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Re-examining the relationship between demographic similarity and turnover: The case of top management groups

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RE-EXAMINING THE RELATIONSHIP BETWEEN DEMOGRAPHIC SIMILARITY AND TURNOVER: THE CASE OF TOP MANAGEMENT GROUPS.

by

Hong Shik Park

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As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Hong Shik Park

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and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Ph. D. in Business Administration

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Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director David Tansik — Date 5/14/92

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ABSTRACT

The previous research on the relationship between demographic similarity and organizational outcomes has been based on the similarity-attraction arguments. In this dissertation, I argue that demographic similarity (or presence of people with similar attributes in a group) is associated not only with social integration but also with competition. The discussion leads to a new model for the effect of demographic similarity on turnover. More specifically, the model posits that structural characteristics such as the absence of a strong Internal Labor Market (ILM), and individual characteristics such as age and tenure moderate the relationship between demographic similarity and turnover.

Using a sample of fifty-one top management groups, I attempted to validate the proposed model in the empirical analysis. I found that, among other things, in groups without a strong ILM, or when the individuals are young or brief in tenure, age similarity was positively associated with likelihood of turnover, confirming the presence of competition effects. Tenure similarity, and main effects of tenure, however, were not found to affect the turnover process in any significant way. Implications for future research are discussed.

1. INTRODUCTION

Birds of a feather flock together. A great deal of research in disciplines such as sociology, social psychology, and organizational studies has documented the tendency of people with similar attributes to be attracted to, and to associate with each other (Pfeffer, 1983; Byrne, 1969; Lazarsfeld and Merton, 1954). To date, research on demographic similarity has been conducted primarily on the premise of this well-established similarity-attraction, or homophile argument. Birds of a feather, however, also compete against each other for the limited resources necessary for survival. I argue that demographic similarity in an organizational setting can breed conflicts and competition between members as well as social integration and attraction, when there are limited organizational resources for organizational members.

Using a sample of top management groups, the present analysis re-examines the relationship between demographic similarity and turnover, with the major focus on the two potential effects of demographic similarity: social integration and competition. I place more emphasis on the latter, since the link between demographic similarity and level of competition has been largely unexplored in previous work. By focusing on the potential effects of the variances

in group structures and individual characteristics on demographic process, I argue that the relationship between demographic similarity and organizational outcomes is far more complex than previously thought. My discussion is developed around the idea that the presence of similar others may represent a higher level of competition, or increased substitutibility for the individual members. From this perspective, the extant theories on demographic similarities will not be complete until the competition perspective complements the reasonings of social integration. The major theoretical thrust is to view the organizational outcomes of demographic process as a function of social integration and competition, not of social integration alone. The discussion leads to a revised model of the relationship between demographic similarity and turnover, along with some testable hypotheses based on the new model.

More specifically, I explore the possibility that the individual level relationship between demographic similarity and individual exit behavior[1] might be

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[1] Turnover can be voluntary or involuntary. While extant theorizing about the effect of demographic similarity on turnover is based on social integration, thus implying an application of the model limited primarily to voluntary turnover, theoretical arguments on the basis of competition or substitutibility do not necessarily limit the effects of demographic similarity to voluntary turnovers. The term 'turnover' in this paper, therefore, refers to both volun-

curvilinear or positive, instead of uniformly negative regardless of situations.

Attention to competition aspects highlights the reward structure as a relevant factor to consider in discussing demographic processes. I propose that individual attributes such as age and tenure, and structural characteristics such as presence or absence of a well developed Internal Labor Market (ILM) may moderate the relationship between demographic composition and turnover. It is hypothesized that the more open[2] the ILM, the younger the age, or the shorter the tenure is, the stronger the positive relationship between demographic similarity and competition, and the less pronounced are the social integration effects associated with demographic similarity.

From the perspective of competition, implications of different demographic variables can also be differentiated. Discriminating the implications of different demographic variables may require evaluating those variables' relevance in allocating organizational rewards such as promotions.

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tary and involuntary exit behaviors.

[2] The term, Internal Labor Market, came into existence to describe the settings in which there is at least some degree of entry barrier for labor mobility to outsiders, so a completely open ILM seems to be a contradiction by itself. The ILM is, however, best viewed in reality, not as a dichotomous variable, but as a continuous variable, on which most organizations or groups fall, as will be discussed later in more detail.

Generally, both age and tenure have been two of the most frequently included variables in models of turnover, as previous reviews on this topic (cf. Mobley, Griffeth, Hand, and Meglino, 1979; Price, 1977) have documented. For the top management sample at hand, however, I hypothesize that age similarity has more relevant implications as a resource allocating criterion and thus greater implications as a base on which competition takes place, since the marginal effects of tenure differences tend to diminish over time, while the effects of age differences do not.

Empirical analyses support the hypotheses that demographic similarity on age is curvilinearly associated with the probability of turnover, with or without controlling for group heterogeneity. I found that the presence of a strong ILM, in the predicted direction, moderates the relationship between individual distances and turnover. Also, age and tenure have emerged as strong moderating variables. In addition to its main effects on turnover, age is shown to moderate the relationship between similarity and turnover: Social integration aspects of demographic similarity are more important for relatively old and long-tenured people, while demographic similarity tends to trigger competition for the relatively young and short-tenured people. Group heterogeneity measures (either on age or on tenure), however, were not related to the

probabilities of turnover at any statistically significant level. The implications of these empirical findings for the theory of demographic similarity and future research are discussed.

Top management groups of fifty-one firms from the list of 1978 Fortune 500 firms constitute the sample for the empirical analysis. Discrete event history analysis (Allison, 1982; 1984) was utilized to analyze the data.

2. LITERATURE REVIEW AND HYPOTHESES

2.1. SOCIAL INTEGRATION MODEL

Consistent with the time-honored observation that similar people attract each other, a substantial body of research in social sciences has documented the tendency of people with similar attributes to be attracted to each other. It was Merton and Lazarsfeld (1954) who coined the term 'homophile' to describe the tendency of people with similar socio-economic attributes to associate with each other. Homophile is, though, only one of many terms that has been used to refer to the same or similar pattern of association or attraction: Terms like similarity and dissimilarity (cf. Lott and Lott, 1965), segregating and desegregating (cf. Blau, 1975), social closeness and social distance (cf. Barlund and Harland, 1963), similarity and complementarity (cf. Jones and Daugherty, 1959) are a few of the synonyms used to describe these phenomena. Not only has there been a variety of terms, but also this phenomenon has been recognized for a long time: Rogers and Bhowmik (1971) traced back the scholastic documentation of this phenomena to as early as 1904 (cf. Tarde, 1904).

Primarily the early research attentions centered on similarity in terms of psychological constructs such as beliefs and attitudes in such settings as marriages,

employment or interviewing decisions, and other experimental settings (Byrne, 1969; Baskett, 1973). This theoretical framework, however, was soon extended to include other forms of similarity, including several demographic attributes (Hammer, Kim, Baird, and Bignoness, 1974; Salancik and Pfeffer, 1978). For example, racial and gender similarities were found to affect performance ratings positively (Hammer, et al., 1974), and Salancik et al. (1974)'s experiment on decision-making pointed out the presence of pronounced biases for socially similar people under the conditions of secrecy and uncertainty. Salancik et al. (1978)'s data for measuring social similarity included such variables as age, gender, hometown, academic major, nationality, recreational interests, and social affiliations. Most of these studies in the social psychological tradition, however, were not conducted in an organizational setting, and the similarity was often measured on one-on-one basis.

In parallel with these social psychological studies, the literature (e.g. Larzarsfeld and Merton, 1954) in sociological tradition consistently reported evidence for the homophile, or the tendency of people with similar backgrounds to be associated with each other. Mostly, those studies had not been conducted in an organizational setting, and instead, research attention had been directed to the effects of socio-economic similarity on formation of

friendship ties in community settings.

Apart from these, a number of researchers (Ryder, 1965; Stinchcombe, McDill, and Walker, 1968; McNeil and Thompson, 1971) began to direct attention to the study of organizational demography. For example, Stinchcombe et al. (1968) suggested that demographic variables of broader communities be applied to organizations, and his analysis of Baltimore school systems indicated that organizational demography was dependent upon the demography of larger systems. Ryder (1965) illuminated the relevance and usefulness of cohort analysis in explaining social change, and McNeil et al (1971), expanding on Ryder's work, also provided an insightful analysis of organizational regeneration in their illustrative study of cohorts in two universities.

Importance of demographic processes in an organizational setting has been recognized for a relatively long time. For example, Gusfield's (1957) classic study of the Women's Christian Temperance Union (WCTU) showed an extreme example of inter-cohort conflicts between older members of 'conviction-oriented' belief and younger and newer members of 'public-oriented' belief regarding the organization's strategy on the sale of liquor. The conflict between these cohorts resulted in many of the younger members leaving, and difficulty of recruiting new members,

which in turn brought about the decline in organizational power.

It was, however, a relatively recent development that research on socio-economic or value similarity and that on demography joined together to explain a variety of organizational outcomes. Particular attention has been paid to the relational or distributional aspect of organizational demography. The term 'similarity' necessarily refers to the relational aspect of demography, since it takes more than one person to talk about similarity. The importance of relational aspects[3] of demography in organizational phenomena was recognized in Kanter (1977)'s study of women in a corporation, where she argued that it was not a sex per se but the proportion of sexes that has important implications in explaining the behavior of individuals in an organization. Spangler, Gordon, and Pipkin (1978) quantitatively tested Kanter's idea, and they showed that the female students of a law school who were more in the minority tended to be less aggressive, not to do very well academically, and were more likely to choose feminine careers.

Pfeffer's works (1983; 1985) summed up the

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[3] Earlier, the use of relations rather than individuals as a valid unit of analysis was advocated in communications research by Rogers and Bhowmik (1971).

literature in this tradition and provided a theoretical synthesis in which organizational or group demography played a unifying role in a broad range of outcomes. The long list of organizational phenomena that organizational demography has been theorized to influence include the following: organizational performance, rate and type of administrative successions, strategy of control, size of administrative component, distribution of power among cohorts, degree of cohort identity, inter-cohort conflict, linkages and transaction patterns with other organizations, turnover rate, and career opportunity and training and development needs (Pfeffer, 1985). Variations in organizational demography were in turn causally attributed to growth rate, technology, personnel and employment policies, and unionization. Pfeffer (1985) argued that, among other things, it is not the simple demographic characteristics but distributional or compositional effects of demographic variables that are critical (Pfeffer, 1983).

Pfeffer and others (e.g., McCain, O'Reilly III, and Pfeffer, 1983; Wagner, O'Reilly III, and Pfeffer, 1984; Zenger and Lawrence, 1989; Tsui and O'Reilly III, 1989; O'Reilly,III, Caldwell, and Barnett, 1989) conducted a number of empirical studies in which organizational demography, particularly the relational construct of demographic similarity, had been shown to exert a

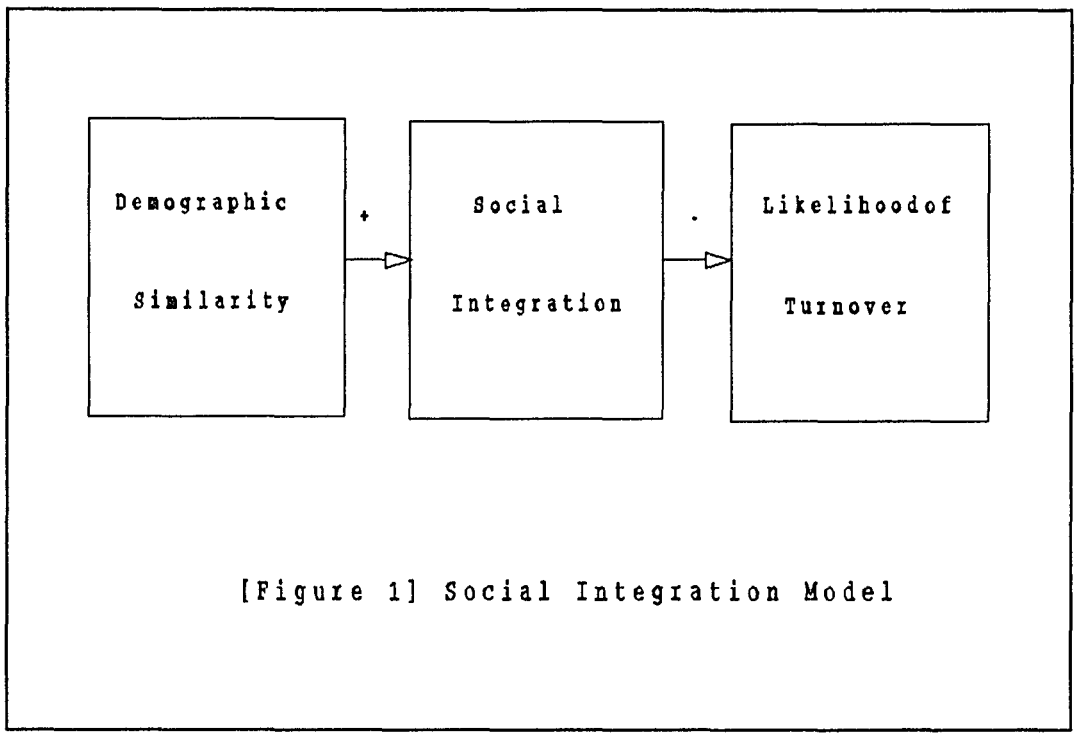
significant impact on such organizational outcomes as frequency of communications, superior's evaluation of subordinates, social integration, and turnover. McCain, O'Reilly, and Pfeffer (1983) showed that large gaps among cohorts (based on length of service or tenure) in an academic department setting were related to the higher subsequent turnover rate of the departments. The significant association they found between voluntary turnover rate and gaps between cohorts indicated that demographic distributions are consequential in understanding patterns of integration and conflict, and group politics.

Wagner, Pfeffer, and O'Reilly (1984) also examined the relationship between demographic distribution and turnover in the sample of the top management groups. Their study contributed to demographic research at least in two respects. First, they devised and used in their analysis a generalizable, quantitative measure of demographic similarity. This was a noteworthy development, given that the measurement of demographic similarity had been a 'thorny conceptual and empirical issue' (Pfeffer, 1983; McCain et al, 1983). Second, they extended the idea of similarity-attraction logic to the individual level, and predicted that a version of an individual's Euclidean distance to other members of the group would be positively related to the likelihood of turnover for that person. Their analysis of

the data on top management demography showed that age similarity was negatively related to turnover probability. They did not, however, report on tenure-related variables (main effect of tenure and tenure similarity) and their study was associated with some methodological shortcomings (to be discussed later).

Zenger and Lawrence (1989) applied Wagner et al.'s measure to studying the effect of demographic similarity on communication frequencies of engineers and engineering managers in a research division of an electronics firm. Their analysis suggested that age and tenure similarities exerted positive influences on communication frequencies in general. More specifically, age similarity was shown to have greater impact on inside communication than tenure similarity, and tenure similarity tended to exert greater influence on outside communication frequencies.

While most studies in this area of research have dealt primarily with similarities of age and company tenure (length of service), Tsui and O'Reilly (1989) incorporated gender, race and education as well as age and company- and job-tenures into their analysis of a superior-subordinate dyadic relationships. They found that the greater the demographic difference in superior-subordinate dyad, the lower the superior's rating of the subordinate's effectiveness, and the higher the subordinate's role



[Figure 1] Social Integration Model

ambiguity.

O'Reilly III, Caldwell, and Barnett (1989) focused their attention on the psychological process of the alleged relationship between demographic similarity and turnover. Their analysis of twenty-five work groups of a large convenience store chain suggested a significant moderating role of social integration on the relationship between demographic similarity and turnover at the group level. At the individual level, however, the results were the opposite to what they had expected: Negative associations were found between measures of age and tenure similarities and the

likelihood of turnover.

In a different conceptual framework, similar predictions have been made. McPherson's work (1983), in the framework of the ecological concept of niche, attempted to link Blau's theory of macro-structure to organizational demography in an analysis of data on voluntary organizations. A number of empirical analyses dealing with the same set of organizations suggested that the farther a person lies from a given organization's niche in terms of 'Blau space' (see McPherson, 1987), the more likely he or she is to leave the organization. They reasoned that this occurs because organizations sharing the same niche in a human resources dimension compete for the same human resources, and individuals tend to be pulled from the group by ties to the network outside the group. At the same time, attraction from inside is relatively weak, due to lack of intra-group ties (McPherson and Smith-Lovin, 1987; McPherson and Popielarz, 1990; Popielarz, 1990).

Two problems may be encountered, however, if we are to generalize these findings to different types of organizations. One may be the potential problem associated with the fact that organizational membership has been treated as a pure resource (thus more is better). The sample being taken from voluntary organizations, this treatment might make sense in their case. Yet the picture

of human behavior drawn in their work is not a very consistent one: the human beings residing in their world compete for an organization's sake, but not for their own sake. After all, an organization is an abstract conception and thus organizations can not compete: only people in the organizations compete. Furthermore, more is not always better: human resources are costly to maintain in non-voluntary organizations.

