrants who attempt to underbid. As a result, the insiders are able to raise their wages above the market-clearing level without inducing underbidding.

At these wages, the unemployed workers ("outsiders") would prefer to trade places with the insiders (i.e. they would prefer to be employed for insider wages under insider conditions of work rather than to be unemployed), but they do not have this option. They are victims of discrimination, because whenever they gain employment through underbidding, they receive less cooperation and more harassment than the insiders do. In fact, the outsiders may be willing to work for sufficiently less than the insider wages so as to compensate the firms for their more limited cooperation skills, but they may nevertheless be unable to find jobs. Given that the outsiders find themselves with lower productivity and higher disutility of work than the insiders, there may exist no wage which both induces firms to hire outsiders and induces outsiders to work. This is the sense in which involuntary unemployment can arise in our analysis.

In the literature on unemployment theory, the "insider-outsider"

approach may be regarded as an alternative (though complementary rather than mutually exclusive) to the "efficiency wage" approach. Whereas the former explains unemployment through insiders' market power which is used to exploit the rent from labor turnover costs in the process of wage determination, the latter approach explains unemployment through asymmetric information and firms' market power in wage determination (see Lindbeck and Snower (1986c) for a comparison of the two approaches). In the insider-outsider world, the unemployed workers do not engage in underbidding because the insiders prevent them from doing so; in the efficiency-wage world, underbidding does not occur because it is not in the firms' interests. Among the contributions to the efficiency wage literature, Akerlof's (1982) "gift exchange model" is closest in spirit to our approach here, in that his analysis describes how employers' wage offers may be used to promote their workers' cooperation and effort.

Section 1 deals with the microeconomic behaviour of workers and firms in our model. Section 2 describes the equilibrium of a single firm and its employees. In Section 3, we incorporate this equilibrium in an aggregate analysis of the labor market and examine how involuntary unemployment can occur in this context. Section 4 deals with potential objections to our analysis. Finally, Section 5 contains concluding remarks.

1. The Behavior of Economic Agents

A. The Underlying Setup

Though our explanation of involuntary unemployment rests on two distinct, logically independent arguments (one of which focuses on cooperation, the other on harassment), for brevity, the formal model in the next two sections deals with these arguments simultaneously.

The cooperation and harassment activities, which the insiders use to protect themselves against underbidding, may be defined as follows. "Cooperation" refers to all those activities in which workers help one another in the process of production and thereby raise their productivity.

"Harassment" stands for all those activities whereby workers make each other's jobs more disagreeable (primarily by damaging their personal relations) and thereby raise their disutility of work.

In practice, those workers who have spent a long time at their jobs are often more capable of cooperation and harassment than their newly-arrived counterparts. We capture this observation roughly by supposing that when workers first enter their firms, they are unable to cooperate with or harass other workers, but after a fixed period of time - call it the "initiation period" - they all gain identical access to these abilities.

Within this context, we identify three homogenous groups of workers:

(i) insiders, the "experienced" employees who are able to engage in the full range of cooperation and harassment activities,

(ii) entrants, the "inexperienced" employees who have no access to these activities, and

(iii) outsiders, the unemployed workers.

In this section, we build a simple model which captures the role of insiders' cooperation and harassment activities in the formulation of wage and employment decisions within a firm. Our model is based on the following salient structural assumptions:

- Wage decisions: Each employees' wage is negotiated for one period at a time, where (for simplicity) the length of the period is assumed equal to the initiation period.^{1/}

- Outsiders are perfect competitors for jobs. Thus, when an outsider is hired (and thereby turns into an entrant), his entrant wage is equal to his reservation wage (for the duration of the initiation period).

- Insiders have some market power. Each insider sets his wage "individually" (taking the strategies of all other agents as given):^{2/}

- An insider's wage cannot be made contingent on his cooperation and

harassment activities, since the firm is unable to monitor these activities directly. (All that the firm can observe is its output and the number of insiders and entrants it employs).^{3/}

- Employment decisions: These are made unilaterally by the firms.
- Sequence of decisions: In the first stage of the decision-making process, the insider wage and the cooperation and harassment levels are set, taking into account how these decisions affect employment. The entrant wage is determined as well. In the second stage, the firms make the employment decisions, taking the insider and entrant wages, as well as the cooperation and harassment levels, as given.

B. The Firm

Consider a firm which has two variable factors of production: insiders (L_I) and entrants (L_E). Let a_I represent the level of cooperation among insiders (measured as the actual number of insiders divided into the number that would be required to produce the same output in the absence of cooperation among insiders), and let a_E stand for the level of cooperation between insiders and entrants (measured as the actual number of entrants divided into the number that would be required to produce the same output in the absence of cooperation from insiders). We will call a_I and a_E the "labor endowments" of the insiders and entrants, respectively. The firm is assumed to know the levels of these endowments but it cannot observe the cooperation activities of individual workers. We write the firm's production function as $Q = f(a_I \cdot L_I + a_E \cdot L_E)$, $f' > 0$, $f'' < 0$, where Q is the level of output.

Let W be the insider wage and R_E be the entrant wage (which is equal to the entrants' reservation wage). All insiders are identical and receive the same wage, and similarly for entrants. The firm can observe W and R_E , but it cannot observe the harassment activities which are reflected in the

level of R_E .

Within the two-stage decision-making process specified in Section 1 (with wages, cooperation, and harassment decisions made in the first stage and employment decisions made in the second), the firm's problem is to maximize its profit with respect to L_I and L_E , taking the insider and entrant wages, the overall cooperation and harassment levels, as well as the production function f as given. To present our analysis in the simplest possible way, we assume that the firm has a one-period time horizon.^{4/}

Let m be the firm's "incumbent workforce," i.e. its the stock of insiders carried forward from the past. Since we assume that cooperation and harassment skills are firm-specific and that entrants acquire them only after they go through the initiation period, it is clear that $L_I \leq m$.

Thus, the firm's profit maximization problem is

$$(1) \quad \text{Maximize} \quad \pi = f(a_I \cdot L_I + a_E \cdot L_E) - W \cdot L_I - R_E \cdot L_E$$

subject to $L_I \leq m; \quad L_I, L_E \geq 0$.

Let $\lambda = a_I \cdot L_I + a_E \cdot L_E$ be the firm's effective workforce (i.e. its workforce in efficiency units of labor). Then the first-order conditions may be expressed as follows:

$$(2a) \quad \frac{\partial \pi}{\partial L_I} = a_I \cdot f'(\lambda) - W \geq 0, \quad \frac{\partial \pi}{\partial L_I} \cdot (m - L_I) = 0;$$

$$(2b) \quad \frac{\partial \pi}{\partial L_E} = a_E \cdot f'(\lambda) - R_E \leq 0, \quad \frac{\partial \pi}{\partial L_E} \cdot L_E = 0$$

where we ignore the non-negativity constraint on L_I and we assume that the firm is able to hire all the entrants it demands at the wage R_E .^{5/}

C. The Workers

Insider i has the following decision variables:

- The level of his harassing activity directed at entrants:

h_E^i (implicitly assuming that the insider harasses all entrants in equal measure). We assume that the insider does not harass other insiders.^{6/}

- The levels of his cooperative activities directed at other insiders and entrants: a_I^i and a_E^i , respectively, defined analogously to a_I and a_E above. (We assume implicitly that he cooperates with all the other insiders in equal measure, and similarly for all the entrants).

- The insider i 's wage: W^i .

The insider makes these decisions "individualistically," i.e. he takes the optimal cooperation, harassment, wage-setting and employment strategies of all other agents as given. Let us examine the role of each of these decision variables in the context of the insider's decision-making problem.

Since we are primarily concerned with the effect of insiders' cooperation and harassment activities on their wages and employment, it is natural to make the simplifying assumption that the insider i 's cooperation and harassment activities do not affect his own utility directly, but only indirectly via the wage he is able to achieve.^{7/} In other words, the insider is assumed to regard the activities h_E^i , a_I^i and a_E^i as neither desirable nor undesirable per se and therefore (as shown below) he uses them only to support his wage claims.

We specify insider i 's utility function quite simply as

$Q^i = C^i - l^i$, where C^i is his consumption and l^i is his labor (in units of time). Labor is taken to be a discrete activity, with $l = 1$ for an employed worker and $l = 0$ for an unemployed one. We assume that each worker consumes his entire income in each period. For insider i , this means that $C^i = W^i$.

The insider's reservation wage, R_I^i , is defined as that wage (W^i) which makes him indifferent between employment (yielding utility W^i-1) and unemployment (yielding utility 0):

$$(3a) \quad R_I^i = R_I = 1 \quad \text{for all } i.$$

Let entrant j 's utility be $U^j = C^j - a^j - H_E$, where H_E stands for his disutility from being harassed by the insiders.^{8/} Naturally, we assume that

$$(3b) \quad (\partial H_E / \partial h_E^i) > 0 \quad \text{for any insider } i.$$

Thus the entrant's reservation wage is

$$(3c) \quad R_E^j = R_E = 1 + H_E \quad \text{for all } j.$$

We assume that each insider's harassing activity (h_E^i) is bounded from above and below, so that each entrant's disutility from being harassed (H_E) is also bounded:

$$(3d) \quad 0 \leq H_E \leq H,$$

where H is a nonnegative constant (described in Footnote 17, below).

We now turn to the insider i 's cooperation activities and specify how they affect the productivities of the other insiders and the entrants. We wish to ensure, quite plausibly, that an insider is able to raise the marginal products of workers by cooperating with them. For this purpose, we make the following two assumptions:

$$(4a) \quad \frac{\partial a_I}{\partial a_I^i}, \quad \frac{\partial a_E}{\partial a_I^i} > 0.$$

and

$$(4b) \quad 0 < \eta_I, \eta_E < 1,$$

where $\eta_I = -(f''/f') \cdot a_I \cdot L_I$ and $\eta_E = -(f''/f') \cdot a_E \cdot L_E$ are the elasticities of the marginal product of labor with respect to the insider and entrant workforces. Thus, when an insider increases his cooperative activity with other insiders and entrants, the marginal products of the insider and entrant workforces rise:

$$\frac{\partial(a_I \cdot f')}{\partial a_I^i} = \frac{\partial a_I}{\partial a_I^i} \cdot \frac{1}{f'} \cdot (1+\eta) > 0,$$

$$\frac{\partial(a_E \cdot f')}{\partial a_E^i} = \frac{\partial a_E}{\partial a_E^i} \cdot \frac{1}{f'} \cdot (1+\eta) > 0.$$

Assumption (4a) means that the jobs within the firm are sufficiently interdependent so that an individual insider's cooperation with other insiders or entrants has a significant, positive effect on their labor endowments. This assumption is unnecessary to our analysis whenever insiders, acting through a union, can influence a_I and a_E directly. Indeed this suggests that, in large plants with little job interdependence, insiders may have a special incentive to form a union. An insider-outsider explanation for the emergence of unions is to be found here.

We let each insider's cooperating activities (a_I^i and a_E^i) be bounded from above and below, so that the labor endowments of insiders and entrants (a_I and a_E) are bounded as follows:

$$(4c) \quad 1 \leq a_I, a_E \leq A,$$

where A is a constant greater than unity.^{9/}

Finally, we turn to the insider's influence over his wage w^i . To reach our qualitative conclusions, we only need to assume that (a) each insider's wage captures at least some of the economic rent generated through his cooperation and harassment activities and (b) the greater this rent, the higher his wage. These properties hold in a variety of well-known bargaining games (e.g. Shaked and Sutton (1984)) and are in accord with common-sense ideas on wage setting processes. However, to make our exposition as simple as possible, we consider only the extreme case in which each insider sets his own wage unilaterally and individualistically (as noted in Section 1). This means that each insider takes the wages and employment of all other insiders as given.

Consequently, if he wishes to retain his job, he must set his wage so that the firm has an incentive to employ him in addition to all the other insiders it is employing. In other words, each insider regards himself as the marginal worker in the firm's employment decisions.

The insider i faces two wage-setting options: (i) he may set his wage at some level V^i which is sufficiently low to ensure his continued employment, or (ii) he may achieve his reservation wage R_I^i by choosing not to be employed. Clearly, the first option will be chosen only if the maximum achievable wage V^i , denoted by V_{\max}^i , is at least as great as the reservation wage; otherwise, the second option is preferable:

$$(5a) \quad W^i = \max[R_I^i, V_{\max}^i].$$

V_{\max}^i may be inferred from the firm's employment behavior as described by the first-order condition (2a) and (2b). If entrants are not employed, then only (2a) is relevant for determining the maximum achievable wage: $W \leq a_I \cdot f'(\lambda)$ and thus V_{\max}^i is the maximum of $[a_I \cdot f'(\lambda)]$ with respect to a_I^i and a_E^i . On the other hand, if entrants are employed (in addition to insiders), then both (2a) and (2b) are relevant and the first parts of (2a) and (2b) hold as equalities:

$$f'(\lambda) = f'(a_I \cdot m + a_E \cdot L_E) = V^i/a_I = R_E/a_E,$$

and thus V_{\max}^i is the maximum of $[(a_I/a_E) \cdot R_E]$ with respect to a_I^i , a_E^i , and h_E^i .

In short, V_{\max}^i may be expressed as follows:

$$(5b) \quad V_{\max}^i = \max_{a_I^i, a_E^i, h_E^i} [\min \{a_I^i \cdot f'(a_I^i \cdot L_I), (a_I^i/a_E^i) \cdot R_E\}].$$

Substituting (5b) into (5a), and recalling that $R_I = 1$ and $R_E = 1 + H_E$, we obtain insider i 's wage:

$$(5c) \quad W^i = \max_{a_I^i, a_E^i, h_E^i} [1, \min \{a_I^i \cdot f'(a_I^i \cdot L_I), (a_I^i/a_E^i) \cdot (1 + H_E)\}].$$

2. The Microeconomic Equilibrium: The Firm and Its Employees

We now show how the equilibrium levels of wages, employment, and cooperation and harassment activities are determined through the interaction of a firm and its employees. Our concept of equilibrium (for the two stage decision making process described above) may be specified as follows:

Definition: In the Nash equilibrium of the firm and its employees,

(a) each insider i maximizes his utility with respect to his decision variables W^i , a_1^i , a_E^i , and h_E^i , taking the strategies of the firm and the other employees as given and

(b) the firm maximizes its profit with respect to its decision variables L_1 and L_E , taking the strategies of its employees as given.

Let us now turn to the characteristics of this equilibrium.

A. Cooperation

Under equilibrium conditions, each insider cooperates fully with other insiders, but does not cooperate with entrants.

Intuitively, the reason is that (a) by cooperating with the other insiders, the insider raises the marginal product of the firm's incumbent workforce and is thereby able to achieve a higher wage and (b) by refusing to cooperate with entrants, the insider reduces the marginal product of the entrant workforce, and consequently reduces the number of entrants hired, thereby raising the marginal product of the incumbent workforce and achieving a higher wage.

This can be shown formally by deriving the cooperation activities a_1^i and a_E^i which permit the insider i to earn his maximum achievable wage V_{\max}^i : By the V_{\max}^i equation (5b), the insider's optimal (equilibrium) levels of cooperation are $(a_1^i)^* = \max(a_1^i)$ and $(a_E^i)^* = \min(a_E^i)$, so that

(6a) $a_1^* = \lambda$ and $a_E^* = 1$.

B. Harassment

Under equilibrium conditions each insider harasses maximally all workers who enter the firm.

Intuitively, we see that by doing so, the insider maximizes the entrants' reservation wage and thereby discourages them from entering the firm, so that a minimal number of entrants are hired. Thus, the marginal product of the incumbent workforce is maximized, so that the insider achieves the highest possible wage.

Formally, the V_{\max}^i equation (5b) implies that the insider's equilibrium level of harassment (which permits him to earn his maximum achievable wage) is $(h_E^i)^* = \max(h_E^i)$, so that

$$(6b) \quad H_E^* = H$$

(recalling that, by (3d), H is the upperbound of H_E).