Another difficulty might be associated with the fact that they conceptualized organizations as occupying a single niche in terms of human resources requirements. This is too simple a conception to apply to diverse organizational populations, given that we know that a considerable degree of division of labor exists even in the smallest form of the organizational populations like restaurants (Freeman and Hannan 1983). Acknowledging the division of labor as a basic property of organizing (Weber, 1947; Mintzberg, 1979), it should be more realistic to view organizations as consisting of multiple niches in terms of human resources needs.

These streams of research predicting a negative relationship between demographic similarity and likelihood of turnover can be summarized as in [Figure 1].

2.2 COMPETITION MODEL

The above studies are characterized by the implication that the primary contribution of demographic similarity is to the well-being of the group or individuals in a group. Of course, some potential dysfunctional possibilities were discussed occasionally. For example, the presence of a large cohort, although this might not necessarily be related to demographic similarity of the group, was related at the group level to intra-group conflict (McCain et al, 1983). Zenger et al. (1989) also discussed possibilities that demographically homogeneous groups might discourage outside group communication, and that increased frequency of communication may not be positively related to performance under some situations. Generally, however, the positive outcomes such as social integration, facilitation of communication, less conflict between members, and less turnover were all associated with similarity at group and/or at individual levels.

However, a substantial part of social science literature suggests that quite a different mechanism, namely competition[4], can be induced from the presence of people,

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[4] The terms, similarity and distance are used interchangeably in the paper. The distance, one can argue, is only one measure of the construct 'similarity'. Doug Wholey, then a faculty member at the department of Management &

organizations, or products with similar attributes. The whole discipline of economics may be premised on the idea of competition between the same or similar products. It is obvious that competition, by definition, is between 'some things' similar or identical to each other.

More relevant to organizational studies, approaches such as population ecology and resource dependence models are also based on the idea of competition among similar organizations. For example, population ecology models assume that competition between organizations sharing the same niche is a major selection mechanism which drives out the less 'fit' organizations (Freeman and Hannan, 1977; Hannan and Freeman, 1984). In more specific terms, Freeman and Hannan (1977) wrote:

"--- the greater the similarity of two resource limited competitors, the less feasible it is that a single environment can support both of them in equilibrium." (P 63)

McPherson (1983), in applying the ecological concept of organizational niche to demographic dimensions, also

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Policy, pointed out in a seminar that the competition level an individual is faced with in a group may be related to the measure of similarity, that is, Euclidean distances, but a conceptual link between similarity and competition is difficult to make. It seems, however, impossible to think of any other measure of demographic similarity that is free of any implications on competition, and I contend that the arguments on the link between similarity and competition should apply both conceptual and measurement levels of demographic similarity.

posits that organizations sharing the same niche in terms of membership characteristics compete for human resources whose demographic characteristics qualify for the occupied membership niche. The idea of competition, however, stopped short of being extended to individual interactions within a group.

The resource dependence theory, another major theory of inter-organizational relations, also relies on the idea of competition to define the relationships among organizations with the same or similar resource requirements. Such organizations are assumed to compete with each other in the manner that the greater the number of organizations dependent upon similar resources, the less the bargaining power in inter-organizational relations (Pfeffer and Salancik, 1978). In other words, more organizations with similar resource requirements mean more intense competition for those resources, forcing those firms into less powerful positions in bargaining.

Although the major foci of these macro-theories are placed on inter-organizational mechanisms, the idea of a positive relationship between similarity and competition can be found in some studies looking into intra-organizational phenomena. For example, from a resource dependence perspective, Hickson, Hinings, Lee, Schneck, and Pennings (1971) proposed a theory of intra-organizational power in

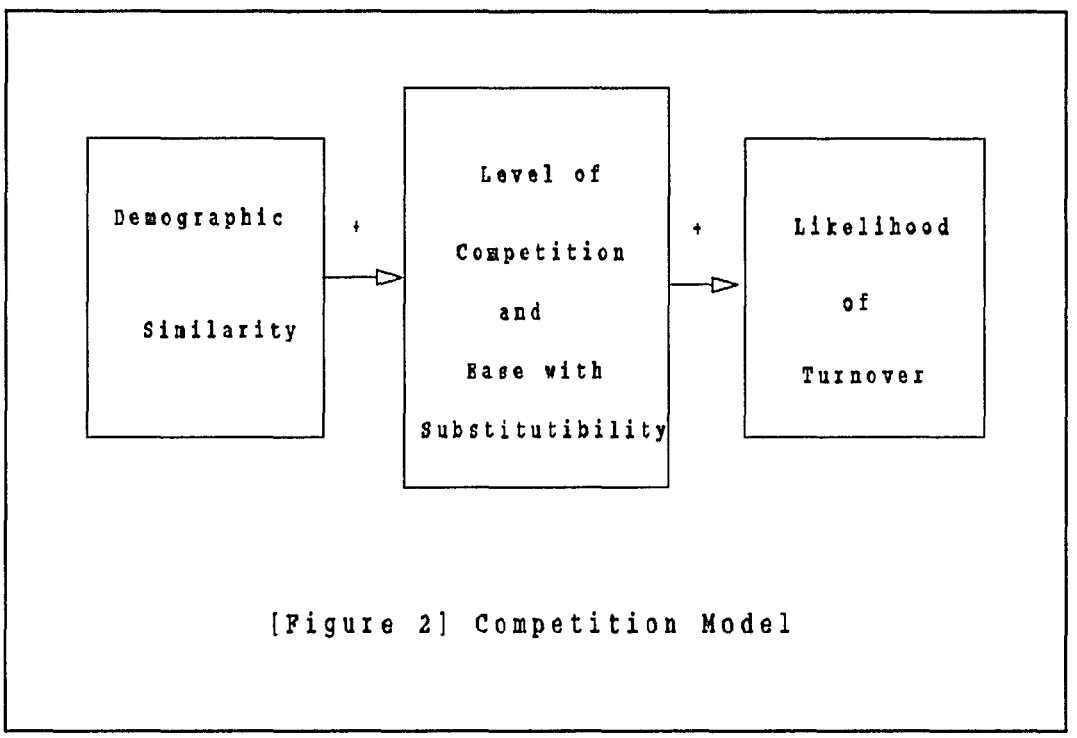
which substitutibility of activities constitutes a central factor determining the amount of power of the unit involved. While their model was concerned with the relationship between the power and the activities of intra-organizational sub-units, the logic can be readily extended to individual attributes. Actually, Hickson et al. (1971) suggested that measuring the individual attributes, such as length of training required for new recruits and ease of hiring, would be a secondary indicator for the substitutibility of a subunit (Hickson et al, 1971). In the same vein, Dubin (1963) argued:

"For any given level of functional importance in an organization, the power residing in a functionary is inversely proportional to the number of other functionaries in the organization capable of performing the function." (P 21)

The most direct application of the idea of competition pertinent to the present investigation, however, may be found in intra-organizational mobility models (White, 1971; Stewman, 1975; Stewman and Konda, 1983; Rosenbaum, 1979a; 1979b), in which members with the same or similar attributes are conceptualized to compete for such scarce organizational resources as promotions. Employing a vacancy-chain model, Stewman and Konda (1983) found that there are substantial advantages of being in a small cohort,

if the opportunity structures are vacancy-based in the internal labor market, since a smaller cohort means that less competition exists for promotion chances. This smaller cohort size, therefore, helps accelerate promotion opportunities throughout one's career ladders. Conversely speaking, the large size of the cohort can decrease the relative promotion chances for the cohort members and may create blockages for some in the cohort (Easterlin, 1961, 1968; Keyfitz, 1973; Stewman and Konda, 1983).

The implications of these works utilizing vacancy-chain models are obvious, and differ significantly from those works focusing on similarity-induced social integrations. A simple example would clarify the contrasting implications. Assume that there is only one dichotomous attribute (coded as 0 and 1, for instance) discriminating members. Think of a work group of size 10, in which three of the group members share the same attribute (coded 1), and the rest of members share the alternative attribute (coded 0). However similarity is measured operationally, social integration arguments would lead to the prediction of a higher probability of turnover for the people coded 1, since they are the minority in the group and thus less similar to, and less socially integrated into the group, than those coded 0. If we assume further that this



[Figure 2] Competition Model

attribute is an important base by which organizational resources like promotions are allocated, and there is an equal number of opportunities (eg. promotion chances) available to these two subgroups[5], respectively, it is a simple mathematical fact that people coded 1 (who are less similar) have a higher probability of getting promoted than

[5]This assumption of an equal opportunity structure to different cohorts is an unrealistic one. This is, however a necessary one to make in this context, and this necessity highlights the importance of structural arrangement in competition both at the conceptual discussion and in reality.

those coded 0.[6] If the resource availability ever has any implications in predicting turnover, the reasoning based on this competition argument would lead to the exact opposite prediction. That is, the presence of more people with the same attributes serves to intensify competition, and consequently leads to higher probabilities of turnover.

Although the turnover (or exit in their terminology) variable has been treated as exogenous in those models (Stewman and Konda, 1983), the implications of the model on turnover would be straightforward. The more similar the individuals, the higher the competition, leading to more disadvantages in intra-organizational resource allocation. Less reward may lead to more discontent and less commitment (Grusky, 1961), which in turn are associated with higher probabilities of turnover (Mobley et al, 1979; Bluedon, 1982). This competition model can be summarized as in [Figure 2].

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[6] The type of resources might not necessarily be limited to promotion opportunities. They can be such things as offices with windows, and funded travels abroad. Any resources that are limited and are allocated on the basis of demographic variables involved would have the same implications as the promotions.

2.3 PROPOSED MODEL AND HYPOTHESES

2.3.1. THE PROPOSED MODEL

A new perspective is necessary to reconcile these apparently conflicting lines of argument concerning the effects of demographic similarity on turnover. I argue that more attention to the individual characteristics and the group structural arrangements, formal and informal, other than demographic structure will be the key for reconciliation.

Note that a pronounced feature of the studies emphasizing the negative link between demographic similarity and turnover is the absence of any discussion on structural dimensions other than the demographic distribution. Although many alternative perspectives coexist to define organizing or organizations (see Scott, 1987), an organization can be characterized as an entity with explicit or implicit goals and accompanying structures specifying a division of labor to accomplish them (Weber, 1947).

This is not denying the possibility that social relations can affect the formal structural arrangement. There is some evidence pointing to the possibility that demographic processes affect the reward structure. Pfeffer and Langton's (1988) study, for example, suggests that ongoing social relations are responsible for the

considerable variations in the degree of reward differentiation, despite the fact that the sample organizations were facing a similar technology and environment.

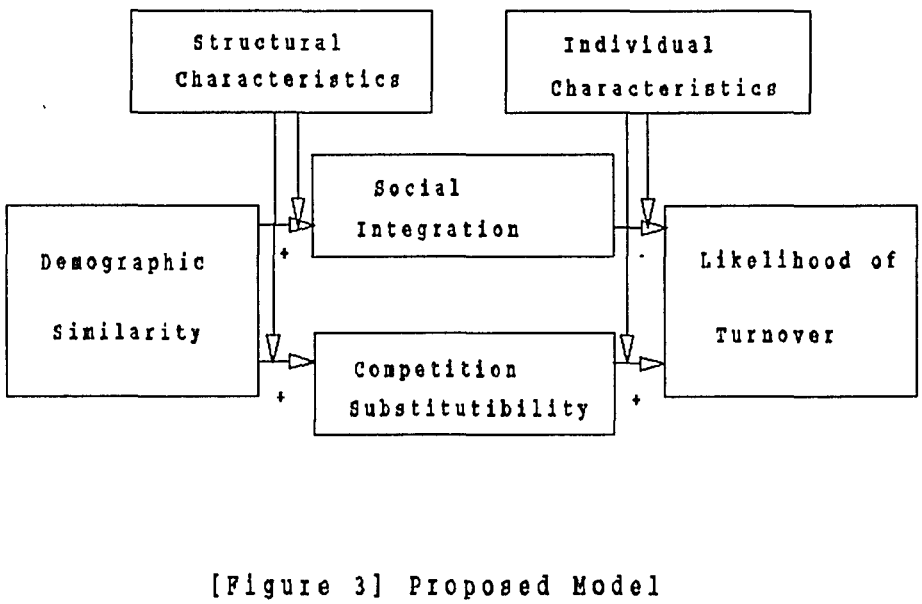
The ongoing social relations, or ongoing demographic processes, however, can be viewed as resulting from previous structural arrangements. Classical experiments on communications structures during the 1950s and 1960s, for example, illuminated the differential impacts of structure on group outcomes such as subject interactions and performance (Leavitt, 1951; Guetzkow and Simon, 1955). Further discussion regarding whether social relations or structure has a causal priority (or which is more prominent) are not pertinent here, as long as we can agree on the fact that relationships can go both ways simultaneously (Baron and Pfeffer, 1991). If structural arrangements exert considerable influence on shaping social relations, and if the predictions of demographic processes are based on competition as well as social integration aspects of demographic similarity, then any legitimate prediction based on demographic processes should require bringing the structure back into the conceptual picture, since the competition and the way resources are allocated among group members should be directly affected by structural arrangements.

There are many ways that the structure can affect social relations in an organization. Even the association patterns may be directly influenced by formal structural arrangements as well as demographic composition, since structurally defined work roles and performance of tasks necessarily require interactions with people with different functions or different hierarchical positions. For example, Lincoln and Miller (1979) distinguished the instrumental ties arising out of positions in division of labor in formal structures from the primary ties forming on the bases of demography. In the case of instrumental ties, they found empirical evidence for the heterophile, or the tendency of people with different attributes (formal positions or roles in this case) to be associated with each other. The possibility of heterophile rather than homophile of association in an organization significantly weakens the argument for a negative link between demographic similarity, social integration and turnover, since those arguments are based on the assumption that it is the mechanism of demographic similarity-attraction that shapes up the interaction patterns within an organization.

The focus of this project is not on heterophile but on the effect of demographic similarity on turnover. Given the importance of structural arrangements in intra-organizational networks, a relevant question to ask at this

point should be what structural dimensions will influence the relationship between demographic similarity and turnover. My general proposition is that the relationship between demographic composition and organizational outcomes, turnover in this case, may be moderated by how organizational rewards are allocated to members of the group. This reward allocation should be influenced or constrained by structural characteristics. When the competition for limited organizational rewards is very intense, and the demographically similar members compete against each other for those scarce rewards, we can hardly imagine much social integration arising out of demographic similarity. Instead, demographic similarity in this situation should be primarily related to the intensity of competition an individual has to face. On the other hand, if the organizational rewards are allocated in a relatively certain and orderly manner, and are not very competitive, the primary ties formed on the basis of demography would be positively related to social integration of the members.

An important variable that has not often been directly measured but that remains influential in studies of turnover is the availability of opportunities outside the current organization (Simon, 1958). Variables such as general economic conditions and individual characteristics like age and tenure may be viewed as secondary indicators



[Figure 3] Proposed Model

for the availability of opportunities outside the current employment. For example, organizational literature on turnover has amply documented strong negative impacts of tenure and age on the probabilities of turnover. It is well documented that tenure and organizational commitment are positively related. Often not explicitly mentioned is the possibility that the mechanism behind age or tenure effects may have something to do with availability of opportunities in the labor market. For relatively old people, the barriers to entry for other employment opportunities would be greater than that for relatively young people.

Institutions like union and internal labor market should serve to the advantages of seniority in intra-organizational mobility, but, at the same time, to disadvantages of seniority of age and tenure in inter-organizational mobility.

The implications of the negative association between age (or tenure) and variances in inter-organizational mobilities are that voluntary turnovers for other employment opportunities are more likely for younger people than for older people, even when faced with the same level of competition. In other words, the competition effects of demographic similarity should be more pronounced for people young in age and brief in tenure, than for people relatively old and long in tenure, since they have less committed to the current organization and it is easier for them to find alternative employment elsewhere.

In summary my argument here is that the effects of demographic similarity should be best viewed as occurring in interaction with structural constraints. Two people with different ages but at the same distance from other group members might behave quite differently, because their commitment to the current organization and their opportunities outside the current employment may depend on age and tenure.

These arguments are modeled in [Figure 3].

The proposed model is quite a simplification of the turnover process as all models are meant to be. The individual characteristics in the model can be any characteristics including psychological constructs, although only two demographic variables, age and tenure, are to be examined in the present analysis.

2.3.2. HYPOTHESES

In light of this new theoretical framework, I will derive some hypotheses for the top management group data. I will start by re-examining in detail the empirical results of the relevant studies focusing on the link between demographic similarity and turnover. The studies by Wagner, Pfeffer, and O'Reilly (1984) and O'Reilly, Caldwell, and Barnett (1989) may be two of the most relevant works in this regard, since these two studies are the ones that attempted explicitly to explore the individual level relationship between demographic similarity and turnover as well as the group level effects.

Wagner et al. (1984)'s study was the first in this tradition to argue explicitly that the same mechanism of social integration should be at work at the individual level as well as at the group level, and attempted to test the idea in the analysis of the top management group data. Although their analysis showed that individual distance (based on age) to the rest of the group members (actually half the group members closest to the individual) was positively associated with the likelihood of turnover, their report left much to be desired. A potential curvilinear relationship between age similarity and turnover was not examined and no information on the possible effects of tenure and tenure similarity was provided. Their model also

did not control for the group level effect of demographic similarity in the individual level analysis (other methodological issues involved in this study will be discussed in more detail in the Method section).