C. Wage Determination

Substituting the optimal cooperation levels (6a) and the optimal harassment level (6b) into the W^i equation (5c), we obtain the following wage equation:

$$(7) \quad (W^i)^* = W^* = \max\{1, \min\{A \cdot f'(A \cdot L_1), A \cdot (1+H)\}\} \text{ for all } i.$$

This equation has a straightforward interpretation. If the insider's reservation wage ($R_1 = 1$) falls short of his maximum wage achievable through employment, ($\min\{A \cdot f'(A \cdot L_1), A \cdot (1+H)\}$), then the insider sets his wage with two independent considerations in mind: W^i must be sufficiently low so that

- the insider remains profitable (or at least does not become unprofitable) to the firm, i. e.

$$(8a) \quad W^i \leq A \cdot f'(A \cdot L_1)$$

(for otherwise he would be dismissed) and

- the insider remains more profitable (or at least does not become less profitable) than the marginal entrant, i.e.

$$(8b) \quad W^i \leq A \cdot (1 + H)$$

(for otherwise he would be replaced by the entrant). We call (8a) the "absolute profitability constraint" (APC) and (8b) the "relative profitability constraint" (RPC) on the insider wage.

D. Employment Determination

Whether the insider wage is given by the reservation wage, the APC, or the RPC depends on the size of the firm's incumbent workforce, m . Recall that the firm faces diminishing returns to labor (i.e. $f' < 0$) and thus the larger the incumbent workforce, the lower the incumbent's marginal product. There are three possible scenarios:

(I) A "large" incumbent workforce: Here the incumbent workforce is so large that its marginal product is less than the insiders' reservation wage (R_1). In particular, $m > \bar{m}$, where \bar{m} is the "maximum sustainable incumbent workforce" (i.e. the largest possible number of incumbents which the firm may have an incentive to employ) and \bar{m} is given by 10/

$$(9) \quad A \cdot f'(A \cdot \bar{m}) = 1.$$

When the incumbent workforce is greater than its maximum sustainable level ($m > \bar{m}$), it is clear that the firm finds it worthwhile to reduce employment. What remains to be examined is how large the new workforce will be and whether some insiders will be replaced by entrants.

To this end, note that in this scenario the insider wage will be set equal to the reservation wage:

$$(10a) \quad W^* = R_1 = 1, \quad \text{for } m > \bar{m}.$$

The reason is that if W were set beneath this level, then some insiders would have an incentive to quit; while if W were above this level, then some insiders would be dismissed even though they prefer employment to unemployment and these insiders would consequently have an incentive to opt for a lower wage.

Given that the insider wage is at its minimum level $W = 1$, then (by (2a) and (9)) the firm employs the maximum sustainable incumbent workforce:

$$(10b) \quad L_I^* = \bar{m}, \quad \text{for } m > \bar{m}$$

Since the insiders' marginal product is equal to their reservation wage ($A \cdot f'(A \cdot L_I) = 1$), the marginal product of an entrant (hired in addition to the insiders) must be less than his reservation wage ($f'(A \cdot L_I^*) < 1 + H$).

Thus, the firm hires no entrants: 11/ 12/

$$(10c) \quad L_E^* = 0, \quad \text{for } m > \bar{m}.$$

11. An "intermediate" incumbent workforce: Here the incumbent workforce is (a) small enough so that its marginal product exceeds the insiders' reservation wage, but (b) large enough so that the marginal product of entrants (hired in addition to incumbents) falls short of the entrants' reservation wage. In particular, $\underline{m} \leq m \leq \bar{m}$, where \underline{m} is the "minimum sustainable incumbent workforce" (ie. the smallest possible number of incumbents which the firm could employ without having an incentive to hire entrants). \underline{m} is given by 13/

$$(11) \quad f'(A \cdot \underline{m}) = 1 + H.$$

Under these circumstances, the firm hires no entrants:

$$(12a) \quad L_E^* = 0, \quad \text{for } \underline{m} \leq m \leq \bar{m},$$

since (by (11)) the marginal product of an entrant is less than the entrant's reservation wage ($f'(A \cdot m) < 1 + H = R_E^*$).

Consequently, in setting his wage, each insider is constrained not by the need to remain at least as profitable as the entrants (since entrants are never profitable in this scenario), but only by the need to keep his absolute

profitability from falling below zero. In other words, the binding constraint on the insider wage (given by the wage equation (7)) is the APC (Constraint (8a)), while the RPC (Constraint (8b)) is redundant.^{14/} This means that each insider sets his wage equal to the marginal product of the incumbent workforce:

$$(12b) \quad W^* = A \cdot f'(A \cdot m) \quad \text{for } \underline{m} \leq m \leq \bar{m}.$$

At this wage, the firm retains all its incumbents: ^{15/}

$$(12c) \quad L_1^* = m, \quad \text{for } \underline{m} \leq m \leq \bar{m}.$$

III. A "small" incumbent workforce: Here the incumbent workforce is sufficiently small so that the marginal products of both the incumbents and some entrants (hired in addition to the incumbents) exceed their respective reservation wages. In particular, $m \leq \underline{m}$.

Under this scenario, the insiders cannot completely exclude the outsiders from getting jobs (regardless of their cooperation and harassment activities). Thus, each insider must set his wage with a view to his profitability vis-a-vis the entrants, i.e. the binding constraint on the insider wage is the RPC (Constraint (8b)).^{16/} By the wage equation (7), this means that the insider wage is a mark-up (by the factor A) over the entrants' equilibrium reservation wage ($R_E^* = 1 + H$):

$$(13a) \quad W^* = A \cdot (1 + H), \quad \text{for } m < \underline{m}.$$

At this wage, the marginal incumbent is just as profitable as profitable as the first entrant (hired in addition to the incumbent workforce): $(\partial \pi / \partial L_1^*) = A f'(A \cdot m) - W^* = (\partial \pi / \partial L_E) = f'(A \cdot m) - (1 + H)$. Since the incumbent workforce is "small", the first entrant generates positive profit; thus, the marginal incumbent does so, too. Consequently, the firm retains all its incumbents:

$$(13b) \quad L_1^* = m, \quad \text{for } m < \underline{m},$$

provided (as shown below) that the firm lacks the incentive to replace all its incumbents by entrants.

Moreover, entrants are hired until their marginal product is brought into equality with their reservation wage: $A \cdot L_1^* + L_E^* = A \cdot \bar{m}$ (by (11)) and thus

$$(13c) \quad L_E^* = A \cdot (\bar{m} - m).$$

We now inquire under what conditions the firm has no incentive to replace all its incumbents by entrants. If the firm were to pursue this replacement strategy, it would encounter a loss and a gain: the loss would arise because the entrants (unlike the incumbents) could not cooperate with one another, and the gain would emerge because the entrants (in the absence of incumbents) would not be subject to harassment. For the loss to exceed the gain, the harassment level H must fall beneath an upper bound, which is easily derived.^{17/}

E. The Microeconomic Equilibrium

Our results above are summarized in the following proposition:

Proposition 1:

For the Nash equilibrium, the insiders' cooperation and harassment activity levels are

$$a_1^* = A,$$

$$a_E^* = 1 \text{ and } h_E^* = H \text{ whenever } L_E^* > 0.$$

Let the firm's incumbent workforce (m) be exogenously given. Then the equilibrium wage and employment levels may be characterized as follows:

$$(I) \quad \text{If } m > \bar{m}, \text{ then } W^* = 1,$$

$$L_1^* = \bar{m}, L_E^* = 0.$$

In other words, if the incumbent workforce (m) is "large", then the insiders receive their reservation wage ($W^*=1$) and, in response, the firm employs the maximum sustainable incumbent workforce (\bar{m}) and does not hire any entrants..

$$(II) \quad \text{If } \underline{m} < m < \bar{m}, \text{ then } W^* = A \cdot f'(A \cdot m),$$

$$L_1^* = m, L_E^* = 0.$$

In other words, if the incumbent workforce is "intermediate", then the insiders are paid the marginal product of the incumbent workforce ($W^* = A \cdot f'(A \cdot m)$) and the firm retains all its incumbents and hires no entrants.

$$(111) \quad \text{If } m < \underline{m}, \text{ then } W^* = A \cdot (1+H), \quad R_E^* = 1+H, \\ L_I^* = m, \quad L_E^* = A'(\underline{m} - m).$$

In other words, if the incumbent workforce is "small", then the insider wage is a mark-up over the reservation wage (with the size of the mark-up depending on the insider-entrant cooperation differential, A) and the firm retains all its incumbents and hires some entrants. The entrants receive the reservation wage, which is amplified by the insiders' harassment activity.

This Proposition 1 is illustrated in Figure 1. The figure contains two demand curves:

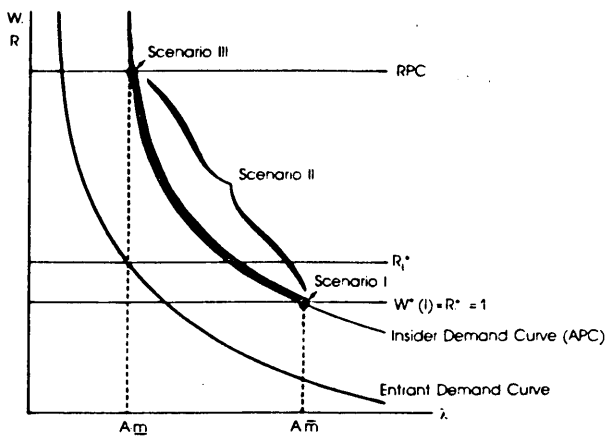
- an "insider demand curve", along which the insiders' marginal product is equal to the insider wage, assuming that only insiders are employed: $A \cdot f'(A \cdot L_I) = W$, and

- an "entrant demand curve", along which the entrants' marginal product is equal to the entrant wage (R_E), assuming that only entrants are employed: $f'(L_E) = R_E$. (Thus $f'(A \cdot L_I + L_E) = R_E$ is the demand curve for entrants hired in addition to a given insider workforce, L_I .)

Observe that the insider demand curve lies above the entrant demand curve (by a factor of A), because the insiders cooperate with each other but are not prepared to cooperate with entrants. The point at which the $R_I^* = 1$ line crosses the insider demand curve yields (by (9)) the maximum sustainable incumbent workforce ($A \cdot \bar{m}$, in efficiency units). Similarly, the intersection of the $R_E^* = 1+H$ line and the entrant demand curve yields (by (11)) the minimum sustainable incumbent workforce ($A \cdot \underline{m}$, in efficiency units).

The RPC is denoted by the uppermost horizontal line in the figures. The APC coincides with the insider demand curve (since the APC, by 18a), is the locus of wage-employment points at which the absolute profitability of the marginal insider is zero).

Figure 1: The Microeconomic Equilibrium



RPC: $W^*(III) = AR_i^* = A(1+H)$
 Insider Demand Curve $Af(\lambda) = W^*$
 Entrant Demand Curve $f(\lambda) = R_i^*$

In the figure, Scenario II is depicted by the thick segment along the insider demand curve. In other words, there is a continuum of equilibrium points, each corresponding to a different incumbent workforce:

$$(14a) \quad [W^*(II), \lambda^*(II)] = [A \cdot f'(A \cdot L_1^*), (A \cdot L_1^* + L_E^*)] = [A \cdot f'(A \cdot m), A \cdot m].$$

Here the insiders prevent all entry into the firm through their cooperation and harassment activities and set their wage so as to exploit all their marginal rent ($W^*(II) = A \cdot f'(A \cdot m)$) and retain their jobs.

Scenario I is pictured by the lowest point on the thick line segment:

$$(14b) \quad [W^*(I), \lambda^*(I)] = [R_1^*(A \cdot L_1^* + L_E^*)] = [1, A \cdot \bar{m}].$$

Here the incumbent workforce is sufficiently large so that the insider wage is reduced to the reservation wage, and, in response, the firm employs only the maximum sustainable incumbent workforce.

Finally, Scenario III is illustrated by the highest point on the thick line segment:

$$(14c) \quad [W^*(III), \lambda^*(III)] = [A \cdot (1 + H), (A \cdot L_1^* + L_E^*)] = [A \cdot (1 + H), A \cdot \underline{m}].$$

Here the incumbent workforce is sufficiently small for some entrants to be profitable at their reservation wage. Thus, the insider wage is set so that the marginal incumbent is just as profitable as the marginal entrant ($W^*(III) = A \cdot (1 + H)$). In response, the firm retains all its incumbents and hires entrants until their marginal product (given by the entrant demand curve in the figure) is equal to their reservation wage (given by the line

$R_E^* = 1 + H$ in the figure). Thus the firm's total workforce, in efficiency units, is equal to what it would be if the minimum sustainable incumbent workforce were employed ($\lambda^*(III) = A \cdot \underline{m}$).

Figure 1 shows quite simply what the insiders' cooperation and harassment activities are meant to achieve. By cooperating with other insiders, each insider raises the insider demand curve (in the figure) and is thereby able to achieve a higher wage than would otherwise have been possible. This is true for one of two reasons: (i) when entrants are not profitable (in Scenario II) so that the insider wage is equal to the marginal product of the incumbent workforce ($W^*(II) = A \cdot f'(A \cdot m)$), then cooperation

among insiders raises this marginal product; and (ii) when entrants are profitable (in Scenario III) so that the insider wage is a markup over the entrant wage ($W^*(III) = A \cdot (1+H)$), then cooperation among insiders raises the firm's cost of replacing an insider by an entrant and thereby increases the mark-up between the insider wage (W) and the entrant wage (R_E).

When the insider withdraws cooperation from potential entrants', he lowers the potential entrant demand curve (in the figure) and, once again, raises the cost of replacing insiders by entrants.

Finally, when the insider increases his harassment of potential entrants, he raises the entrants' reservation wage, which is the basis on which the insider wage is marked up.

Observe that the insiders' threats to withdraw cooperation and to harass entrants are credible. Given that the firm has already hired a fixed amount, L_E , of entrants, it remains in the insiders' interest to fulfill their threats. For in withdrawing cooperation, each insider causes a reduction in a_E and thereby also reduces the firm's effective workforce ($\lambda = a_I^* \cdot L_I^* + a_E \cdot L_E$); as result, he is able to raise his marginal product and his wage (i.e. for given L_E , $(\partial W_E^i / \partial a_E^i) = a_I \cdot f'' \cdot (\partial a_E / \partial a_E^i) < 0$ for any insider i). Furthermore, each insider still has an incentive to fulfill his harassment threat because, in doing so, he raises the entrants' reservation wage and is thereby able to achieve a higher wage for himself.

3. The Aggregate Labour Market: Involuntary Unemployment

We now shift the focus of our attention from the microeconomic equilibrium within a firm to unemployment in the labor market. Consider an economy which contains a fixed number (n) of identical firms and a fixed

number (s) of workers. The wage and employment decisions are made in a decentralized fashion within each firm, along the lines indicated in the previous section.

Aggregate labor market activity may be described in terms of three building blocks:

(i) The aggregate labor demand curve, denoted by N^D (the thick downward-sloping curve) in Figures 2a-c. (These figures picture the labor market under Scenarios I-III, respectively). When aggregate labor demand (N^D , in efficiency units) is less than or equal to the aggregate incumbent workforce ($A \cdot m \cdot n$, also in efficiency units) employment decisions are made along the aggregate insider demand curve:

$$(15a) \quad N^D = n \cdot g(W^*/A), \quad \text{for } 0 \leq N^D \leq A \cdot m \cdot n,$$

(by (2a), with $a_I = A$) where $g = (f')^{-1}$. Yet when aggregate labor demand exceeds the aggregate incumbent workforce, employment decisions are given by the aggregate entrant demand curve:

$$(15b) \quad N^D = n \cdot g(R_E^*), \quad \text{for } N^D > A \cdot m \cdot n$$

(by (2b), with $a_E = 1$).

(ii) The aggregate labor supply curve, denoted by N^S (the dashed step function) in Figures 2a-c:

$$(16a) \quad W = R_I^*, \quad \text{for } 0 \leq N^S \leq A \cdot m,$$

$$(16b) \quad W = R_E^* \quad \text{for } A \cdot m < N^S \leq \bar{s},$$

where N^S is measured in terms of efficiency units of labor and \bar{s} is the total labor force in efficiency units ($\bar{s} = A \cdot m + (s - m)$).