O'Reilly et al. (1989) investigated the mechanism of demographic processes in small groups of a large convenience chain and their approach corrected for some of these methodological problems. However, some of the results were not at all consistent with their expectations. Their analysis provided empirical evidence for the presence of a positive link between social integration of the group and age similarity at the group level. At the individual level, however, the results were the opposite of their expectations regarding the impact of demographic similarity on turnover. They expected to find evidence for the similarity-attraction relations, but the analysis showed that the farther a person lies from the rest of the group members in the distance scale, the less likely he/she is to turnover. Individual distances based on both age and tenure were found to be negatively related to the likelihood of turnover, though only the coefficient for age distances reached a statistically significant level.

The lack of support for the expected positive relationship between demographic distances and turnover at the individual level led the authors to conclude that the

social integration effect is primarily a group level property. O'Reilly, et al. (1989), however, did not elaborate on the possible reasons for the unexpected results.

What is agreed upon by both studies is the positive relationship at the group level between group heterogeneity and turnover. In other words, the findings of previous research suggest that the group-level relationships between demographic similarity and turnover are dominated by social integration effects rather than competition effects. It seems premature to conclusively deny any presence of competition effects associated with demographic similarity even at the group level, until more studies are conducted to delineate the contingencies in which these positive group-level relationships are most likely to be pronounced or marginal. However, note that the competition effects specified in the proposed model may be concerned with intra-organizational reward allocation and the similarity at the group level might not offer mant implications on the group level effects, as long as the amount of resources available to the members are the same. The present project suffices to focus on individual-level relationships. At the individual level, the arguments for the presence of competition effects are easier to develop, and previous research has generated mixed empirical results.

The positive relationships at the group level are consistent with the social psychology literature, which has postulated that attitude- or value- similarity tends to promote group cohesion (Terborg, Castro, and DeNinno, 1976). It seems that despite the gap between value- or attitude-similarity and demographic similarity, these variables are positively related to group cohesiveness and social integration, and negatively related to the turnover rate of the group. Following these findings, the first hypothesis associated with group-level effect of demographic similarity is as follows:

Hypothesis 1: The heterogeneity of the group in age or tenure is positively associated with the likelihood of turnover.

At the individual level, the prediction is not simple. The conflicting findings in previous research suggest two possibilities: first, there may not actually be a strong relationship between demographic similarity and turnover at the individual level, and second, the individual level demographic models have been mis-specified, and thus the model of the relationship between the two has not been tested properly. The present paper takes the latter position.

All that was tested in previous works was whether or not there is a negative relationship between demographic similarity and turnover. The possibility of change of direction, for example, has not been tested, since the potential competition effect of demographic similarity has not been considered at the theoretical level.

The question asked in the previous works on the relationship is actually a dichotonomous one of who is more likely to turnover, a more similar member or a more dissimilar member? With the introduction of the competition perspective, the question should be more general: It should include the possibility of a curvilinear relationship between demographic similarity and turnover, since we do not yet know how the forces of competition and social integration interact to affect turnover behavior. Given that this is an exploratory study aimed at developing a theory about their joint effects on turnover, the hypothesis should be a tentative one. We know, however, that a large cohort can form a dominant clique (Gusfield, 1957; McCain et al, 1983), which is so powerful that the members in the cohort no longer need to compete against each other. It is more likely that social integration effects dominate competition effect in such circumstances, hence a positive relationship between distance scores and turnover are expected. Beyond that point, however, it is hypothesized

that the relationship between distance score and turnover probability is negative, as competition effects begin to take hold. In other words, an inverted U-shaped curve is expected for the overall relationship between demographic similarity and turnover at the individual level. In mathematical terms, the following expression can be constructed regarding the relationship between the two.

$$Log\ R\ (t) = b_1\ D + b_2\ D^2,\quad thus$$

$$R\ (t) = \exp\ [b_1 D + b_2 D^2]$$

where R (t) is the turnover rate at time t, D is the individual distance scores. It is tentatively hypothesized that b1 is negative, b2 is positive, and the absolute value of b1 is greater than that of b2, implying an inverted U-shaped curve of distance effects on turnover rate. Hypothesis 2 is stated as follows:

Hypothesis 2: The association between individual distance scores and likelihood of turnover is inverted U-shaped curvilinear.

By examining the inconsistent findings of previous research, we may be able to generate more relevant

hypotheses testing the presence of competition effect induced from demographic similarity. Recall that one of the differences in samples between Wagner et al.'s (1984) study and O'Reilly et al.'s (1989) is the great gap in average age and tenure of the samples. Wagner et al.'s sample is top management groups with a mean age of about 54 years and a mean tenure of 23 years, while the mean age and the mean tenure of O'Reilly et al.'s sample are only 27 and 4 years, respectively. One way of reconciling these two conflicting findings is to test the possibility that age moderates the relationship between demographic similarity and turnover, in the manner that older people tend to value social integration more than younger people. In other words, younger people may be guided more by a competition effect than by social integration, while for older people, the smaller reward associated with higher competition may not be so important as social integration, or strong enough to affect turnover. This possibility is expressed in the following hypothesis:

Hypothesis 3a: Age moderates the relationship between demographic distance and turnover in the manner that for younger people the individual distance scores tend to be negatively associated with turnover, while for older people, the relationship tends to be positive.

Hypotheses 3b: Tenure moderates the relationship between demographic distance and turnover in the manner that for people with brief tenure the distance scores tend to be negatively associated with turnover, while for people with relatively long tenure the relationship tends to be positive.

The idea of competition induced from demographic similarity can also be tested by examining how the effects of demographic similarity on turnover are moderated by organizational or group structures. One structural dimension having relevant implications for the competition among members would be the structure of the Internal Labor Market (ILM). The ILM structure can be treated, as in many theoretical discussions (Osterman, 1974; Doeringer and Piore, 1971; Sakamoto and Chen, 1991) as a dichotomous variable in which only the presence or absence of an ILM is differentiated. A more realistic treatment, however, would be to view the degree of openness (or closedness) of an ILM, the degree to which the internal labor markets are open to the external labor markets (Doeringer et al, 1971), as falling on a continuum, since completely closed or open firm internal labor markets are seldom observed (Wholey, 1985).

The extant literature on the internal labor market suggests that the openness of the ILM may have important

implications for competition, turnover, or mobility in general. The discussion on the institutionalization of internal labor markets (Doeringer and Piore, 1971; Williamson, 1975; 1981) suggests that ILMs develop where firm-specific skills are learned on the job, thus replacement on turnover costs is great for both employer and employees. Following this argument, the main effect of the openness of the ILM on the probability of turnover is hypothesized as follows:

Hypothesis 4: The openness of the ILM is positively associated with the probability of turnover.

Discussions on the ILM also suggest a major moderating role for the ILM structure in the relationship between demographic similarity and turnover. Sorensen and Kalleberg (1981), for example, argued that the promotions system in internal labor markets often represented a major mechanism for rewarding group members, very different from 'the use of competition among employees in open employment systems' (p. 57). In other words, this suggests that competition among members is minimized in a relatively closed ILM, and competition among members would be significant in a relatively open ILM. Given that demographic similarity is theorized to induce competition

and social integration simultaneously, the implications are that it is more likely that competition effects of demographic similarity dominate social integration effects in a relatively open ILM, thus demographic similarity tends to be positively associated with turnover in a relatively open ILM. The reverse should be true in a relatively closed ILM, where the social integration effect is likely to be stronger in the absence of the competition effect and thus the relationship between similarity and turnover tends to be less pronounced or negative in a relatively closed ILM. This leads to the following hypothesis:

Hypothesis 5: The openness of an ILM moderates the relationship between demographic similarity and turnover in the manner that, in a relatively open ILM structure, the demographic distances tend to be negatively associated with the probability of turnover, while in a relatively closed ILM, the relationship tends to be positive.

Hypotheses 2-5 delineate the moderating roles of structure, and sample characteristics in the relationships between demographic similarity and turnover. The discussion leading to these hypotheses has implicitly assumed that different demographic variables have similar influences on competition and social integration associated with

demographic similarity. There are, however, some empirical findings that suggest that the effects of tenure differences diminish over time, while age differences continue to persist. Zenger and Lawrence (1989) argued that tenure effects were primarily related to learning organizational languages, and the most rapid gains in organizational language learning took place in early stages of organizational life.

Whether tenure represents organizational language or some other attributes, tenure effects are, by definition, derived from sharing organization-specific experiences. Sources of age effect are broader, and not necessarily limited to intra-organizational experiences. Given that top management is usually not occupied with the day-to-day operations of the firm, firm-specific skills (including language) represented by organizational tenure may be less relevant as a basis for competition and social integration than general skills and needs represented by age. This implies that the effects of age differences on competition and social integration are stronger than those of tenure differences in top management groups. The following hypothesis is derived:

Hypothesis 6: The magnitude of the relationship between age similarity and turnover is greater than that

between tenure similarity and turnover.

Only age, tenure and openness of ILM have been discussed in the current analysis as moderating variables affecting the relationship between demographic similarity and turnover. I admit that the potential list of moderating variables should include many more than these three: it may well be that the process is influenced by other structural characteristics, such as the extent of a vacancy-based mobility pattern, the degree of formalization, or other environmental characteristics having implications in intra-organizational reward-allocations. However, the principal aim of the current analysis is limited to proposing a new model on the effect of demographic similarity on turnover, and to examining empirical evidence to test the validity of the proposed model.

Other Control Variables

Age has been an important variable in explaining a variety of organizational behaviors, and as such has been one of the most frequently included variables in different streams of research (Zenger and Lawrence, 1989). The impressive explanatory power of age has been confirmed in many settings, even though the theoretical mechanism behind the explanatory power is less researched and less understood

(Lawrence, 1988). Recent works (Lawrence, 1987; 1988) suggest that the impressive explanatory power of the age variable is derived from many other processes which are closely associated with aging; thus the age variable is, at best, a good surrogate for other more direct mechanisms.

The age variable in the current context is important primarily as a control variable, because the major variable of interest here, the demographic similarity (or demographic distance scores), has been constructed on the basis of age differences, and there is a possibility that a high collinearity between main effects of age and that of distance scores could easily bias the result.

Ordinarily, the relationship between age and turnover is set to be negative: older people are less likely to turnover than younger people (Mobley et al, 1978). For a relatively old sample as the current one, however, the age effect should be more complex. Physiological effects associated with age, such as bad health, retirement, or death become important, thus implying that turnover is a positive function of age. In fact, such a relationship between age and turnover was postulated and supported in Wagner et al.'s (1984) study. Since the current sample ranges from young to relatively old, a curvilinear relationship is hypothesized here. Age is negatively associated for younger people, but beyond a certain point,

age is expected to affect turnover positively.

Similar logic is applied regarding the effects of tenure on turnover. The majority of literature on the relationship between tenure and turnover predicts turnover as a decreasing function of tenure (Mobley et al, 1978; Tuma and Hannan, 1981). Most works concerned with the effect of tenure on turnover, however, are characterized by much younger samples with corresponding short tenures. Given a sample in which many are at the end of their work lives, the overall relationship between tenure and turnover is hypothesized to be U-shaped curvilinear. Hypotheses 7a and 7b are stated as follows:

Hypothesis 7a: The relationship between age and turnover is curvilinear (U-shaped), in the manner that for a relatively young people age is negatively associated with turnover and the relationship is positive beyond a certain age.

Hypothesis 7b: The relationship between tenure and turnover is curvilinear (U-shaped), in which for a relatively short-tenured, the tenure is negatively related to turnover, while the relationship is positive beyond a certain point in tenure.

Organizational performance is also controlled. Different arguments are available in the literature regarding the effects of performance on turnover rate (Wagner et al., 1984). One is the scapegoating argument (Gamson and Scotch, 1964) that top management is often held responsible for the poor performance of the firm, and top managers in poorly performing firms are thus more likely to experience turnover.

This issue of the relationship between firm performance and top management turnover rate is also related to how to view this newly emerging class (Soref and James, 1981). Are they powerful and independent enough so that they are not subject to market whims, and intervention of the owners? Or, are they still agents of the owners and thus easily affected by indicators of financial performance? This negative relationship is consistent with many economists' view of the major mechanism of the market as efficiency winning over, or replacing, inefficiency (Jensen, 1988). Many empirical works (James and Soref, 1981; Pfeffer and Salancik, 1977; Allen, Panian, and Lotz, 1979; Eitzen and Yetman, 1972) investigating the link between performance and turnover of top managers have produced results supporting a negative relationship between these two.

The opposite prediction is also possible (Wagner et al., 1984). We can argue that top managers are often

targets for recruitment, and managers in high performing firms are more likely to be attractive targets for recruitment, since top managers in high performing firms are equated with effective managers. Empirical evidence in Wagner et al's study, as well as in the majority of literature, however, supports the negative relationship. I thus hypothesize that the lower the firm performance, the higher are the rates of turnover in top management groups.

Hypothesis 8: The performance of a firm is negatively associated with the likelihood of turnover.

The last variable to be included in the model is group size. There is some evidence indicating that larger groups are less likely to be integrated than smaller ones (Thomas and Fink, 1963), although empirical evidence is not very consistent. The group size is also deemed necessary for control to ensure that the measures of distances and of heterogeneity are not sensitive to the effect of group size. The last hypothesis is obtained as follows:

Hypothesis 9: Group size is positively associated with the probability of turnover.

3.METHOD

3.1. DESIGN

Some of the previous studies of organizational demography in relation to turnover generally suffer from either one or both of the following methodological shortcomings: one is the problem inherent in cross-sectional design which does not allow for differentiating the timing of the turnover event, and the other is the failure to incorporate the time-varying independent variables. Demographic composition, for example, was usually measured at a single point of time, and some years later those who had exited were compared to those who had not exited yet (e.g. Wagner et al 1984). This approach does not allow for any distinction as to when during the observation period the turnover occurred, nor is it able to incorporate the time-varying independent variables. Moreover, the use of Ordinary Least Squares (OLS) in estimating the parameters can not deal with the problems resulting from right-censoring the data[7].

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[7] A sample is defined as censored if "certain values are unknown although their existence is known."(Kendal and Buckland, 1971, p 20). Almost all samples are right censored in this sense as long as there remains some cases for which the event has not occurred yet. For more information on censoring and its implications, refer to Tuma and Hannan (1978)'s "Approaches to the censoring problem in analysis of event histories." In K.F. Schuessler (Ed.), Sociological

More recent works such as O'Reilly et al.'s study of turnover (1989), adopted a design that accounted for the timing of the event as well as simultaneously correcting for censoring problems by use of the maximum likelihood method in estimating the parameters. Yet these studies also fell short of varying the independent variables during the observation period. It is obvious that some biases may result from setting explanatory variables as constant over the period, although how serious they are should depend upon the time span of the observation period and the mobility of the group. The bias, for example, should be pronounced for people who turnover at the close of a relatively long observation period, particularly for those groups in which mobility in and out of the group has been high, since any mobility is bound to change the group demographic composition. In other words, a person who exits at the end of an observation period may have come from quite a different group in terms of demographic composition than a person who exits just after the measurement of demographic composition, even if they were treated as if coming from the same demographic composition.

This study attempts to correct for these potential biases by introducing a longitudinal research design in

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Methodology 1979, pp. 209-240.

which both major explanatory variables and turnover are measured several times (annually) during the observation period. More specifically, a cross-section of fifty one top management groups, meaning the groups of people at the vice-president level or above, were sampled at one point of time and followed annually for five years, measuring turnover, changing demographic compositions and other independent variables of interest throughout the observation period.

The nature of this investigation requires additional information on the new members who joined the groups during the study period, since the major explanatory variables are not on stable individual properties, but on relational properties that vary with characteristics of the rest of the group members. Accordingly, the data on the new members were obtained annually and these data were used to construct the demographic distance and group heterogeneity measures. In addition, these new members are also treated as additional samples, since not doing so wastes information on them. The distance and heterogeneity variables are set to vary annually.[8]

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[8] There remains, of course, the possibility that this procedure could not account for people who had joined and left the group within the interval of a year. The effect of this possibility, however, is assumed not to bias the result in any significant way, since first, the number of people doing so is deemed to be few, and secondly, their short lengths of stay are not believed to affect the group processes substantially.

Apparently, turnover processes are not discrete; thus differentiating the time of turnover further within a year would be desirable under some circumstances. A sample of top management groups, however, experience a relatively low rate of turnover (less than 8 percent a year) and thus the benefits of distinguishing turnover time points within a year was judged to be marginal.

3.2. DESIGN

The sample firms[9] were selected from the Fortune 500 firm list of 1978. Every fifth firm from the largest on the list was included in the sample until the 60th firm. Some of the firms with more than five missing values on demographic variables (to be discussed later) were replaced with the next largest firms. Six non-manufacturing firms, as well as two firms who underwent mergers in 1979 and 1980, were excluded from the sample in an attempt to make the sample as homogeneous as possible except for dimensions accounted for in the model. Also one firm (Lever Brothers Company), a subsidiary of a British corporation, was eliminated because data on mobility and financial performance were not available from the sources mentioned above. These procedures left a total of fifty-one firms in the final sample[10]. Table 1 lists the names of the fifty-

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[9] The unit of analysis for the investigation is individuals, not firms. This means that those people who entered the firms after the initial sampling time do not have to be included in the analysis, without causing any sampling biases. This, however, would waste the information on them, if that information is needed, and thus collected for valid construction of the measures used in the analysis, which is the case here. The strategy here is to sample firms, and collect information on all top management people in those firms throughout the observation period.

[10] Demographic processes in groups that undergo drastic changes such as mergers or acquisitions should be interesting by themselves, but investigation of that process was judged to

(Table 1) Sample Firms by Industry

Aerospace & Transport
1. Signal Cos
2. General Dynamics
3. Lockheed Corp

Autos and Auto Parts
1. General Motors Corp
2. Fruehauf Corp
3. Borg-Warner Corp
4. Eaton Corp
5. Smith (A.O.) Corp
6. Timken Co

Builing & Forest Products
1. Armstrong Cork Corp
2. Certain-teed Corp
3. Johns-Manville Corp *
4. Boise Cascade Corp
5. Lousiana Pacific Corp

Chemicals
1. Du Pont (E.I.) De Nemours
2. National Distillers and Chemical
3. Olin Corp
4. Philips Petroleum Corp
5. Union Carbide Corp

Computers & Office Equipment
1. Xeros Corp

Conainer
1. American Can Co

Electronics-Electrical
1. Hewlet-Packard Co
2. North American Philips Corp
3. Gould Inc
4. ITT Corp
5. McGraw-Edison Co

(Table 1) continued

Food and Beverages
1. Beatrice Co
2. Dart & Craft Co *
3. General Foods
4. General Mills
5. International Multifoods Corp
6. Iowa Beef Processors Inc *
7. Quaker Oats Co
8. Coca-Cola Co
9. Reynolds (R J) Industries Inc

Health Care
1. Bristol-Myers Co
2. Merck & Co
3. Pfizer Inc
4. Upjohn Co
5. Johnson & Johnson
6. Chesebriygh-pond's Inc
7. Gillette Co

Oil
1. American Petrofina
2. Cities Service Co *
3. Murphy Oil Co
4. Standard Oil Co of California

Railroads-Trucking
1. IC Industries Inc

Steel & Heavy Machinery
1. Interlake Inc
2. National Steel Co *
3. Deere & Co

Textiles-Apparel-Home Furnishings
1. Whirlpool Co

one corporations by industry. Not all firms in the sample, however, survived the five year period covered in the study. Six firms marked by an asterisk (*) were merged or acquired during the period and thus only part of the years for those firms were included in the analysis.

Data on turnover were obtained from Standard & Poor's Register of Corporations, Directors and Executives from 1978 through 1983. If a person was present in the previous year, and was absent from the list in the following year, then he (or she) was coded as 1 and otherwise coded as 0. Although technically the people who might have moved to other functions within the corporations or demoted to lower levels are not distinguished from the people who actually exited the firm, they are hard to track down. From a theoretical perspective, this distinction is not important, since the mechanisms behind moving out of the group and moving out of company are not dissimilar (Wagner et al, 1984).

Demographic data on company tenure and age were supplementally obtained from two sources: one is Dun & Bradstreet's Reference Book of Corporate Management, and the other is Standard and Poor's Register of Corporations, Directors and Executives. Dun and Bradstreet provides a

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be beyond the scope of this project.

information (age and company tenure), by the alphabetical order of the corporate names, and thus was initially consulted. Whenever missing values were encountered, Standard & Poor's directory was referenced. After consulting both sources, the firms with more than five missing values on these demographic variables were replaced with the next largest firms, in order to make the list as complete as possible.

Financial data on sample firms were obtained from Compustat tape and the N.Y. Stock Exchange Report both from Standard & Poor's. Data on the Compustat tape was checked first, but financial data on approximately one-third of the firms were missing from the tape, and thus were obtained manually from the NY Stock Exchange Report (They were found to be identical for all non-missing cases as they should be). Earnings per Share (EPS), Return on Total Assets (ROA), and Return on Equity (ROE) were recorded each year, beginning in 1975 through 1982.

3.3 MEASURES

Demographic similarity

Demographic similarity has been measured as a variant of Euclidean distance. It is actually a measure of dissimilarity, since the larger the value, the farther a distance a person lies from the rest of the group members. The first attempt to quantify the construct was made by Wagner et al. (1984). The measure[11] they used is interesting in that they did not measure a member's distance from the rest of the group. Instead, they chose a subgroup of half the group size in the manner that it minimizes the individual's distance scores and, based on that particular subgroup, they measured an individual's distance. Their argument for the choice of that particular subgroup was that their approach might possibly identify dominant cohorts. They reported, however, that the results were not sensitive to the choice of other subgroup sizes including the total group.

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[11] The formula for the distance measure is as follows.

$$D_1 = \min_{s} \left[\frac{1}{n}\sum_{j \in s} (X_i - X_j)^2\right]^{1/2}$$

, where s = all possible subsets of size n

n = the largest integer in (n+1)/2

O'Reilly et al (1989) used a revised, but similar version, which did not choose any arbitrary subgroup. Instead, the distance measure was based on a member's distance from the rest of the group members. This measure is simpler to use and, among other things, is not subject to any charge of arbitrariness in the choice of subgroup in measuring the distances. This project thus uses O'Reilly et al.'s measure, which we will call similarity measure #1. The expression for the measure is as follows:

$$\sqrt[2]{\sum_{j-1}^{n} \frac{(S_i - S_j)^2}{n}}$$

, where Si = demographic value of a person i

Sj = demographic value of person j in the group

This measure generates absolute distance scores not adjusted by other group characteristics. However, we might need to consider only the relative rankings in distance, a consideration which facilitates the comparisons across groups. It might be that the impacts of some group level variables discriminate only how an individual member

compares with other group members in the organization. Out of this consideration, I will construct the similarity measure #2 in the following manner:

$$\frac{\sqrt[2]{\sum_{j=1}^{n} \frac{(S_i - S_j)^2}{n}} - MEAN_k}{STD_k}$$

where Si = Demographic value of person i in group k

Sj = Demographic value of person j in group k

MEAN k= mean of the unadjusted distance score for group k

STD k = standard deviations of the unadjusted distance score for group k.

Group Heterogeneity

Group heterogeneity has been measured as coefficients of variations in previous studies, although widely differing variables were used. Wagner et al. (1984) used the coefficient of variation for individual distances derived in the manner described above, while O'Reilly et al. (1989) used the coefficient of variation for demographic variables for the group as a measure of demographic heterogeneity.

Wagner et al.'s (1984) measure was, at best, a

misleading one, and, at worst, simply a wrong indicator of group similarity. The coefficients of variation for individual distance scores in a group should measure how heterogeneous the group members are in terms of their distance scores, not in terms of demographic variables per se. Suppose there are two groups, A and B, in both of which intra-group variations in distance are zeroes, meaning that all members in each group have the same distances. Further suppose that members' distances are all very large in group (A), and the distances are all very small in group (B). The measure Wagner et al. (1984) used would produce the same zero coefficients for both groups, despite the fact that average distances for group (A) is much larger. The situation becomes clearer if we suppose that there are slight variations so that the numerators can not be zeros (since coefficients of variation are obtained by dividing the standard deviations by means). Division by a larger number would produce a smaller value for group (A) than for group (B). In other words, for the above example, group (B) would turn out to be more heterogeneous, despite the fact that the average distances among the members of the group are much smaller, thus much more homogeneous in the dimension of the demographic variable of interest. Because of these undesirable properties associated with the Wagner et al.'s measure of group heterogeneity, their version of

group heterogeneity measure is excluded from consideration for the current analysis.

A more recent measure used by O'Reilly et al (1989) is the coefficient of variation on a demographic dimension as a measure of heterogeneity. More specifically, the standard deviation of age or tenure for the group divided by the group's mean age or tenure was used to measure the group's heterogeneity in age and tenure. Theoretical reasons for the popular use of the coefficient of variations as a similarity measure were provided by Allison's (1978) review of measures of inequality. Allison (1978) analyzed several measures of inequality and concluded that the coefficient of variations was superior to other measures of inequality, including the Gini index.

Actually, it is hard to distinguish conceptually between inequality and intra-group similarity, and the two should be highly correlated empirically whatever measures researchers choose to use. Given that an individual level similarity measure is defined, however, a simpler measure, the mean of the individual distance scores for the group, makes sense as a group dissimilarity measure. The group means as aggregate measures, in parallel with corresponding individual level measures, have been used widely as gauging a variety of structural or group properties such as decentralization, professionalization, or administrative

ratios (Lincoln and Zeit, 1980). An additional advantage is that intuitive interpretations at both individual and group levels are certainly facilitated with this simpler measure of heterogeneity. This project uses the group mean distance score as a measure of how dissimilar the group is as a whole, and also reports the results based on the coefficients of variation for age or tenure.

Firm Performance

Performance of the firm can be measured in a variety of ways. Financial data as a performance measure has the advantage of being easy to obtain and lends itself readily to quantitative analysis. However, annual fluctuations in financial performance are not considered to be good predictors of turnover, particularly for top management groups. A more appropriate measure is the trend, rather than year by year fluctuations, since it is not reasonable to assume that one bad or good year would affect the turnover chances for the relatively powerful top management personnel in any significant way. The following formula is used to quantify the financial performance for a firm.

$$P_i = \frac{1}{7} \sum_{j=76}^{82} \frac{(EPS_j + ROA_j + ROE_j)}{3}$$

where EPS = Earnings Per Share

ROA = Return On Asset

ROE = Return On equity

For the six firms that underwent mergers or acquisitions during the observation period, only the years up to that prior to merger or acquisition were used to compute the performance index. Exclusion of merged or acquired firms from the sample might weaken the performance effects on turnover, since the process of mergers or acquisitions can be viewed as alternative management teams competing for the right to manage the firm, and poor firm performance invites those opportunities (Jensen and Ruback, 1983).

Openness of Internal Labor Market

Closeness of an Internal Labor Market (ILM) is measured as the proportion of people recruited to the top management positions from outside the firm. All those whose initial position in the current firm was not at the vice-president level or above were classified as inside promotions and all others are classified as outside recruits. The proportion of outside recruits in a group is then used as a measure of the openness of ILM. Since the structural properties are assumed to be stable over time,

this variable is set to be constant over time. The cross-sectional samples of 1978 and 1982 are used to compute the proportion of people to be classified as outside recruits, and the mean value for these two proportions is used to indicate the openness of ILM (the correlation for these two values were .88 for the data). More specifically, the job histories of the group members for each firm were reviewed to determine whether or not their company tenures were identical to their dates of entry into the top management positions. Then, the number of people classified as outside recruits over the number of people in the group was multiplied by 100 to come up with a percentage of outside recruits in the group. So, the ILM is conceptualized not as a dichotomous but as a continuous variable on which a firm can fall anywhere between 0 to 100 (Wholey, 1985).

There could be some technical controversy over the definition of outside recruits, such as whether or not a person recruited to the director position and promoted to the vice-president level after a couple of years should be considered as an inside promotion. The purpose of the study, however, is focused on the interaction within the top management groups, and thus it seems that the definition of outside recruits is better based on the top management positions.

Group size

The group size is measured as the number of people at the vice president level or above. As the number of people in a group changes over time, the group size variable is set to vary over time and is thus measured annually over the five years.

3.4 Statistical Model

Almost all longitudinal data are characterized by censoring problems. The data at hand is censored in both left and right directions. They are right-censored because many people had not yet experienced the turnovers at the end of the observation period, though they are certain to have that experience eventually. They are also left-censored, because we do not have information on those who entered the top management groups with the people included in the sample, but had exited earlier than the observation began. The problem is alleviated for the current data, since for the sample on hand we know when they entered the firm, and the substantive interest lies not in finding out the shape of the time dependence of turnover rate, but in investigating the direction and significance of the effects of the independent variables on the turnover process. The appropriate technique for analyzing left-censored data is not yet readily available.

The problems associated with right-censoring can be addressed with the use of the maximum likelihood method in estimating the parameters (Tuma and Hannan, 1978). The discrete time event history analysis, with the logit model (Allison, 1982; 1984) is utilized to estimate the parameters. The model can be expressed as in the following expression.

$$P_{it} = \exp(\alpha_t + \beta' X_{it})$$

where Pit = probability of turnover for person i at time t.

$\alpha(t)$ = turnover rate for Year t

X(t)i= independent variables

β' = vector of Parameters to be estimated.

The $\alpha(t)$ term can be restricted to follow such functions as Gompertz, Weibull or some polynomial terms in t (Mantel and Hankey, 1978). However, the imposition of a functional form is not always the best strategy, since we are not certain what function best characterizes the data. Turnover processes, for example, are known to follow a Gompertz function (Tuma, 1980), but not much is known about

the samples like top management groups which are relatively long-tenured and also include outside recruits as well. A better strategy would be not to impose any specific functions on data. Fortunately, for discrete time analysis, it is possible to generalize the model without imposing any restriction on the time effect, in a way that the effect of time is set to vary freely with time by creating dummy variables representing points of time.

There are two types of time in the current model. One is the time in terms of tenure, and the other is the calendar time. This complication results from left-censoring of the data. Creating dummy variables for tenure time would be unwieldy, since the range of tenure is from 0 to 40, requiring 39 dummy variables to account for dependence of turnover process on tenure. Bracketing the tenure into manageable numbers, for instance, into five year intervals, would, however, throw away information on variations within the interval. A compromise solution to this dilemma is the inclusion of polynomial terms as independent variables in the model to control for the dependence of turnover process on tenure time. The 't' in the model thus refers to calendar time, accounting for annual fluctuation of any relevant factors not included in the model.

The specific procedure for estimating the discrete-

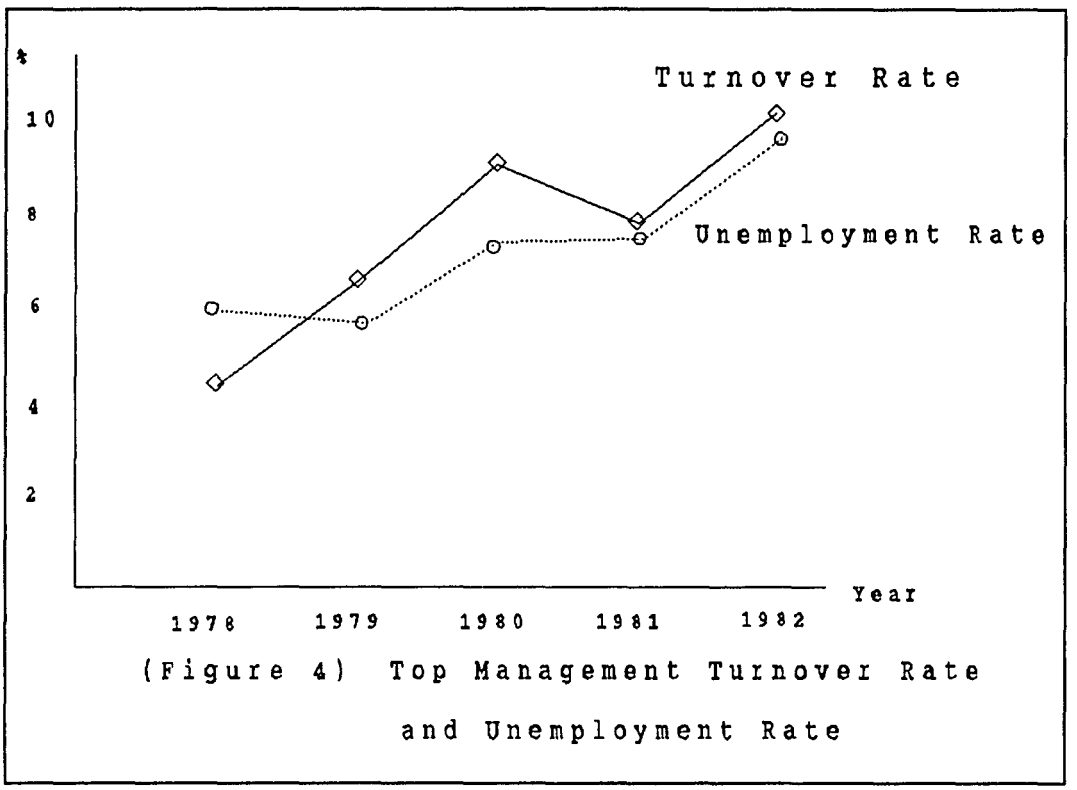
time model is to record the samples by year, and treat samples from each year as if they were independent, and aggregate the five years into one large data set. The time varying independent variables can then be easily accommodated (Kalleberg and Leicht, 1989; Lawrence, 1988; Allison, 1982; 1984). SAS Logistic (version 6.1 with the link=logit) is used for estimation.

4. RESULTS

4.1. DESCRIPTIVE STATISTICS

The descriptive statistics (Table 2) indicate that, on average, about 7.2 percent of the top management personnel for large Fortune 500 firms experience turnover annually. Breakdown of the turnover rate by years shows that the turnover rates for the top management were lower in 1978 and 1979 (4.4% and 6.56%) than in 1980, 1981 and 1982 (9.03%, 7.92% and 10.15%, respectively).