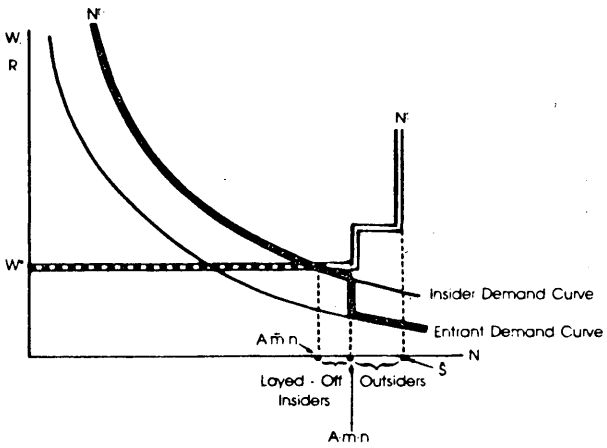
(iii) The wage setting curve, denoted by W^* (the dotted horizontal lines) in Figures 2a-c. When the aggregate incumbent workforce is "large" (Figure 2a), insiders receive their reservation wage:

$$(17a) \quad W^* = 1, \quad \text{for } N^D > A \cdot m \cdot n.$$

When this workforce is "intermediate" (Figure 2b), they receive their marginal

Figures 2: The Aggregate Labor Market

Figure 2a: Scenario I



N^i : Aggregate Labor Demand Curve (—)
 N^e : Aggregate Labor Supply Curve (≡)
 W^* : Wage Setting Curve (••••)

Figure 2b: Scenario II

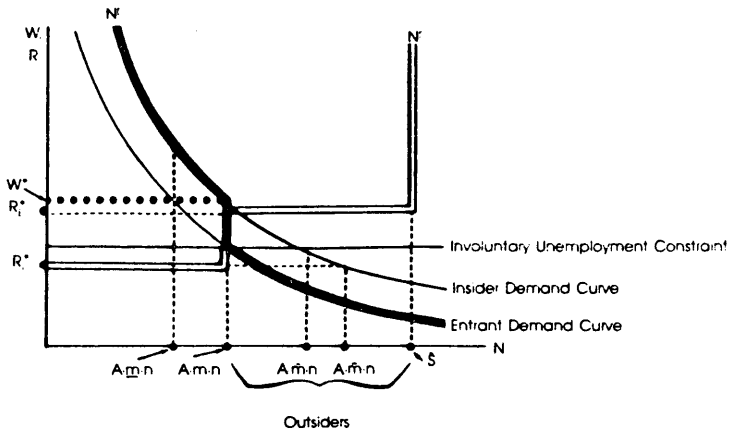
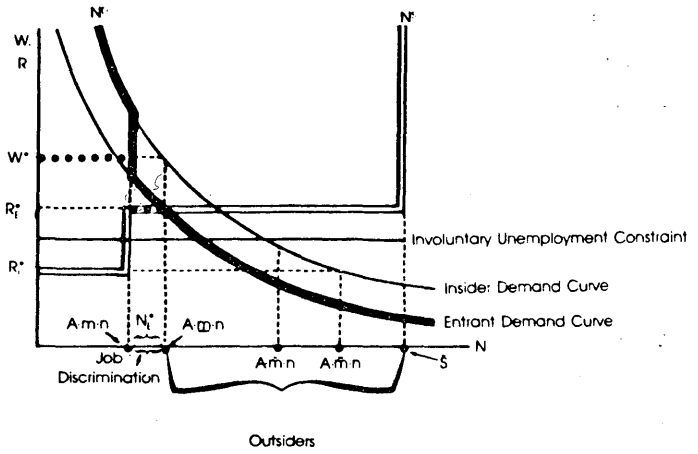


Figure 2c: Scenario III



product:

$$(17b) \quad W^* = A \cdot f'(A \cdot \bar{m}), \text{ for } A \cdot \underline{m} \cdot n \leq N^D \leq A \cdot \bar{m} \cdot n.$$

When it is "small" (Figure 2c), they receive a mark-up over the entrant wage (which is equal to the entrants' reservation wage):

$$(17c) \quad W^* = A \cdot R_E^* = A \cdot (1+H), \text{ for } 0 \leq N^D < A \cdot \underline{m} \cdot n.$$

Figures 2a-c are drawn so that the labor force \bar{s} exceeds the demand for labor at the equilibrium insider wage W^* ; thus, some workers remain unemployed. The question to which we now turn is whether this unemployment is involuntary.

Clearly, it is not involuntary in Scenario I (Figure 2a). Here the wage-setting curve (W^*) passes through the intersection of the aggregate labor demand curve (N^D) and supply curve (N^S). Employment (in efficiency units) is $A \cdot \bar{m} \cdot n$, leaving $(\bar{s} - A \cdot \bar{m} \cdot n)$ workers unemployed - voluntarily so, since the incumbents who lose their jobs ($(m - \bar{m})$ in number) prefer to be unemployed than to work for their marginal product ($W^* = R_I^* > A \cdot f(A \cdot \bar{m})$) and the outsiders ($(s-m)$ in number) would be unwilling to work at the prevailing wage even if they were not harassed ($R_E^* > R_I^* = W_I^*$).

In Scenarios II and III, the nature of unemployment is a more complex matter. The reason is that insiders and outsiders in our labor market have different employment opportunities. The difference is twofold:

- a. They do not face "identical conditions of employment" (ICE), i.e. job attributes lying outside the worker's control. Insiders are able to work under full cooperation and without harassment from the other insiders, whereas outsiders do not have this option.

b. Even under ICE, insiders and outsiders are not equally productive. Even if insiders and outsiders would receive equal cooperation from their colleagues, the outsiders would still be less productive since they (unlike the insiders) are unable to engage in cooperative activities with others.

These differences suggest that, in order for unemployment to be involuntary, it is not sufficient for workers to be unsuccessful in finding jobs at less than the prevailing wage. Differences in ability should be included in our conception of involuntary unemployment, but differences in conditions of employment (lying beyond the workers' control) should be excluded.

Let the prevailing "efficiency wage" be defined as the prevailing wage normalized for differences in productivity. Then, we propose the following definition of involuntary unemployment:

A worker is involuntarily unemployed over a particular period of time if he does not have a job during that period, even though he would wish to work at an efficiency wage which is less than the efficiency wage of a current employee, provided that he had the opportunity to be employed under identical conditions of employment (ICE) as that employee. This definition is easily extended to a multi-period context. ^{18/}

Our definition of involuntary unemployment is meant to capture the idea that outsiders are out of work because they have a smaller choice set -- in terms of wages received per efficiency unit of labor -- than the insiders. In our model, an insider's efficiency wage is (w/a_1) . Under identical conditions of employment (ICE), an outsider's efficiency wage is (R_E^{ICE}/a_E^{ICE}) . If outsiders are involuntarily unemployed, then their choice set is smaller than that of the insiders in the sense that

$$(18a) \quad (R_E^{ICE}/a_E^{ICE}) < (w/a_1).$$

Defining $x \equiv (a_E^{ICE}/a_I)$ as the ratio of an entrant's and insider's labor endowments under identical conditions of work,^{19/} our condition for involuntary unemployment becomes

$$(18b) \quad W > x \cdot R_E^{ICE} = x \cdot R_I^* = x.$$

This means that, under identical conditions of employment, an outsider would be cheaper (in terms of efficiency wages) than an insider. (An outsider's labor costs, normalized for productivity differences is $x \cdot R_E^{ICE}$, whereas an insider's labor cost is W .) The reason why the firms in our analysis nevertheless do not replace insiders by outsiders is that these workers do not in fact face identical conditions of employment. Under actual conditions of employment (in which insiders receive cooperation and no harassment, whereas potential entrants receive harassment and no cooperation), an outsider is more expensive (in terms of efficiency wages) than an entrant. There is no underbidding because insiders rob their firms of the incentive to employ outsiders.

Our definition of involuntary unemployment sheds light on the nature of unemployment in Scenarios II and III, pictured in Figures 2b and 2c (respectively). Observe that, in both figures, the wage-setting curve (pictured by the dotted horizontal line W^*) crosses the N^D curve to the left of the intersection of the N^D and N^S curves. This implies that the outsiders ($\bar{s} - A \cdot m \cdot n$) are willing to work for less than the prevailing insider wage (W^*), but are unable to do so. In order for this unemployment to be involuntary, we require that condition (18b) be satisfied, so that the insider wage lies above the "involuntary unemployment constraint", $W^* = x$, in Figures 2b and 2c.^{20/}

The wage $W = x$ corresponds to a particular size (\bar{m}) of the firm's incumbent workforce:

$$(19) \quad x \equiv A \cdot f' (A \cdot \bar{m}).$$

Thus, we see that the outsiders (s-A.m.n) are involuntarily unemployed only if the aggregate incumbent workforce is less than $n \cdot \bar{m}$. It is easy to show that

$$(20) \quad \underline{m} < \bar{m} < \bar{m} \cdot \frac{21}{/}$$

This means that when the aggregate incumbent workforce is "small" (Scenario I), all the unemployment is involuntary. However, when the aggregate incumbent workforce "intermediate" (Scenario II) the unemployment is involuntary when $m < \bar{m}$ and voluntary when $m \geq \bar{m}$. (As Figure 2b is drawn, it is involuntary).