One interesting comparison would be to plot these turnover probabilities of top managers against the annual unemployment rates of production workers. The plotting (see Figure 4) suggests that the turnover behaviors of top managers do not deviate very much from those of production workers. It is revealed that even top managers in Fortune 500 firms seem to be subordinated to economic imperatives as much as production workers. Note that some theorists (Galbraith, 1971; Giddens, 1973) argued that in modern societies industrial bureaucrats have replaced the capitalist class in their power and influence (Galbraith, 1971; Giddens, 1973). Are top management groups in the largest industrial firms powerful enough to cushion themselves against market whims? The bivariate



(Figure 4) Top Management Turnover Rate and Unemployment Rate

plotting does not give any support to that argument, and instead suggests that involuntary turnover such as firings or lay-offs is also prevalent among top management groups. Indeed, James and Soref (1981) showed that the firings of chief executive officers were primarily a function of their firm's performances.

Average age for the sample was about 55 years with a standard deviation of 7 years. The range of age from thirty-one through eighty-three was impressively large. Average tenure was about 21 years with a standard deviation

[Table 2] Descriptive Statistics

Variable Name	Mean	Standard Deviation	Minimum	Maximum
Turnover (1=leave, 0=stay)	.0719	.2580	0.0000	1.0000
Distance (age)	8.3770	3.0344	2.8940	28.2310
Distance Square (age)	79.3787	63.6295	8.3752	796.9894
Distance (tenure)	12.1376	4.8657	.0000	34.7040
Distance Square (tenure)	170.9903	145.6370	.0000	1204.3676
Age	54.5860	6.8698	31.0000	83.0000
Age Square	3027.3459	737.9213	961.0000	6889.0000
Tenure	21.1414	11.4170	0.0000	49.0000
Tenure Square	577.2768	509.8285	0.0000	2401.0000
Heterogeneity (age)	.2491	.0510	.1380	.4530
Heterogeneity (tenure)	.1581	.0440	0.0000	.2790
Mean Distance (age)	8.3429	1.9136	3.8600	14.7000
Mean Distance (tenure)	12.1272	3.3510	0.0000	22.3000
Group Size	22.7408	11.3285	3.0000	52.0000
Performance	21.5490	8.0697	7.7300	52.0000
Openness of ILM	20.0961	20.5333	0.0000	100.0000
Age*Distance (age)	17.8793	6.5378	5.9810	108.4802
Age*Distance (tenure)	11.5269	5.2356	0.0000	36.5714
Openness of ILM *Distance(age)	6.7393	7.6351	0.0000	49.8686
Openness of ILM *Distance(tenure)	3.8204	3.9284	0.0000	29.2267

of 11 years, reflecting a considerable proportion of people joining current groups in the middle of their careers. Despite the larger range, the standard deviation for the age variable is much smaller than that for tenure, suggesting that the top management groups are more homogeneous in age than in tenure.

The standard deviations and minimums and maximums for age and tenure also suggest that the sample is heterogeneous enough in age and tenure to allow for tests of the hypotheses concerning demographic dissimilarity.[4] Kanter's case study (1977) of a corporation painted a picture of quite a homogeneous nature for corporate managers, but the demographic homogeneity she talked about was primarily about fixed attributes such as race, gender, and education. Age and tenure, however, should be different from those fixed attributes in the sense that they change year by year, and organizations cannot survive beyond a human life-span without continuous regeneration (McNeil and Thompson, 1971).

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[4] In principle, how homogeneous or heterogeneous a group is can not be discussed in absolute terms. For example, the same populations of organizations can be described as heterogeneous or homogeneous. Organizational ecologists (Freeman and Hannan, 1975) framed their research question by saying that they attempt to explain the variations of organizational heterogeneity. On the other hand, neo-institutional theorists (Dimagio and Powell, 1983) started by saying that they aimed to investigate why organizational populations in a field are so isomorphic.

Average performance was shown to be 25.59. This number, however, is hard to interpret, since this is a composite measure, constructed out of aggregating earnings per share, return on assets and return on equity over the period. The mean scores for the three components of performance were 3.59 (1.58) for EPS, 6.76 (2.89) for ROA, and 13.78 (6.04) for ROE, respectively (the numbers in the parentheses are standard deviations). These three components of the performance measure were correlated significantly (p=.001) but not very closely (.23, .67, and .43). Recall that merged and acquired firms were eliminated, and those firms are more likely to have had performance problems (Jensen, 1983).

Average group size is about 23, from the minimum of 3 to the maximum of 52, which is much larger on average and heterogeneous in range than the sample studied by O'Reilly et al. (3 to 6 persons in a group). The mean for the openness of ILM is about 20%, suggesting that, on average, one out of five positions in top management groups of Fortune 500 firms is filled from the outside.

[Table 3] Pearson Correlation Coefficients

	2	3	4	5	6	7	8
1. Distance (age)	.969**	.297**	.286**	-.130**	-.072**	-.058**	-.013
2. Distance Square (age)		.262**	.255**	-.141**	-.082**	-.069**	-.027*
3. Distance (tenure)			.960**	.171**	.183**	.162**	.283**
4. Distance Square (tenure)				.159**	.172**	.106**	.238**
5. Age					.997**	.503**	.530**
6. Age Square						.505**	.538**
7. Tenure							.966**
8. Tenure Square							
9. Group Heterogeneity (age)							
10. Group Heterogeneity (tenure)							
11. Mean Distance (age)							
12. Mean Distance (tenure)							
13. Group size							
14. Performance							
15. Openess of ILM							
16. Year 78							
17. Year 79							
18. Year 80							
19. Year 81							
20. Interaction (1*5)							
21 Interaction (1*11)							
22. Interaction (3*5)							
23. Interaction (3*11)							
24. Turnover (1=leave, 0=stay)							

[Table 3] continued

	9	10	11	12	13	14
1. Distance (age)	.571**	.225**	.494**	.230**	-.016	-.031
2. Distance Square (age)	.510**	.190**	.431**	.222**	-.032	-.021
3. Distance (tenure)	.274**	.692**	.137**	.643**	.211	-.094**
4. Distance Square (tenure)	.227**	.561**	.110**	.520**	.170**	-.102**
5. Age	-.025	.114**	-.212**	.027	-.017	.019
6. Age Square	-.005	.118**	-.191**	.032	-.015	.017
7. Tenure	-.067**	.234**	-.207**	.034	.164**	.023
8. Tenure Square	-.037	.254**	-.186**	.058*	.161**	.003
9. Group Heterogeneity (age)		.392**	.834**	.458**	-.083**	-.082**
10. Group Heterogeneity (tenure)			.188**	.924**	.277**	-.152**
11. Mean Distance (age)				.358**	.016	-.056*
12. Mean Distance (tenure)					.206**	-.140**
13. Group size						.319**
14. Performance						
15. Openess of ILM						
16. Year 78						
17. Year 79						
18. Year 80						
19. Year 81						
20. Interaction (1*5)						
21. Interaction (1*11)						
22. Interaction (3*5)						
23. Interaction (3*11)						
24. Turnover (1=leave, 0=stay)						

[Table 3] continued

	15	16	17	18	19	20
1. Distance (age)	.051*	.085**	.076**	.041*	.002	.876**
2. Distance Square (age)	.056*	.080**	.065**	.034	.001	.840**
3. Distance (tenure)	-.221**	.042*	.038	.045	.027	.343**
4. Distance Square (tenure)	-.139**	.050*	.043	.047	.029	.329**
5. Age	-.083**	-.043	-.022	-.000	.000	.338**
6. Age Square	-.081**	-.045	-.024	-.002	-.001	.391**
7. Tenure	-.440**	-.049	-.034	-.006	.006	.165**
8. Tenure Square	-.391**	-.042	-.031	-.004	.007	.218**
9. Group Heterogeneity (age)	.101**	.144**	.127**	.071**	-.001	.536**
10. Group Heterogeneity (tenure)	-.314**	.069**	.061**	.070**	.041	.245**
11. Mean Distance (age)	.173**	-.035	-.017	-.036	-.047	.402**
12. Mean Distance (tenure)	-.086**	.007	.016	.031	.016	.251**
13. Group size	-.271**	-.031	-.018	-.003	-.007	-.024
14. Performance	-.097**	.000	.001	.022	-.014	-.027
15. Openess of ILM		.017	.016	-.014	-.017	.024
16. Year 78			.475**	.487**	.491**	.070**
17. Year 79				.485**	.488**	.002
18. Year 80					.500**	.040
19. Year 81						.002
20. Interaction (1*5)						
21. Interaction (1*11)						
22. Interaction (3*5)						
23. Interaction (3*11)						
24. Turnover (1=leave, 0=stay)						

[Table 3] continued

	21	22	23	24
1. Distance (age)	.227**	.384**	.184**	.101**
2. Distance Square (age)	.192**	.387**	.173**	.091**
3. Distance (tenure)	.951**	-.107**	.298**	.064**
4. Distance Square (tenure)	.919**	-.043	.306**	.070**
5. Age	.442**	-.101**	.008	.183**
6. Age Square	.454**	-.078**	.014	.197**
7. Tenure	.316**	-.394**	-.246	.087**
8. Tenure Square	.436**	-.335**	-.166**	.116**
9. Group Heterogeneity (age)	.240**	.303**	.261**	.029
10. Group Heterogeneity (tenure)	.644**	-.188**	.158**	.015
11. Mean Distance (age)	.072**	.344**	.258**	.037
12. Mean Distance (tenure)	.580**	.027	.374**	.022
13. Group size	.184**	-.236**	-.165**	-.000
14. Performance	-.082**	-.076**	-.143**	-.040
15. Openess of ILM	-.213**	.882**	.732**	.013
16. Year 78	.028	.044	.025	-.067*
17. Year 79	.029	.041	.028	-.053*
18. Year 80	.040	-.002	.010	-.020
19. Year 81	.024	-.014	-.003	-.034
20. Interaction (1*5)	.412**	.325**	.185**	.191**
21. Interaction (3*5)		-.116**	.281**	.118**
22. Interaction (1*11)			.750**	.035
23. Interaction (3*11)				.021
24. Turnover (1=leave, 0=stay)				

** p < .0001, * p < .05

[Table 4] Group level Correlations
(N = 241)

	2	3	4	5	6	7	8	9
1. Performance	-.18	.35**	-.08	-.17*	-.11	-.20*	.17*	.16
2. Openness of ILM		-.31**	.02	-.38**	.06	-.21**	-.25**	-.78**
3. Group Size			-.02	.24**	.06	.19*	.02	.31**
4. Group Heterogeneity(age)				.44**	.88**	.49**	-.06	-.07
5. Group Heterogeneity(tenure)						.27**	.95**	.31**
6. Mean Distance (age)							.40**	-.44**
7. Mean Distance (tenure)							.15*	.15*
8. Mean Age								.61**
9. Mean Tenure								

** p < .0001, * p < .05.

4.2 CORRELATIONS[5] AND BI-VARIATE PLOTTING

The estimated model is not linear, and thus the Pearson correlation coefficients between the independent variables and turnover are not likely to give much relevant information concerning their impacts on the turnover processes. The correlation coefficients, however, can give a first-hand approximation about the relationships between variables included in the model. Table 3 and Table 4 report the linear correlation coefficients between variables at the individual level, and at the group level, respectively. Considering the correlations at the group level is deemed helpful, since the numbers in Table 3 are weighted by group sizes for group-level variables and thus are biased in favor of larger groups. Table 4 gives unweighted relationships at the group level, in which groups are treated as single cases.

Simple correlations (Table 3) suggest that the distance scores (on age and on tenure) were positively associated with turnover but the magnitudes were not great (.10 and .06, respectively). A more relevant approach to

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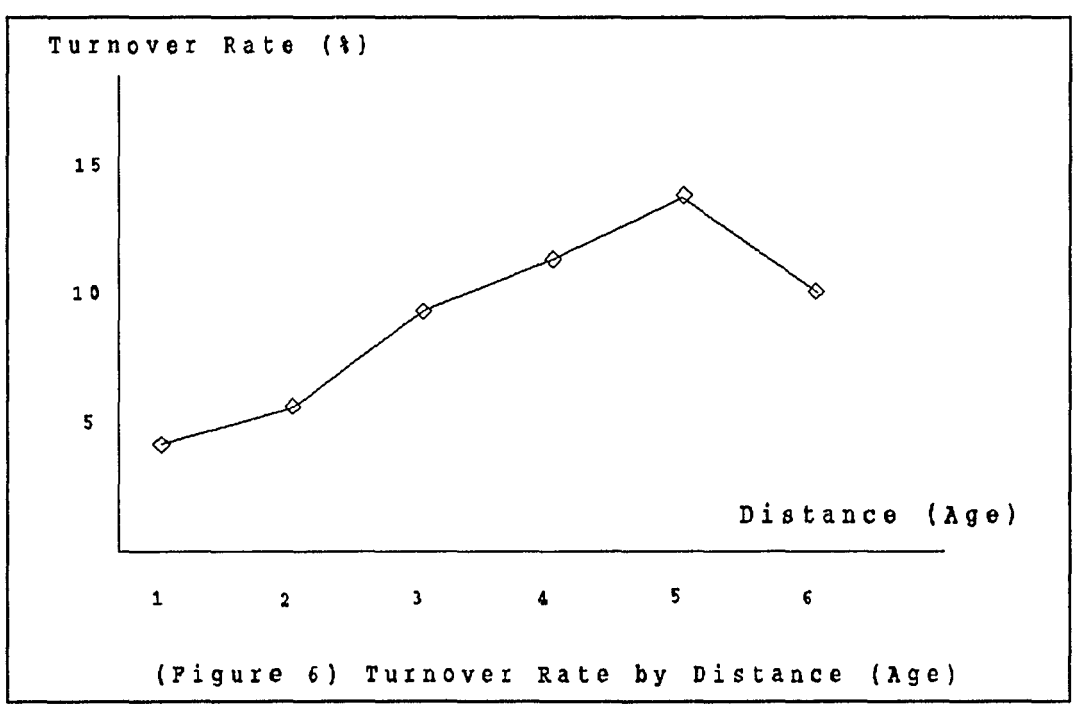
[5] Even a small value of correlation is statistically significant, due to the relatively large sample size. Generally, an absolute value greater than .07 was significant at $\alpha = .0001$. The p-values for correlations are not reported in the text for this reason.

capture the potential curvilinear relationship would be to plot the relationship by breaking down the turnover rate by both distance scores. Figure 5 through Figure 10 plot the relationships between the dependent variable (turnover rate) and explanatory variables; age, tenure, individual distances based on age and tenure, the openness of ILM and performance. The intervals for these explanatory variables were equally spaced by standard deviations in both directions, starting from the mean.

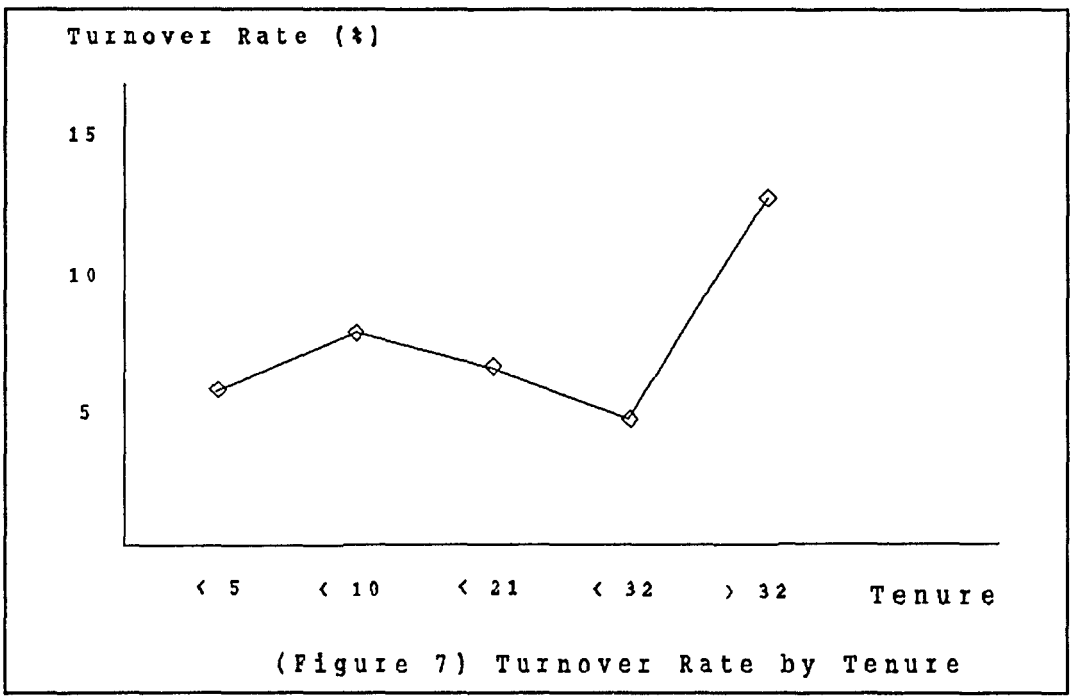
Demographic Variables

The plotting of turnover rate against age (Figure 4) suggests that the likelihood of turnover increases as one ages, but the relationship does not appear to be strictly linear. Beyond the age range of 55 to 62, the probability increases dramatically. The picture (Figure 5) does not give any indication that turnover probability can be a negative function of age for any subgroup of the sample at hand, thus disconfirming a part of the Hypothesis 7a. It appears that the older a person is, the less likely he or she is to turnover for this sample, and the probability increases dramatically after 55-62 years of age. This is quite a different pattern from most findings of previous studies, and surprising given that the sample contains a considerable number of relatively young people (for instance, 751 cases under the age of 48).

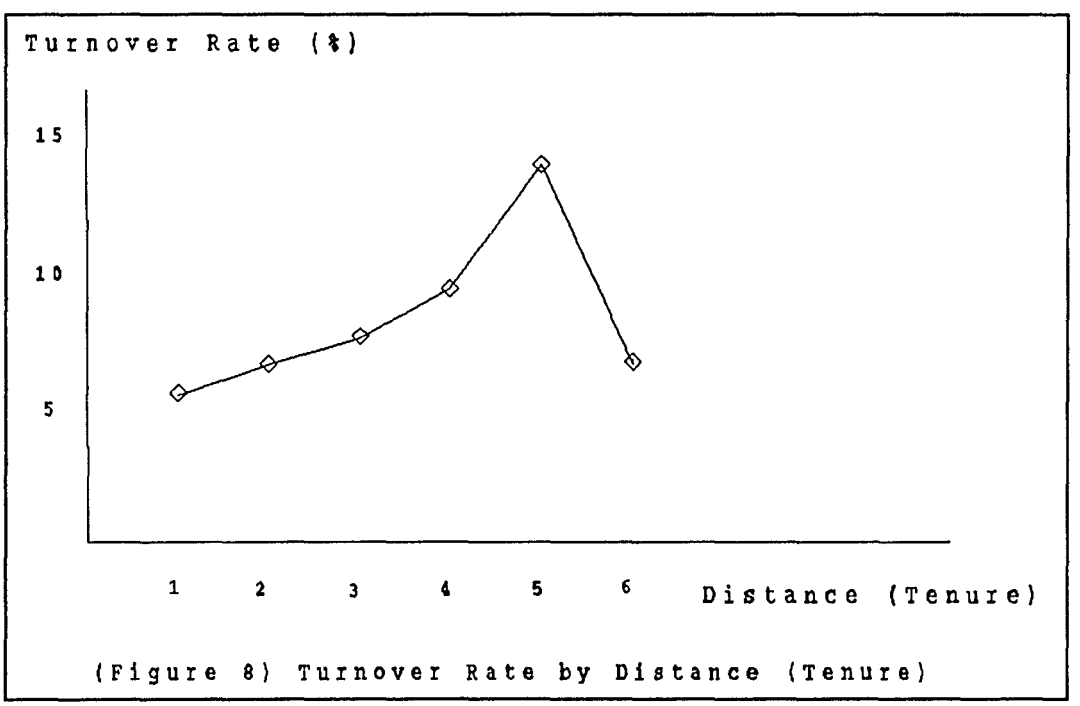
(Figure 5) Turnover Rate by Age



(Figure 6) Turnover Rate by Distance (Age)



(Figure 7) Turnover Rate by Tenure

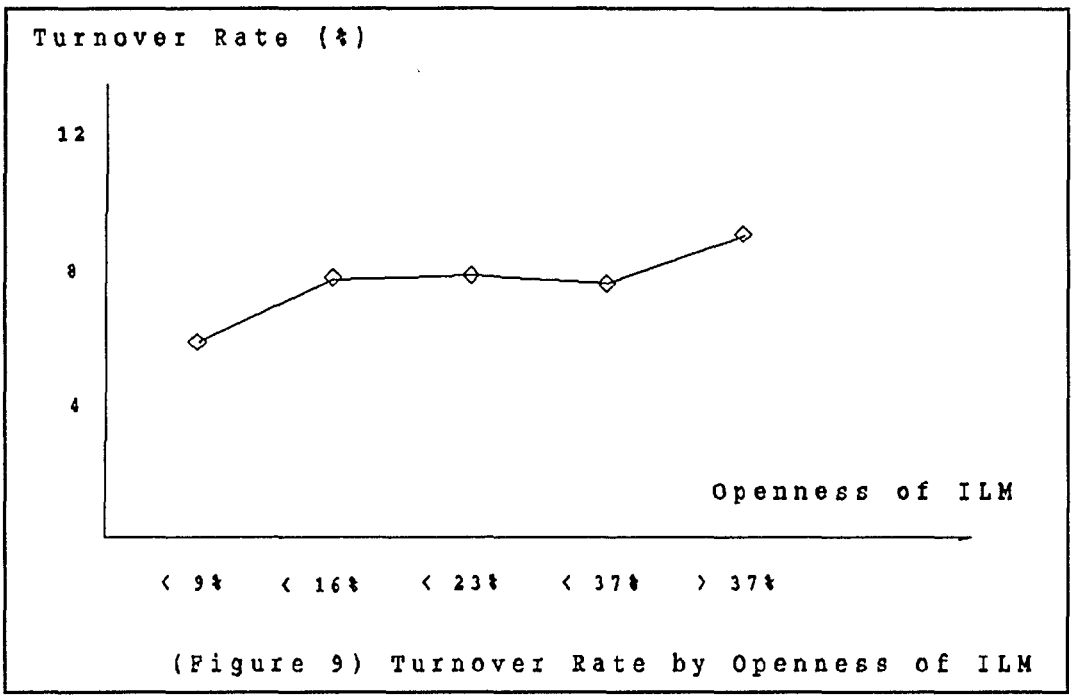


(Figure 8) Turnover Rate by Distance (Tenure)

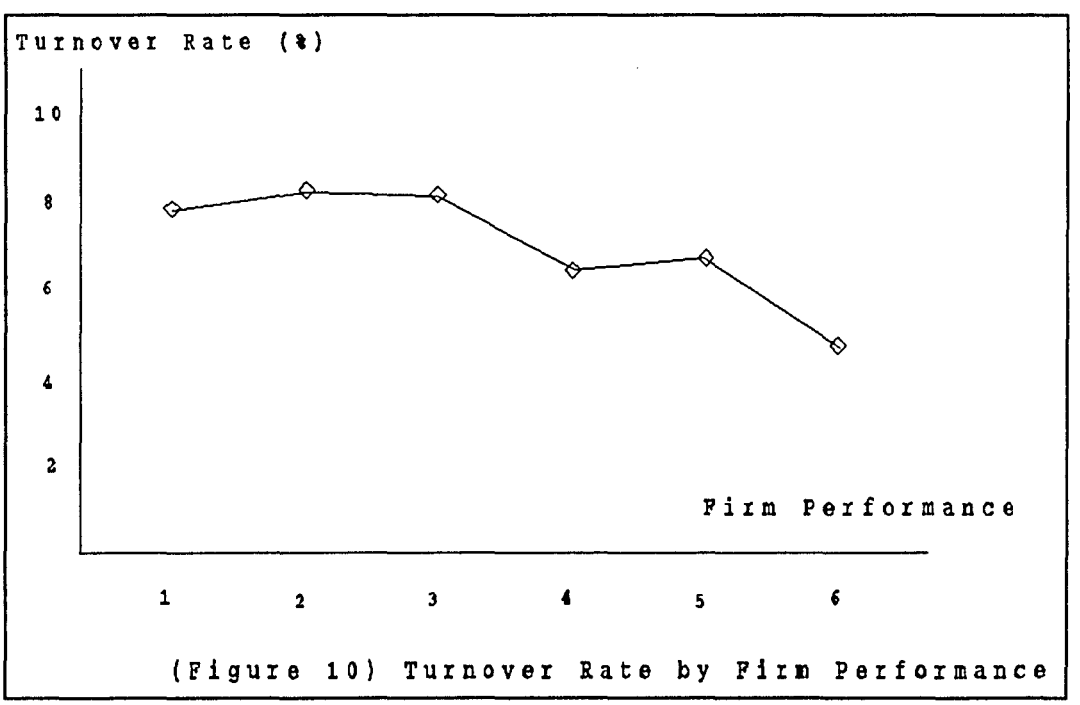
The age distances are positively related to turnover for a large part of the distance range, giving preliminary support to similarity-attraction arguments. This plotting as well as a positive significant correlation between turnover and age distance is generally consistent with a positive association between these variables that Wagner et al. (1984) reported in a similar sample. For the extremely distant members, however, turnover rate drops drastically. A specification of the curvilinear relationship between these two variables seems to be fit into the data. However, further analyses in a multivariate setting will be necessary to confirm this relationship.

The plotting of turnover rate against tenure does not show an interpretable pattern. We cannot tell conclusively at this point whether or not there is any relationship between these two variables. Although the plotting does not show any definite pattern, it is possible that some other factors exist that are strongly associated with both turnover rate and tenure. A more comprehensive test will be conducted later in a multivariate setting.

The relationship between turnover rate and tenure distance appears to follow the same pattern as that between turnover rate and age distance: the turnover rate increases for a large part of the tenure-distance range, but falls drastically for the most distant members.



(Figure 9) Turnover Rate by Openness of ILM



(Figure 10) Turnover Rate by Firm Performance

[Table 5] Mean and Standard Deviations of Explanatory Variables by ILM Openness.

Explanatory Variables	ILM Openness 1 (n=1466)	2 (n=1334)	3 (n=456)	4 (n=872)	5 (n=391)
Age	54.9 (6.8)	55.5 (6.7)	52.4 (7.1)	54.4 (6.6)	53.5 (7.2)
Tenure	25.0 (10.4)	23.0 (11.4)	20.0 (10.4)	16.9 (10.3)	11.2 (9.9)
Distance (age)	8.1 (3.0)	8.2 (3.1)	9.4 (2.8)	8.3 (2.9)	9.0 (3.4)
Distance (tenure)	10.7 (4.0)	12.8 (5.3)	14.0 (4.3)	13.1 (4.2)	9.0 (6.4)
Performance	25.9 (6.1)	26.1 (6.9)	22.5 (8.2)	27.0 (9.8)	22.0 (9.9)
Group Size	21.2 (6.7)	27.4 (12.2)	32.8 (17.3)	19.7 (8.2)	13.6 (4.6)

* Numbers in parentheses are standard deviations.

Other Variables

The openness of an ILM is shown to be negatively related to mean tenure and mean age of the group. Particularly strong is its linear association with mean tenure at the group level (-.78). More interesting is, however, the relationship between ILM openness and mean age (-.25). Not only is the mean tenure short, which is not surprising at all, but also the mean age tends to be younger in a relatively open ILM. The magnitude of the difference is, however, not great (see [Table 5]).

In order to check whether these correlations miss any relationships other than the linear one, Table 5 shows means and standard deviations of major explanatory variables by the openness of the ILM broken down into five categories.

The correlations at both individual and group levels (Table 4 and Table 5) show that the ILM openness is also negatively associated with group size (-.27 at the individual level, and -.31 at the group level, respectively): the larger the group, the less open the ILM (the more internal promotions over outside recruiting). However, the five mean values of group size by ILM openness (see the last of row of Table 5) suggest that a more appropriate relationship might actually be an inverted U-shape. The firms that consist of 16% to 23% of outside

recruits tend to be the ones with the largest group size, and firms having less than 16% or larger than 23% of outside recruits tend to be smaller. Not being aware of extensive work on the relationship between group size and the openness of ILM, it is difficult to interpret the first part of the relationship (positive relationship between group size and ILM openness). My speculation is that the large group size might represent a greater demand for top management personnel than they can promote internally, thus requiring a greater proportion of outside recruits than in smaller firms.

Note that we are here talking about top firms in U.S. industries. It is very likely that top firms in an industry represent high visibility, and accordingly draw a lot of public attention, and are thus subject to scrutiny from regulatory agencies. Firms, particularly the largest ones, are capable of managing the environment and often attempt to do so (Pfeffer and Salancik, 1978; Fligstein, 1990). The effective management of environmental uncertainties should require a larger number of personnel at the top. For example, a well known way to manage the uncertainties directly is to recruit the people associated with the sources of uncertainty; e.g. the practice of interlocking directorates (Palmer, 1985).

Of course, it is premature to conclude that this

relationship holds independent of the effects of other relevant variables, such as technology and environmental differences. Unfortunately, we do not have data on these variables here to pursue this issue further. Recall also that the size we are discussing is not the total firm size but the top management group size.

Generally, however, the overall relationship between ILM openness and group size tends to be negative, as the magnitude of the mean differences between the ILM intervals and the negative correlations at both levels indicate. This is not a surprising result. Although the size of the top management group has not been used directly, the size variable has consistently been found to be related to the differentiation of activities and structural complexity (Scott, 1985; Blau, 1973; Blau and Schoenherr 1971; Hall, Haas, and Johnson, 1967)[6]. Size also has been found related to the degree of formalization (Blau et al., 1971; Hall et al, 1967). Though I am not aware of any empirical work causally relating these structural dimensions to emergence

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[6] Initial research on the relationship between organizational size and the size of the administrative component had generated inconsistent findings. Further research, however, suggested that heterogeneity of the administrative component, and two opposing forces related to size, the scale of operations, and structural differentiation were accountable for the lack of consistency (Blau, 1970). See Scott (1985) for a concise summary on this topic.

of the internal labor market[7], we can reason that the structural complexity and differentiation of activities tend to give rise to the internal labor market, because these structural characteristics should serve to value organization specific knowledge or skills. In firms where organization-specific knowledge or skills are important, ILM should be more likely to emerge (Doeringer and Piore, 1971; Williamson, 1975).

The other contributing factor might be the presence of a relatively fixed number of professionals like lawyers or researchers (at positions like R&D vice presidents) in most groups. Given that professionals tend to have high mobilities (Doeringer and Piore, 1971), smaller management groups might include larger proportions of highly mobile professionals, thus appearing to be a more open ILM. These interpretations are not contradictory, and it is probable that both factors may have contributed to this pattern of correlation.

Interesting to note are the significant negative correlations between ILM openness and both measures of group heterogeneity on tenure (# 10 and # 12 in Table 3), and positive correlations between ILM openness and those on age

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[7] Marxist theorists (cf. Edwards, 1977) view both structural differentiation and intra-firm promotion ladders (the ILM) as resulting from the capitalists' strategy of divide and conquer.

(# 9 and # 11 in Table 3). Since these two variables are both at the group level, Table 4 serves as a more appropriate guide, and it appears that no discernable relationship exists between age-heterogeneity and the ILM openness. But there is indeed a negative relationship between the degree of tenure-heterogeneity of a group and the ILM openness. This negative correlation suggests that the more open the ILM, the more homogeneous the group in terms of tenure. This is unexpected, since in a relatively open ILM we might expect to find a mix of people with long tenures promoted internally with the people with short tenures recruited from outside, that is, a group, heterogeneous in terms of tenure.

Several interpretations are possible. First, it is possible that in a relatively open ILM many of the top managers tend to join simultaneously or in a relatively short period of time as a team, resulting in a comparatively homogeneous group in tenure. Another possible explanation for this correlation might be found in the fact that the mean tenures for relatively open ILMs are much shorter, resulting in reduced range of variability on tenure. On the other hand, in a relatively closed ILM, the mean tenure tends to be longer and a few outside recruits would contribute to high variability, even though a majority of promotions to the top management positions may be more

orderly, and probably occur on a continuous basis. Another way of looking at this pattern of relationships is that in a relatively open ILM, the competition among members tends to take place on the basis of age rather than on the basis of tenure, thus resulting in a group which is relatively homogeneous in tenure.

High correlations (.88 and .95) between two measures of group similarity (mean distances and group heterogeneity on age and tenure) suggest that they are in fact tapping on the same underlying construct. These two measures, however, show some differences in the magnitude of their correlations with other variables.

4.3 INTERACTIONS

Simple correlations and bi-variate plotting can not give relevant guidance to assess the interacting relationships between the variables of interest. Before we conduct a multivariate analysis on the moderating effects of the ILM openness, age and tenure on the relationships between demographic similarity and turnover, I will try in this section to examine the approximate relationships between demographic similarity and the openness of an ILM, age and tenure. Table 6 to Table 8 present the breakdowns of distance score means by ILM openness, age, and tenure.

[Table 6] BREAKDOWN OF DISTANCE SCORES BY AGE AND TURNOVER

		Distance (age)		Distance (tenure)	
Turnover*		0	1	0	1
Age					
(1)		15.6	15.4	12.7	13.1
age < 41		(2.5)	(1.6)	(5.1)	(4.2)
	n=	134	4	134	4
(2)		10.9	10.0	11.9	11.1
age >= 41		(2.3)	(1.8)	(4.6)	(3.7)
< 48	n=	589	24	589	24
(3)		7.3	7.2	11.4	11.4
age >= 48		(1.6)	(1.5)	(4.3)	(4.9)
< 55	n=	1238	54	1238	54
(4)		6.8	7.6	11.9	11.9
age >= 55		(1.9)	(2.3)	(4.5)	(5.0)
< 62	n=	1623	81	1623	81
(5)		10.1	11.0	13.9	14.0
age >= 62		(3.0)	(2.8)	(6.0)	(6.2)
	n=	610	162	610	162

* 1 = those who turn over.
0 = those who stay.
** Numbers in parentheses are standard deviations.