The workers who enter the firm in Scenario III face a similar form of discrimination as the outsiders, in that they have a smaller choice set (in wage/efficiency-labor space) than the insiders. In particular, if the entrants and insiders faced identical conditions of employment, then each entrant's compensation per efficiency unit of labor would be less than that of each insider ($R_E^{ICE}/a_E^{ICE} < (W/a_I)$). Hence, in Figure 2c the distance ($A \cdot n \cdot (\bar{m} - m)$) may be called "job discrimination."

Our conclusions concerning the existence of involuntary unemployment are summarized in the following proposition:

Proposition 2: Consider a labor market described by the aggregate labor demand curve (15a) and (15b), the aggregate labor supply curve (16b) and (16c), and the wage setting curve (17a) and (17b). Let aggregate incumbent workforce, $m \cdot n$, be historically given (where n is the number of firms and m is the size of each firm's incumbent workforce). If this workforce happens to fall short of a particular critical level, $\bar{m} \cdot n$, then there is involuntary unemployment.

Although our model deals with the simultaneous performance of cooperation and harassment activities, our explanation of involuntary unemployment may rest on each of these activities alone. If insiders engage in cooperation but no harassment activities, then the equilibrium within the firm is given by Proposition 1 with $H=0$ and involuntary unemployment arises under

the conditions in Proposition 2. When harassment but no cooperation activities are performed, we must not only set $A=1$ in Proposition 1, but we must also assume that the firm faces some costs of replacing insiders by outsiders. The reason is that, in the absence of such costs, the firm would always find it worthwhile to fire all its harassing insiders and hire entrants who (by assumption) are incapable of harassing.^{22/}

4. Some Potential Objections

We now turn to some potential objections to our explanation of wages, employment, and unemployment.

A. Labor Turnover

If incumbent workers are able to restrict labor turnover of their firms, why do firms often have large labor turnover rates in practice? Is our analysis inapplicable whenever a firm's workforce has large simultaneous inflows and outflows?

When our model is extended to include quits and retirements of employees, it is able to account for simultaneous inflows and outflows. In particular, suppose that $r \cdot n$ randomly chosen ^{23/} incumbents in each firm quit or retire at the end of each time period (where $0 < r < 1$). If the incumbent workforce initially exceeds its minimum sustainable level ($m > \underline{m}$), then the separations cause this workforce to shrink. As it does so, the insider wage (W) and the marginal product of the insiders and potential entrants rise. However, once the incumbent workforce falls beneath \underline{m} , the marginal product of potential entrants is so high that the insiders are no longer able to prevent all outsiders from being hired. Consequently, workforce inflows and outflows occur simultaneously. In the stationary equilibrium, they are of equal magnitude. It can be shown ^{24/} that these flows are

$$r \cdot L_I^* = L_E^* = (r \cdot A \cdot n \cdot \underline{m}) / (r + A), \text{ and the associated level of unemployment is}$$

$$u = s - L_I^* - L_E^* = s - (1 + r) \cdot (A \cdot n \cdot \underline{m}) / (r + A).$$

Another reason why insiders' discriminatory activities do not preclude labor turnover in the real world is the following. Suppose that a firm employs "teams" of heterogeneous workers who are complementary to one another in the production process. In this context, insiders have no incentive to prevent the replacement of workers who have quit or retired. On the contrary, since all members of a team are complementary, it is in the insiders' interest to cooperate with and avoid harassing new entrants who fill vacancies on the team. In this light, it becomes clear that our analysis, in the case of heterogeneous labor, applies not to labor turnover within teams, but rather to turnover of teams (viz., the replacement of a team of insiders by a team of entrants).

B. Creation of Firms

Does our explanation of involuntary unemployment hinge on an assumption that the number of firms in the economy is fixed? Would free entry of firms lead to the elimination of this unemployment?

Our analysis suggests that when insider market power is widespread, entry of new firms (which have no insiders) may be a potentially important route to reducing unemployment. However, it is worth noting that, in practice, the creation of firms is often a lengthy process. Thus, even if free entry would eventually permit full employment to be achieved, the involuntary unemployment may nevertheless last a long time.

Moreover, the existence of involuntary unemployment does not necessarily generate an incentive to create new firms. The mere fact that insiders keep outsiders from being hired by the existing firms does not mean that new firms would find it profitable to hire these outsiders. Observe that new firms, in our analysis, are at a disadvantage vis-a-vis the existing firms, since new firms can employ only entrants (who are unable to cooperate with one another) whereas existing firms also employ insiders (who do cooperate with one another). There are of course many other reasons why new

firms may be unprofitable even when existing firms are not, e.g., set-up costs, capital market imperfections, scarcity of entrepreneurial skills, reduction of product prices due to entry of firms. Hence, the involuntary unemployment of Section 4 may persist even after all profitable opportunities for entry of firms have been exhausted.

C. Output-Related Wage Contracts

Does our explanation of involuntary unemployment hinge on our assumption that time-rate wages are the only form of labor remuneration? Could output related wage contracts be used to bribe the insiders not to discriminate against entrants, thereby making the employed and unemployed workers as well as the firms better off and eliminating the unemployment?

Although Pareto-superior alternatives to time-rate wages may exist under some circumstances, they may not be available in others. In fact, they are never available for unemployment generated through differential harassment activities. The reason is that the firm is unable to infer the performance of these activities from the variables it can observe - viz., its total output, its employment of insiders and entrants, and its wages ^{25/} - and thus it has no opportunity to reward insiders for foregoing harassment of entrants.

The matter is not quite so simple for cooperation activities. Although the firm cannot observe these activities directly, it is able to observe its total output. Thus, it may be able to reward its insiders for cooperating with entrants by sharing the proceeds of its output with these insiders. This could take the form of profit- or revenue-sharing.

Yet, there are a variety of obstacles to designing and implementing such output-related wage contracts. Consider the following three significant ones (which are analyzed formally in Lindbeck and Snower (1985a)):

(i) The Monitoring-Cost Difficulty: Since profit and revenue-sharing schemes are generally costly for workers to monitor, ^{26/} managers may have an incentive to use their superior position in composing profit or revenue figures to their own advantage. In response, the employees may have

an incentive to implement monitoring procedures (and possibly also engage in litigation). The gains from profit- or revenue-sharing may not fully compensate the firm and its employees for these monitoring costs.

(ii) The Risk-Aversion Difficulty: Profit- and revenue-sharing schemes inevitably involve the imposition of risk on employees. If these employees are risk-averse, then they thereby suffer a utility loss. The firm may be unable to compensate them for this loss without robbing itself of the incentive to implement such schemes.

(iii) The Market-Power Difficulty: When an insider decides to cooperate with entrants, he loses something and gains something: (a) he loses market power vis-a-vis the entrants and thus his time-rate wage sinks towards the reservation wage; and (b) he gains some of the profit or revenue which accrues as a result of his cooperation with the entrants. In order for the output-related wage contract to induce insider-outsider cooperation, the second effect must outweigh the first. However, that will happen only if the firm relinquishes at least a certain amount of its gross profit. Yet if the firm does so, it may find that its net profit is lower than in the non-cooperative equilibrium, and then it has no incentive to implement the contract.

These difficulties, and perhaps others, help explain why output-related wage contracts do not play a particularly prominent role in nowadays' labor markets. However, there is no reason to believe that the difficulties are necessarily insuperable; indeed, the model of differential cooperation activities surely suggests that there is a real-world case to be made for seeking alternatives to time-rate contracts. Be that as it may, time rate wages are in fact the predominant form of labor remuneration and our analysis indicates how involuntary unemployment may arise when they are used.