[Table 7] BREAKDOWN OF DISTANCE SCORES BY TENURE AND TURNOVER

		Distance (age)		Distance (tenure)	
Turnover*		0	1	0	1
Tenure					
(1) tenure < 5		9.4	9.1	16.6	12.6
		(3.5)	(2.8)	(5.9)	(6.4)
	n=	329	19	329	19
(2) tenure >= 5 < 10		9.2	9.1	13.2	12.3
		(3.6)	(2.8)	(5.5)	(5.6)
	n=	505	44	505	44
(3) tenure >= 10 < 21		8.8	9.2	10.4	10.3
		(3.0)	(3.4)	(3.4)	(4.0)
	n=	1196	77	1196	77
(4) tenure >= 21 < 32		7.6	10.1	7.7	9.7
		(2.3)	(3.9)	(2.9)	(3.1)
	n=	1311	65	1311	65
(5) tenure >= 32		7.7	9.7	14.0	16.3
		(2.9)	(3.1)	(5.8)	(6.2)
	n=	853	121	853	121

* 1 = those who turn over.
0 = those who stay.
** Numbers in parentheses are standard deviations.

[Table 8] BREAKDOWN OF DISTANCE SCORES BY ILM OPENNESS AND TURNOVER

		Distance (age)		Distance (tenure)	
Turnover*		0	1	0	1
ILM Openness					
(1)		8.0	9.3	10.6	12.3
ILM < 9%		(2.9)	(3.4)	(4.0)	(4.8)
	n=	1379	87	1379	87
(2)		8.1	9.4	12.7	13.7
ILM >= 9%		(3.1)	(2.9)	(5.2)	(5.5)
< 16%	n=	1229	105	1229	105
(3)		9.4	10.8	13.8	16.6
ILM >= 16%		(2.7)	(3.2)	(4.1)	(5.7)
< 23%	n=	420	36	420	36
(4)		8.2	9.7	16.6	13.0
ILM >= 23%		(2.8)	(3.8)	(5.7)	(4.0)
< 37%	n=	809	63	809	63
5		9.0	8.7	11.3	9.0
ILM >= 37%		(3.5)	(3.0)	(6.5)	(5.6)
	n=	357	34	357	34

* 1 = those who turn over.
0 = those who stay.
** Numbers in parentheses are standard deviations.

Up to the 3rd row (see Table 6) in the ILM openness dimension (23% to 37%), the mean distance scores on age and tenure were larger for those who have turned over than who have stayed, suggesting the tendency for more distant members in age- and tenure-distances to turnover for this range. In row 4, this tendency is partially reversed: tenure distances are, on average, greater for those who have stayed than for those who have left, but average age-distances were smaller in the cases of stayers. The trend is completely reversed, however, in row 5 where the ILM openness is greater than 37%: those who turn over tend to be people with smaller age and tenure distance scores. These patterns of mean values appear to give preliminary support to hypotheses 5a and 5b that the relationship between demographic similarity and turnover is moderated by the openness of ILM. In the presence of a strong ILM, demographic similarity is primarily associated with social integration, rather than with competition. In a relatively open ILM, the situation is reversed; demographic similarity is associated with competition, and thus the more similar a member is, the more likely he or she is to turnover.

Interactions regarding Hypothesis 3a and Hypothesis 3b are related to the moderating roles of age and tenure in the relationship between demographic similarity and turnover. Table 6 shows the means of age- and tenure-

distance scores by age and turnover. For people at ages less than 48 years old, age-distance scores were larger in the case of stayers, suggesting a positive relationship between age-similarity and turnover (thus indicating the presence of competition effects). For people older than 48, the stayers turned out to be those with smaller distance scores, suggesting that the relationship between turnover and distance scores is positive in this range.

The pattern is not very clear regarding the age effect in the relationship between tenure-distances and turnover. Only for the age range of 41 to 48 was the mean distance score of the stayers larger than that of leavers. For other age brackets, the differences in tenure distance scores were either small or the same, showing no sign of hypothesized interaction effects.

Table 7 examines the moderating role of tenure in the relationship between age- and tenure-distance scores and turnover. The patterns of mean values are exactly as we hypothesized. In tenure brackets 1 and 2 (tenure < = 10 years), age distance scores, on average, tend to be smaller for the leavers than for the stayers. Then the relationship is reversed in tenure brackets 3, 4 and 5. This suggests that tenure moderates the relationship between age distances and turnover in the hypothesized directions.

The right two columns of Table 7 also show a strong

interacting role of tenure in the relationship between tenure-similarity and turnover. Mean distance scores of stayers in tenure brackets 1, 2, 3 were larger than those of leavers, while the reverse is true in the cases of brackets 4 and 5.

A more appropriate test of these interaction effects should require a multivariate setting, since as we have seen, there are some correlations between explanatory variables, and these correlations could not be controlled here to examine the interaction effects. For example, the relationship between group size and ILM openness, or the relationship between ILM openness and tenure, might have influenced the values in Table 6 to Table 8.

4.2 MULTIVARIATE ANALYSIS

Overview

This section examines the hypotheses in multivariate settings. Table 9 and Table 10, and Table 11 and Table 12 present coefficients of the explanatory variables obtained from the maximum likelihood estimation method. As I discussed in the method section, two different measures were used to construct demographic distance variables. Measure #1 for age and tenure distance scores is used to obtain the coefficients in Table 9 and Table 10, and measure #2 was used for coefficients in Table 11 and Table 12. Because of the potential collinearity problems associated with high correlations between first and second order terms (age, tenure, and distance measures), a deviation form was used for the estimates. Note that similarity measure #2 had already been standardized. For each measure, two separate tables were presented to test hypothesis 3 which is concerned with the relative explanatory powers of age- and tenure-similarity variables. Table 9 and Table 10 focus on age-similarity, and tenure-similarity variables, respectively. Different sets of variables were entered hierarchically in the models in order to examine how coefficients for the demographic similarity variables and other explanatory variables will behave with a different set

variables will behave with a different set of variables in the model. The order of variables to be included in the models (Table 9 to Table 12) is as follows:

(Model 1): Demographic similarity variables (age-distance and its squared terms).

(Model 2): Other demographic variables (age, age squared term, tenure and tenure squared term).

(Model 3): Group level variables (group size, firm performance, ILM openness, and group heterogeneity variable).

(Model 4): Time variables (annual fluctuations).

(Models 5 to 7): Each interaction variable related to the demographic distance variable.

(Model 8): All three interaction terms related to the demographic distance variable.

Model 1 of Table 11 reports the full model in which age- and tenure-similarity measures are all included.

In order to check the validity of the proposed model, I did three things. First, I estimated the same set of models using the complementary log-log model instead of the logit model to find out if the coefficients are sensitive to the estimation method, and the results are shown in Table 13. Second, I randomly split the whole sample into two sub-samples of approximately equal size, and

(Table 9)

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(1)	(2)	(3)	(4)
Distance (age)	.1690 ** (.0261)	.0844 * (.0309)	.0344 (.0448)	.0415 (.0446)
Distance Square (age)	-.0104 * (.0040)	.0185 ** (.0039)	-.0186 ** (.0040)	.0183 ** (.0040)
Age		.1107 ** (.0099)	.1158 ** (.0105)	.1129 ** (.0105)
Age Square		.0080 ** (.0015)	.0093 ** (.0016)	.0091 ** (.0016)
Tenure		-.0129 * (.0056)	-.0095 (.0062)	-.0097 (.0062)
Tenure Square		.0010 * (.0004)	.0007 (.0004)	.0008 (.0004)
Heterogeneity (age)			.0674 (.0491)	.0570 (.0493)
Openness of ILM			.0096 * (.0046)	.0096 * (.0046)
Group Size			.0101 (.0057)	.0088 (.0057)
Performance			-.0143 (.0080)	-.0134 (.0081)
Year 78				-.3146 * (.1388)
Year 79				-.1667 (.1284)
Year 80				.2041 (.1155)
Year 81				-.0017 (.1226)
Intercept	-2.5388 ** (.0663)	-3.3040 ** (.1138)	-3.8446 ** (.5421)	-3.7658 ** (.5457)
Chi-Square for Covariates	53.247	260.903	271.993	284.833

Interaction #4 = tenure distance * age;
Interaction #5 = tenure distance * tenure;
Interaction #6 = tenure distance * openness of ILM

** $p < .0001$, * $p < .05$.

(Table 9) continued.

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(5)	(6)	(7)	(8)
Distance (age)	-.0005	.0288	.0720	.0326
	(.0504)	(.0459)	(.0477)	(.0547)
Distance Squared (age)	-.0270 **	-.0183 **	-.0162 **	-.0247 **
	(.0052)	(.0042)	(.0042)	(.0054)
Age	.0785 **	.1091 **	.1136 **	.0796 **
	(.0136)	(.0107)	(.0105)	(.0143)
Age Squared	.0114 **	.0097 **	.0092 **	.0113 **
	(.0019)	(.0017)	(.0016)	(.0019)
Tenure	-.0091	-.0123 *	-.0096	-.0081
	(.0062)	(.0063)	(.0062)	(.0065)
Tenure Squared	.0008 *	.0006	.0008	.0009 *
	(.0004)	(.0004)	(.0004)	(.0004)
Heterogeneity (age)	.0468	.0554	.0683	.0565
	(.0509)	(.0498)	(.0498)	(.0513)
Openness of ILM	.0097 *	.0097	.0116 *	.0108 *
	(.0046)	(.0045)	(.0045)	(.0045)
Group Size	.0095	.0094	.0090	.0093
	(.0058)	(.0058)	(.0057)	(.0058)
Performance	-.0134	-.0149	-.0145	-.0139
	(.0082)	(.0081)	(.0082)	(.0083)
Year 78	-.3424 *	-.3177 *	-.3139 *	-.3401 *
	(.1402)	(.1391)	(.1389)	(.1401)
Year 79	-.1779	-.1681	-.1688	-.1787
	(.1291)	(.1286)	(.1285)	(.1291)
Year 80	.2068	.2003	.1998	.2051
	(.1161)	(.1157)	(.1156)	(.1162)
Year 81	.0218	.0055	-.0070	-.0235
	(.1233)	(.1228)	(.1227)	(.1234)
Interaction # 1	.0115 *			.0118 *
	(.0033)			(.0037)
Interaction # 2		.0029		-.0013
		(.0015)		(.0020)
Interaction # 3			-.0023 *	-.0022
			(.0011)	(.0013)
Intercept	-3.6852 **	-3.7224 **	-3.8860 **	-3.7844 **
	(.5641)	(.5504)	(.5526)	(.5703)
Chi-Square for Covariates	298.924	288.590	289.458	301.845

Interaction #1 = age distance * age
Interaction #2 = age distance * tenure
Interaction #3 = age distance * openness of ILM

** $p < .0001$, * $p < .05$.

(Table 10)

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(1)	(2)	(3)	(4)
Distance (tenure)	.0279 *	-.0105	-.0195	-.0209
	(.0139)	(.0150)	(.0245)	(.0246)
Distance Square (tenure)	.0023	.0002	-.0002	-.0004
	(.0013)	(.0014)	(.0015)	(.0015)
Age		.1101 **	.1113 **	.1094 **
		(.0099)	(.0100)	(.0100)
Age Square		.0072 **	.0072 **	.0071 **
		(.0010)	(.0010)	(.0010)
Tenure		-.0122 *	-.0093	-.0096
		(.0055)	(.0063)	(.0063)
Tenure Square		.0013 *	.0012 *	.0013 *
		(.0005)	(.0005)	(.0005)
Heterogeneity (tenure)			-.0048	-.0063
			(.0296)	(.0297)
Openness of ILM			.0079	.0077
			(.0047)	(.0046)
Group Size			.0099	.0086
			(.0058)	(.0059)
Performance			-.0184 *	-.0176 *
			(.0083)	(.0084)
Year 78				-.3307 *
				(.1390)
Year 79				-.1613
				(.1280)
Year 80				.2051
				(.1150)
Year 81				-.0087
				(.1223)
Intercept	-2.6328 **	-3.3434 **	-3.2933 **	-3.3256 **
	(.0671)	(.1107)	(.4863)	(.4892)
Chi-Square for Covariates	18.052	238.040	247.945	261.971

** $p < .0001$, * $p < .05$.

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(5)	(6)	(7)	(8)
Distance (tenure)	-.0312	-.0186	.0019	-.0020
	(.0258)	(.0251)	(.0271)	(.0292)
Distance Squared (tenure)	-.0003	-.0020	-.0006	-.0016
	(.0017)	(.0019)	(.0016)	(.0019)
Age	.1104 **	.1090 **	.1087 **	.1085 **
	(.0101)	(.0101)	(.0101)	(.0102)
Age Squared	.0069 **	.0067 **	.0070 **	.0066 **
	(.0010)	(.0010)	(.0010)	(.0098)
Tenure	-.0128	-.0193 *	-.0083	-.0180 *
	(.0066)	(.0074)	(.0063)	(.0074)
Tenure Squared	.0013 *	.0013 *	.0012 *	.0012 *
	(.0005)	(.0005)	(.0005)	(.0005)
Heterogeneity (tenure)	-.0083	-.0080	-.0161	-.0156
	(.0300)	(.0303)	(.0304)	(.0308)
Openness of ILM	.0063	.0021	.0052	.0002
	(.0047)	(.0052)	(.0049)	(.0053)
Group Size	.0088	.0092	.0074	.0082
	(.0059)	(.0059)	(.0059)	(.0060)
Performance	-.0181 *	-.0182 *	-.0167 *	-.0176 *
	(.0084)	(.0084)	(.0084)	(.0084)
Year 78	-.3353 *	-.3452 *	-.3322 *	-.3463 *
	(.1391)	(.1393)	(.1389)	(.1392)
Year 79	-.1611	-.1687	-.1636	-.1705
	(.1280)	(.1282)	(.1281)	(.1283)
Year 80	.2053	.2083	.2047	.2077
	(.1151)	(.1153)	(.1151)	(.1154)
Year 81	.0069	.0026	-.0071	-.0009
	(.1224)	(.1226)	(.1223)	(.1226)
Interaction # 4	.0028			.0002
	(.0019)			(.0022)
Interaction # 5		.0027 *		.0025 *
		(.0010)		(.0012)
Interaction # 6			-.0011	-.0010
			(.0006)	(.0006)
Intercept	-3.3106 **	-3.1955 **	-3.3852 **	-3.2405 **
	(.4911)	(.4960)	(.4932)	(.4997)
Chi-Square for Covariates	264.226	268.745	265.223	271.292

Interaction #4 = tenure distance * age
Interaction #5 = tenure distance * tenure
Interaction #6 = tenure distance * openness of ILM

** p < .0001, * p < .05.

(Table 11)

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(1)	(2)	(3)	(4)
Distance (age)	.5247 ** (.0839)	-.0095 (.1147)	.0107 (.1171)	.0408 (.1172)
Distance Square (age)	-.1085 * (.0437)	.0019 (.0494)	-.0045 (.0499)	.0010 (.0498)
Age		.1101 ** (.0105)	.1106 ** (.0107)	.1077 ** (.0107)
Age Square		.0072 ** (.0014)	.0065 ** (.0015)	.0061 ** (.0015)
Tenure		-.0123 * (.0055)	-.0084 (.0062)	-.0086 (.0062)
Tenure Square		.0011 * (.0004)	.0009 * (.0004)	.0010 * (.0004)
Heterogeneity (age)			.0502 (.0333)	.0487 (.0335)
Openness of ILM			.0069 (.0046)	.0069 (.0046)
Group Size			.0091 (.0056)	.0077 (.0057)
Performance			-.0171 * (.0080)	-.0162 * (.0081)
Year 78				-.3330 * (.1392)
Year 79				-.1645 (.1281)
Year 80				.2058 (.1150)
Year 81				-.0007 (.1223)
Intercept	-2.5280 ** (.0688)	-3.3220 ** (.1251)	-3.5849 ** (.3729)	-3.5698 ** (.3792)
Chi-Square for Covariates	51.677	237.457	248.670	262.635

** p < .0001, * p < .05.

(Table 11) continued.