D. Economic Recovery

Given that insiders can prevent outsiders from getting jobs, does our analysis imply that they can prevent employment from recovering after a recession? In particular, suppose that there has been an upswing in business conditions, shifting the insider and entrant demand curves in Figure 1 to the right. Does our analysis lead to the counterfactual implication that insiders invariably take advantage of such an upswing by raising their wages so that employment remains unchanged?

To see why this potential objection does not hold, let us consider how our macroeconomy responds to an upswing in each of the three scenarios. (Lindbeck and Snower (1985a) contains a formal analysis of the repercussions of business variations). To begin with, note that the minimum and maximum sustainable incumbent workforce (\underline{m} and \bar{m} respectively) rise in an upswing, so that the dividing lines between the three scenarios in Figure 1 shift to the right. If the incumbent workforce is "large" (before and after the upswing), then the insider wage remains at $W^*(I) = R_1^* = 1$ and more insiders are retained on account of the upswing. If the incumbent workforce is "intermediate" (before and after the upswing), the insiders raise their wage ($W^*(II)$) by the full amount of the upward shift of the insider demand curve (without thereby encouraging entry of new employees) and, as a result, employment remains unchanged. Finally, if the incumbent workforce is "small" (before and after the upswing), the insiders are unable to raise their wage, for otherwise they would induce the firm to replace them by entrants. Consequently, the insider wage remains at $W^*(III) = A.(1+H)$ and the firm hires more entrants on account of the upswing.

In short, under Scenarios I and III, insiders do not prevent employment from rising in an upswing, but they do have this effect under Scenario II. In this connection, it is important to mention that if insider

wages are assumed to be the outcome a bargaining process which splits the marginal rent between the insiders and their employers, then an upswing will lead to a rise in employment even under Scenario II.

The degree to which an upswing leads to higher wages versus higher employment may depend on the size of this upswing. Consider, for example, a labor market suffering from unemployment and stuck in Scenario II. If the upswing is "small", so that the labor market remains in this scenario, then employment will continue to stagnate while insider wages rise. Yet if the upswing is "large", so that the labor market moves into Scenario III, then insider wages rise to a particular markup over entrants' reservation wages and employment expands (the larger the upswing, the greater the expansion). Here we observe that a large business stimulus reduces the level of unemployment whereas a small stimulus is unable to do so.

As another example of how the magnitude of the upswing matters to the wage-employment response, consider a labor market in Scenario I. Here a "small" upswing (which maintains the existence of Scenario I) keeps wages stable and induces firms to fire fewer incumbents than they would have done in the absence of the upswing. Yet if the upswing is large enough to put the labor market into Scenario II, then all incumbents are retained and wages rise.

5. Concluding Remarks

This article outlines how insiders' cooperation and harassment activities may give rise to unemployment. The central idea is that firms find it costly to substitute outsiders for insiders, and that insiders manage to capture at least some of the associated economic rent in the process of wage determination. Consequently, insiders raise their wages above the level at which outsiders would be willing to work, but firms nevertheless lack the incentive to replace insiders by outsiders or to add outsiders to their workforces.

In general, the insider-outsider turnover cost can come in many guises (e.g. hiring, training and firing costs (Lindbeck and Snower (1984a)), morale effects of labor turnover (Lindbeck and Snower (1984b)) and this paper explores another one: the insiders' ability to cooperate with and harass some workers but not others. This ability enables them to create rent and thereby drive up their wages.

In this context involuntary unemployment can arise in the sense that outsiders are unable to find work even though they would be just as profitable to the firm as the insiders, provided that they faced identical conditions of employment. It is the insiders' cooperation and harassment activities which ensure that these conditions are not the same for insiders and outsiders.

Our analysis has a variety of empirical implications. On the whole, these do not square with those of the natural rate hypothesis, since employment within our framework is not uniquely determined by preferences, endowments, and production technologies. Rather, our analysis suggests that the size of the incumbent workforce may be an important determinant of employment, since insiders may have market power over wages whereas outsiders do not. As we have seen (in Section 2E), past employment (by virtue of its influence on the current incumbent workforce) may affect current employment. In particular, over an "intermediate" range of incumbent employment levels ($\underline{m} \leq m \leq \bar{m}$), there is inertia in employment; but this inertia disappears at "low" incumbent employment levels ($m < \underline{m}$) and at "high" ones ($m > \bar{m}$).

Our model also includes the size of the incumbent workforce as an argument in the insider wage equation. In particular, over an "intermediate" range of incumbent employment levels, the insider wage is determined in the traditional way, viz, from the relevant marginal productivity condition associated with an estimated labor demand curve (for insiders); yet at "high"

and "low" incumbent employment levels, the insider wage is given by the reservation wage (proxied, for example, by unemployment pay, social security benefits, etc.) and a mark-up over the reservation wage, respectively. The reservation wage itself depends on the size of the incumbent workforce in our model (since insiders have an incentive to harass other workers only when the incumbent workforce is sufficiently small).

Of course, when conducting empirical studies, it is important to take heed of the production technologies under consideration. To the extent that these differ from the ones assumed in our model, our predictions (regarding the effect of the incumbent workforce on employment and wage formation) must be altered accordingly.

Furthermore, our analysis suggests that business upswings will tend to generate fewer jobs in countries with large insider power (due, for example, to unions' ability to exploit cooperation and harassment opportunities) than in countries where insiders are weak. Moreover (as shown in Section 4D), whether a business upswing leads primarily to higher wages or higher employment may depend on the magnitude of this upswing relative to the size of the incumbent workforce.

Our model also has implications for cyclical variations in labor market activity. As shown in Lindbeck and Snower (1985a), the movement of wages and employment in an upswing and a downswing may not be symmetric. In particular, a downswing may be characterized by stable insider wages and a contraction of the incumbent workforce through retirements and layoffs, while an upswing (as in Section 4D) may take the form of rising insider wages and only modest (if any) increases in employment.

In these and other respects, our insider-outsider approach yields an interrelated set of predictions about labor market activity.

FOOTNOTES

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1/ In other words, there are no "long-term" wage contracts (extending over the lifetimes of the employees). If such contracts were possible and if employees lacked market power on entering the firms, then involuntary unemployment could not exist.

2/ The assumption of unilateral wage setting by insiders is made only for expositional simplicity, as noted in Section 2B.

3/ Our conclusions would not be substantively affected if we would make the more general assumption that the firm (through supervision of its employees) monitors the cooperation and harassment activities imperfectly.

4/ With regard to our analytical conclusions, this turns out not to be a restrictive assumption. Naturally, if the firm has a multi-period time horizon, it faces an inherently intertemporal problem, since the entrants hired in one period become insiders in the next. Lindbeck and Snower (1985a) extends our model to a two-period, overlapping-generations setting.

5/ Since $L_1 \leq m$, the marginal incumbent may generate positive profit, as shown by the inequality in (2a). Since $L_E \geq 0$, the marginal potential entrant may generate negative profit, as shown by the inequality in (2b). Finally, we assume that $A \cdot f'(0) > 1$ (where A is the upper bound on a_1 , as given in (4c)), so that it is always profitable to the firm to employ some insiders: $L_1^* > 0$.

6/ This assumption could be derived from more basic postulates. For example, we could assume that each insider finds it disagreeable to harass the other insiders and then show that, in the Nash equilibrium (described below), no insider is able to achieve a higher wage by harassing other insiders. Thus, each insider chooses not to harass the other insiders.

7/ Allowing the insider's cooperation and harassment activities to affect his utility directly has self-evident implications for our results. In practice, of course, this direct utility effect might be positive or negative. Whereas it is usually safe to assume that harassment activities are disagreeable to the harassors, the same cannot be said of cooperation activities. For example, there are direct utility gains from cooperation when an insider prefers to work in cooperation with entrants or other insiders than to work in isolation. On the other hand, direct utility losses from cooperation are conceivable as well, since an insider who cooperates may expend more "effort" than one who does not.

8/ Recall that the entrants, unlike the insiders, are unable to perform harassment activities. Furthermore, note that H_E is the same for every entrant (since we have assumed that each insider harasses all entrants in equal measure).

9/ The assumption that A is a constant is merely an expositional simplification. Our analysis could be easily be extended to cover the possibility that A is an increasing function of L_I (i.e. the more insiders there are, the greater the potential for cooperative activity). In that case, we would require that the marginal product of insiders (in the Nash equilibrium described below) diminishes as more insiders are hired.

$$\partial(a \cdot f') / \partial L_I = A \cdot f'' + A' \cdot f' < 0.$$

(This implies that the demand curve for insider labor is downward sloping).

10/ Proof: If the firm is not constrained by $L_I \leq m$ in its maximization problem (1), then (by the first-order condition (2a)) its demand for insiders (L_I^*) rises with a_I and falls with W . By (3a) and (4c), $\max(a_I) = A$ and $\min(W) = R_I = 1$. Substituting these values into the

insider demand function (2a), as equality, yields (9).

11/ The firm has no incentive to replace some (but not all) of its insiders by entrants, since the profit contribution from replacing one insider by one entrant is

$$\phi = (\partial\pi/\partial L_E) - (\partial\pi/\partial L_I) = (W - R_E) - (A-1) \cdot f'(\lambda) < 0,$$

by (2a) and (2b), and

$$\left. \frac{d\phi/dL_E}{dL_E} \right|_{dL_E = -dL_I} = (A-1)^2 \cdot f'' < 0.$$

Clearly, this applies to all three scenarios.

12/ The firm has no incentive to replace all of its insiders by entrants for the following reason. In the equilibrium for Scenario I, the firm's profit is $\pi^*(1) = f[Ag(1/A)] - g(1/A)$, where $g = (f')^{-1}$.

If the firm replaced all its insiders by entrants, its profit would be

$$\hat{\pi} = f[g(1)] - g(1)$$

(since entrants do not harass one another and thus $R_E = 1$).

$\pi^*(1)$ (which is described by the area under the insider demand curve and above the $W^* = 1$ line in Figure 2a below is greater than $\hat{\pi}$ (which is described by the area under the entrant demand curve and above the $W^* = 1$ line (in the same figure).

13/ Proof: If $m = \underline{m}$, then $L_E^* = 0$, provided that $a_E = 1$ and $R_E = 1+H$.

(The reason is that, by (2b), $(\partial\pi/\partial L_E) = f'(A \cdot \underline{m}) - (1+H) = 0$.) If

$m < \underline{m}$, then $L_E^* > 0$, for any feasible a_E and R_E . (The reason is that

$(\partial\pi/\partial L_E) = a_E \cdot f'(A \cdot \underline{m}) - R_E > 0$ for any feasible a_E and R_E .)

14/ Formally, this may be shown as follows. Since $m \geq \underline{m}$ then (by 11)

$f'(A \cdot m) \leq 1 + H$. Since $m \leq \bar{m}$, then (by (9)) $A \cdot f'(A \cdot m) \geq 1$. Therefore, $1 \leq A \cdot f'(A \cdot m) \leq A \cdot (1 + H)$. By the wage equation (7), we obtain (12b).

15/ The firm has no incentive to replace all of its insiders by entrants, for the following reason. In the equilibrium for Scenario II, the firm's profit is $\pi^*(II) = f(A \cdot m) - A \cdot f'(A \cdot m) \cdot m$. In the equilibrium for Scenario III, the firm's profit is $\pi^*(III) = f[g(1+H)] - A \cdot (1+H) \cdot m - (1+H) \cdot A \cdot \{(1/A) \cdot g(1+H) - m\}$. Observe that in Figures 2a and b below, $\pi^*(II)$ and $\pi^*(III)$ (respectively) are described the areas under the insider demand curve, above the $W^* = 1$ line, and to the left of the incumbent workforce m (where $\underline{m} \leq m \leq \bar{m}$ for $\pi^*(II)$ and $m < \underline{m}$ for $\pi^*(III)$). Clearly $\pi^*(II) > \pi^*(III)$. The upper bound on H , given in Footnote 17, implies that $\pi^*(III) > \hat{\pi}$ (where $\hat{\pi}$ is defined in Footnote 12). Consequently, $\pi^*(II) > \hat{\pi}$.

16/ Formally, it follows from $m < \underline{m}$ that $f'(A \cdot m) > 1+H$. Thus, $A \cdot f'(A \cdot m) > A \cdot (1+H) > 1$. By the wage equation (7), we obtain (13a).

17/ Thus, we assume that $0 \leq H \leq H^C$, where H^C is the harassment level at which the profit from retaining all the incumbents and additionally hiring the profit-maximizing number of entrants [$\pi^*(III)$, defined in footnote 15] is equal to the profit from firing all the incumbents and hiring the profit-maximizing number of entrants instead [$\hat{\pi}$, defined in footnote 12]. In particular, H^C is a constant implicitly given by

$$f[g(1+H^C)] - A \cdot (1+H^C) \cdot m - (1+H^C) \cdot A \cdot \left\{ \left[\frac{g(1+H^C)}{A} \right] - m \right\} = f[g(1)] - g(1)$$

18/ For our analysis, the relevant period is the single period over which the firm and the workers optimize their objectives. In a multi-period context, our definition may be restated in terms of present values: a worker is involuntarily unemployed if he unsuccessfully seeks work (under ICE) for a discounted stream of efficiency wages which is less than the corresponding discounted stream of a current employee, over the same set of time periods. In other words, an outsider is involuntarily unemployed if he has less favorable opportunities than a current employee to earn a present value of wage income for a given stream of productive services. Under our simplifying assumption that outsiders turn into insiders after a single period of work (the initiation period), our intertemporal definition of involuntary unemployment reduces to the condition that the outsider

has less favorable opportunities than a current employee during the initiation period. Observe that our definition involves a comparison of the wage-labor service opportunities of an outsider and a current employee over a unique set of time periods. It is not concerned with a comparison of those opportunities over an outsider's future working lifetime with those over an insider's past, present and future working lifetime. We believe that the notions of unemployment commonly adopted by the news media, politicians, and compilers of unemployment statistics are more readily captured by the former comparison than the latter.

19/ The ratio of the insiders' and entrants marginal products under identical conditions of employment is $[(a_1 \cdot f'(\lambda))/(a_E^{ICE} \cdot f'(\lambda))] = a_1/a_E^{ICE}$

20/ Clearly, $1 < x < A$, because the insider is able to engage in cooperative activity whereas the entrant is not. (If insiders and entrants had equal cooperative abilities, then $x=1$; when insiders cooperate fully with each other but not at all with potential entrants, then $(a_E/a_1) = A$.)

21/ Proof: $\bar{m} < \bar{m}$, since $x > 1$ (by footnote 20) and given the definition of \bar{m} (in (19)) and \bar{m} (in (9)). Furthermore, $\bar{m} > \underline{m}$, since $x < A$ (by footnote 20) and given the definitions of \bar{m} and \underline{m} (in (11)).

22/ Formally, by the definition of H^C given in Footnote 17, if $A=1$, then $H^C=0$ and thus, $H=0$. This implies that the insiders would be unable to erect entry barriers against the outsiders and thus there could be no involuntary unemployment.

23/ The assumption of random choice is made only for expository simplicity, guaranteeing that all workers have the same reservation wage. Had we assumed that workers retire after reaching a particular age, then (a) the reservation wage would rise with age; (b) the firm would hire the youngest entrants available; and (c) it is the reservation wage of these entrants that is relevant to insider wage determination.

24/ Suppose that the incumbent workforce is $\hat{m} (< \underline{m})$ when it first falls short of \underline{m} . In that period of time, the firm hires $L_E^* = A \cdot (\underline{m} - \hat{m})$. Then, in the next period, the incumbent workforce becomes $(1-r) \cdot \hat{m} + A \cdot (\underline{m} - \hat{m})$. In general, $m_t = (1-r) \cdot m_{t-1} + A \cdot (\underline{m} - m_{t-1})$. Assuming that $r + A < 1$, the incumbent workforce rises monotonically to its stationary level $(A \cdot n \cdot \underline{m}) / (r + A)$.

25/ We assume that firms do not know what the outsiders' reservation wages would be in the absence of harassment (e.g. they do not know whether these reservation wages are the same as those of the insiders). Thus they cannot infer the presence of harassment by observing the entrant wages (in the event that Scenario III obtains).

26/ For instance, managers often have considerable latitude in their choice of profit and revenue accounting practices (e.g. how to price intermediate goods and inventories, how to evaluate the firm's debt in real terms, how to treat depreciation and obsolescence).

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