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(5)	(6)	(7)	(8)
Distance (age)	-.0171 (.1234)	.0088 (.1187)	.3221 * (.1352)	.2037 (.1449)
Distance Squared (age)	-.1025 (.0645)	-.0277 (.0529)	-.0208 (.0500)	-.1047 (.0644)
Age	.0605 ** (.0139)	.0999 ** (.0109)	.1123 ** (.0107)	.0717 ** (.0143)
Age Squared	.0069 ** (.0017)	.0074 ** (.0016)	.0068 ** (.0015)	.0078 ** (.0017)
Tenure	-.0071 (.0063)	-.0146 * (.0064)	-.0089 (.0062)	-.0105 (.0065)
Tenure Squared	.0010 * (.0004)	.0001 (.0005)	.0008 (.0004)	.0004 (.0005)
Heterogeneity (age)	.0102 (.0349)	.0290 (.0340)	.0491 (.0332)	.0116 (.0347)
Openness of ILM	.0047 (.0046)	.0061 (.0046)	.0097 * (.0045)	.0061 (.0045)
Group Size	.0066 (.0057)	.0087 (.0057)	.0084 (.0057)	.0079 (.0058)
Performance	-.0184 * (.0083)	-.0197 * (.0082)	-.0161 * (.0081)	-.0193 * (.0083)
Year 78	-.3728 * (.1405)	-.3450 * (.1402)	-.3334 * (.1397)	-.3696 * (.1401)
Year 79	-.1839 (.1290)	-.1675 (.1287)	-.1621 (.1284)	-.1788 (.1293)
Year 80	.2116 (.1160)	.2034 (.1159)	.2054 (.1154)	.2098 (.1165)
Year 81	.0151 (.1235)	.0015 (.1233)	-.0001 (.1225)	-.0110 (.1238)
Interaction # 1	.0524 ** (.0115)			.0404 * (.0123)
Interaction # 2		.0276 ** (.0057)		.0116 (.0068)
Interaction # 3			-.0171 ** (.0039)	-.0133 * (.0044)
Intercept	-3.0506 ** (.3906)	-3.2536 ** (.3815)	-3.6610 ** (.3798)	-3.0921 ** (.3929)
Chi-Square for Covariates	289.177	288.818	281.447	308.331

Interaction #1 = age distance * age
Interaction #2 = age distance * tenure
Interaction #3 = age distance * openness of ILM

** p < .0001, * p < .05.

(Table 12)

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(1)	(2)	(3)	(4)
Distance (tenure)	.2279 *	-.0864	-.0516	-.0513
	(.0861)	(.1062)	(.1068)	(.1067)
Distance Square (tenure)	-.0164	.0068	-.0133	-.0132
	(.0433)	(.0472)	(.0474)	(.0474)
Age		.1106 **	.1113 **	.1093 **
		(.0099)	(.0100)	(.0101)
Age Square		.0072 **	.0072 **	.0071 **
		(.0010)	(.0010)	(.0010)
Tenure		-.0123 *	-.0091	-.0093
		(.0055)	(.0063)	(.0063)
Tenure Square		.0015 *	.0012 *	.0013 *
		(.0005)	(.0005)	(.0005)
Heterogeneity (tenure)			-.0159	-.0156
			(.0190)	(.0192)
Openness of ILM			.0085	.0086
			(.0045)	(.0049)
Group Size			.0099	.0085
			(.0058)	(.0059)
Performance			-.0185 *	-.0177 *
			(.0083)	(.0084)
Year 78				-.3285 *
				(.1390)
Year 79				-.1580
				(.1280)
Year 80				.2093
				(.1150)
Year 81				-.0061
				(.1224)
Intercept	-2.5600 **	-3.3676 **	-3.0336 **	-3.0491 **
	(.0703)	(.1258)	(.3509)	(.3534)
Chi-Square for Covariates	13.587	239.839	248.581	262.098

** $p < .0001$, * $p < .05$.

(Table 12) continued.

Maximum Likelihood Estimates for Covariates
(N = 4519)

Covariates	Models			
	(5)	(6)	(7)	(8)
Distance (tenure)	-.1093 (.1131)	-.0448 (.1077)	.0292 (.1287)	.0013 (.1359)
Distance Squared (tenure)	-.0355 (.0503)	-.0469 (.0525)	-.0106 (.0475)	-.0458 (.0531)
Age	.1116 ** (.0102)	.1085 ** (.0101)	.1080 ** (.0102)	.1085 ** (.0104)
Age Squared	.0068 ** (.0010)	.0066 ** (.0010)	.0070 ** (.0007)	.0065 ** (.0010)
Tenure	-.0137 * (.0068)	-.0188 * (.0074)	-.0075 (.0065)	-.0176 * (.0079)
Tenure Squared	.0012 * (.0005)	.0011 * (.0005)	.0012 * (.0005)	.0010 (.0005)
Heterogeneity (tenure)	-.0171 (.0192)	-.0192 (.0191)	-.0142 (.0192)	-.0179 (.0192)
Openness of ILM	.0073 (.0049)	.0038 (.0053)	.0093 (.0049)	.0046 (.0053)
Group Size	.0093 (.0060)	.0112 (.0060)	.0082 (.0059)	.0109 (.0060)
Performance	-.0193 * (.0083)	-.0201 * (.0085)	-.0172 * (.0084)	-.0201 * (.0085)
Year 78	-.3317 * (.1392)	-.3305 * (.1391)	-.3262 * (.1389)	-.3288 * (.1391)
Year 79	-.1591 (.1280)	-.1630 (.1281)	-.1575 (.1280)	-.1621 (.1281)
Year 80	.2061 (.1151)	.2082 (.1152)	.2090 (.1150)	.2071 (.1153)
Year 81	.0011 (.1225)	.0007 (.1225)	-.0067 (.1224)	-.0004 (.1226)
Interaction # 4	.0182 (.0107)			.0071 (.0122)
Interaction # 5		.0132 * (.0056)		.0110 (.0063)
Interaction # 6			-.0049 (.0044)	-.0042 (.0044)
Intercept	-2.9672 ** (.3559)	-3.2536 ** (.3815)	-3.0713 ** (.3544)	-2.8784 ** (.3600)
Chi-Square for Covariates	265.217	268.184	263.391	269.487

Interaction #4 = tenure distance * age
Interaction #5 = tenure distance * tenure
Interaction #6 = tenure distance * openness of ILM

compared the coefficients obtained from these two sub-samples. The coefficients for variables obtained from these two sub-samples are presented in Table 14. Third, the coefficients obtained from each sub-sample were used to predict the number of turnovers in the other sample, and the actual number of turnovers was compared with the predicted number of turnovers.

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4.2.1 ANALYSIS

Demographic Similarities

The major theoretical thrust guiding this research has been on the potential link between demographic similarity and competition. The first empirical evidence that could lend support for the presence of this competition effect would be a negative relationship between demographic distance variables and the probability of turnover, for at least a part of the distance range. Models 1 to 4 of Table 9 suggest that the effects of age-distance and its squared term on turnover probabilities are robust and are independent of other explanatory variables. A Chi-square test for the distance-square term (age) confirms the relevance of specifying curvilinear relationship. Furthermore, examining the magnitudes of distance on age and its square terms in Equation 2 reveals that, for the sample at hand, the highest level of turnover occurs in the range of the age-distance scale and the rate of turnover decreases towards both ends of the scale, which is consistent with the plotting in Figure 5. The coefficients for these terms are not altered in any significant way with the introduction of other control variables, thus giving confidence in the relationship between age-similarity and turnover, independent of other variables.

However, the result regarding the effects of demographic similarity on turnover turns out to be sensitive to the choice of the measurement of similarity (see Table 11). Age-distance terms in Table 11 were not significant in any models including other explanatory variables (models 2 to 4 in Table 11), suggesting that the significant associations shown in model 1 of Table 11 is due to their collinearity with other influential variables of age and tenure. Recall that the distance measure in Tables 11 and 12 is a standardized one, measuring an individual's relative ranking in distance scores within a group. The presence of consistent effects of age distances on turnover in Table 9 is sharply contrasted with the absence of any independent effect of age distances in [Table 11]. Note that the information contained in the first measure is greater than the second measure, in the sense that the second measure can be constructed from the first one, but not vice versa. This indicates that the extra information (absolute values of age-distance scores in this case) matters. In other words, the absolute distance scores can be compared across different groups (see also the Chi-square statistics at the bottom row in Tables 9 and 11).

Tenure similarity does not seem to have as much explanatory power as age similarity. Not only did the coefficient for the squared term fail to reach any

group in Wagner et al.'s case; for details, see p 63), however, keep us from making a direct comparison. Furthermore, as we discussed previously, they did not control for individual level variables when assessing the group level property of demographic similarity. Also, biases resulting from right-censoring problems might have biased their result.

Interaction Variables.

Six interaction terms (three were concerned with age distance, and the remaining three were with tenure distances) were constructed to test the moderating roles of ILM openness, age, and tenure with respect to the relationships between likelihood of turnover and age and tenure distances. The two interaction terms, age distance*ILM openness and age distance*age were significant in the predicted directions, if entered separately into the model (models 5 and 7 of Table 9). The interaction #2 (age distance*tenure) was not significant at the two-tail test, but the p-value was close to .05 and the coefficient was in the hypothesized direction. When all three of them were entered together (model 8), only the age distance*age term emerged as related significantly to turnover probabilities, suggesting that adding the other interaction terms did not improve the fit significantly (look at the Chi-square values

at the bottom row).

Note again that the distance measure #1 was used to estimate the parameters of the models in Table 9 and Table 10. This may not be a valid way of testing the interaction hypotheses, although the coefficients in Table 9 show some support for the interacting hypotheses. Using the absolute values of distance scores as a measure of demographic similarity could bias the results when it comes to testing the interaction terms, since the interaction terms are concerned with the effects of differences in relative distance scores within a group.

Let us take a simple example to expand on this point. Hypothesis 8 posits that in a relatively open ILM the relationship between demographic distances and turnover probabilities can be negative due to competition effects associated with demographic similarity. Suppose that the hypothesis 8 is true, and there are two groups that differ very much in demographic distributions and ILM openness: group (A) is largely closed in terms of ILM structure and is staffed with quite homogeneous members (thus their scores in distance scale are very low). Group (B) is comparatively open in ILM and are staffed with heterogeneous members (thus their scores on the distance scale are very high). We expect to find turnovers of people with relatively low distance scores from group (B), and turnovers of people with

relatively high distance scores from group (A). Note that the 'relatively high distance scores' of the members exiting from group (B) may not necessarily be higher than those 'relatively low distance scores' of the members from group (A). If the distance scores of people exiting from group (A) are lower than those from group (B), then using the absolute values of distance (distance measure #1) (Table 9 and 10) as similarity measure would not allow us to estimate correct coefficients for the interaction terms, despite the fact that the hypothesis is correct. The same logic applies to interaction terms involving age and tenure.

These considerations led to constructing Table 11 and [Table 12], that show the coefficients of explanatory variables and interaction terms estimated by using the distance measure #2 for demographic similarities.

The coefficients for interaction terms emerge as much more potent variables and greatly improve the fit. A Chi-square difference of 46.331 was attributed to the three interaction terms in Table 12 (the difference between Chi-squares of model 8 and that of model 4), in contrast to the difference of only 17.012 in [Table 10]. Not only was the overall fit increased, but also the interaction #2 (tenure*age distance) emerged as an influential variable (see model 6). When the three interaction terms were entered together, however, the coefficient of interaction #2

turned insignificant again, probably because of its collinearity with interaction #1 (age*age distance).

Overall, the coefficients of parameters in Table 11 provide relatively strong empirical evidence for the three interaction hypotheses related to age distance. The analysis of interaction terms suggests that the relationship between age similarity and turnover is strongly moderated by structural charactertistics such as ILM openness, and by individual characteristics such as age and tenure. Age similarity is more likely to trigger competition when there is not a strong internal labor market, the individuals are relatively young, and are at the relatively early stages of their organizational lives in the current group. In sum, confirming these interaction hypotheses gives support to the validity of the proposition that demographic similarity is positively related to the intensity of competition a member has to face in a group.

The interaction hypotheses related to tenure distances were a different case. Only interaction #5 was statistically significant (see model 6 of Table 12) and even that interaction term was not significant with other interaction variables in the model (model 8 of Table 12). This pattern of parameter estimates suggests that tenure similarities do not seem to serve as a strong base for social integration or for competition between members.

(Table 13) Full Model and Complementary Log-Log Model
Maximum Likelihood Estimates for Covariates (N=4519)

Covariates	Models (1) (link= logit)	(2) (link= complementary log)	(3) (Industry performance)
Distance (Age)	.1213	.2511	.2115
	(.1766)	(.1601)	(.1513)
Distance Squared (Age)	-.0956	-.1378	-.0949
	(.0641)	(.0570)	(.0646)
Distance (Tenure)	-.1722	- .1327	-.1044
	(.1766)	(.1597)	(.1456)
Distance Squared (Tenure)	-.0183	- .0296	-.0191
	(.0535)	(.0505)	(.0547)
Age	.0711 **	.0662 **	.0666 **
	(.0151)	(.0144)	(.0153)
Age Square	.0071 **	.0057 **	.0071 **
	(.0018)	(.0016)	(.0018)
Tenure	-.0095	-.0092	-.0071
	(.0083)	(.0077)	(.0085)
Tenure Square	.0009	.0007	.0011
	(.0006)	(.0005)	(.0006)
Heterogeneity (Age)	.1213	.2511	.0232
	(.1766)	(.1602)	(.0396)
Heterogeneity (Tenure)	-.0198	-.0163	-.0132
	(.0207)	(.0193)	(.0216)
Opennesss of ILM	.0066	.0072	.0078
	(.0053)	(.0049)	(.0053)
Group Size	.0094	.0097	.0090
	(.0062)	(.0056)	(.0066)
Performance	-.0191 *	-.0191 *	-.0232 *
	(.0087)	(.0081)	(.0107)
Year 78	-.3400 *	-.3181 *	-.3330 *
	(.1329)	(.1345)	(.1426)
Year 79	-.1606	-.1279	-.1937
	(.1207)	(.1223)	(.1353)
Year 80	.2069	.1994	.1937
	(.1063)	(.1076)	(.1179)
Year 81	.0013	-.0143	.0310
	(.1147)	(.1159)	(.1252)
Interaction # 1	.0367 *	.0327 *	.0389 *
	(.0125)	(.0119)	(.0127)
Interaction # 2	.0163 *	.0144 *	.0172 *
	(.0078)	(.0069)	(.0079)
Interaction # 3	-.0119 *	-.0122 *	-.0109 *
	(.0051)	(.0045)	(.0052)
Interaction # 4	-.0142	-.0159	-.0141
	(.0134)	(.0124)	(.0134)
Interaction # 5	.0053	.0052	.0046
	(.0069)	(.0065)	(.0070)
Interaction # 6	-.0012	.0009	-.0002
	(.0045)	(.0041)	(.0046)
Industry performance			.0101
			.0151
Intercept	-3.3039 **	-2.8994 **	-3.1615 **
	(.4462)	(.4096)	(.4565)
Chi-Square for Covariates	313.336	309.236	314.767

Tenure Similarity

Overall, distance measures on tenure and the interaction terms constructed from tenure distances were not found to affect the turnover process in any significant way (see Tables 10 and 12). Despite the relatively large sample size, none of the terms related to tenure distances either at the group level or at the individual level reached a statistically significant level. It did not matter whether the relative distance in groups or the absolute distance scale was used as a measure of the tenure similarity variable.

The only exception was the interaction term regarding the moderating effect of tenure on the relationship between tenure similarity and turnover. The coeffcients in models 6 of Table 10 and Table 12 suggest that for people with short tenures the tenure distances to the other group members tend to be associated negatively with the likelihood of turnover. Even this interaction term, however, lost its independent explanatory power with the introduction of all the variables related to age-distances (see model 1 of Table 13).

Although the effects of tenure differences were expected to be relatively smaller than those of age differences, the almost total absence of any effects is unexpected, and departs considerably from previous analysis

of demographic similarity effects. In the present theoretical framework, these results imply that similarity of tenure does not have any discernible effects on social integration or competition in top management groups. Given that the sample is unique in the sense that average tenure is comparatively long, a definite conclusion should be reserved until further studies on a more comprehensive sample are conducted. It might be that differences in tenure might have influences in both social integration and competition at the early stage of a work life, when the competition is likely to be with members of similar length of service. Tenure similarity may influence organizational members at the time when shared organizational experiences is an important base of association (Lawrence et al., 1989). Note that the top management groups are not known to occupy themselves with day-to-day intra-organizational affairs; thus sharing of intra-organizational experiences might not be as important as for those members at lower levels of hierarchy.

Overall, the consistent effects of age similarity and its related variables and the absence of any notable effects in the case of tenure similarity give support to hypothesis 6. The results are consistent with the analysis of communication frequency by Lawrence et al. (1989). Lawrence et al. (1989) suggested that tenure similarity was

primarily related to work-related technical communications, while age similarity was related to non-work-related communications, and accordingly, the effect of tenure similarity on the technical communication diminished over time. Recall that if the current sample contains a considerable number of people with short tenures, the majority has relatively long tenures (mean of 21 years).

Since there are not many works available that are concerned with the effects of tenure at the late stages of a work life, it is difficult to compare the result with other published works. The Wagner et al.'s (1984) analysis of top management groups is the one most closely comparable to the current sample, but they did not include the tenure distances variable in their model. I suspect that they did not find any convincing patterns of effects related to tenure similarity, and that was the reason that they did not report on the variables.

Other Variables

Age variables, including the squared term, turned out to be strong predictors of turnover, with or without controlling for other variables. The significant coefficients of the square term throughout different models, however, suggest that the relationship between age and turnover for the sample at hand is curvilinear: the lowest

level of turnover occurring in the middle range of age in the sample, and turnover rate increasing for both the very young and old members of the top management groups. This result suggests that Wagner et al mis-specified the age effects, and the data are not necessarily consistent with Wagner et al. (1984)'s analysis, which postulated a positive linear relationship between the two variables.

The main effects of the tenure and tenure squared term were at best marginal and were inconsistent throughout the models (Tables 10 and 12). The directions of tenure effects are the same as those of age effects, as was hypothesized, but the coefficients for tenure and tenure squared terms were no longer statistically significant in the full model (Table 13). Overall, it may be concluded that the relationship between tenure and turnover for the current sample is at best tenuous.

These marginal effects of tenure on turnover are surprising in a sense, given the robust relationships between these two variables reported in previous research (Mangione, 1975; Mobley et al., 1979; Tuma and Hannan, 1981). The same reasoning behind the lack of evidence for a tenure difference may explain this lack of consistent effects. Note that the majority of the literature on this relationship has been based on the analyses of relatively short-tenured, and lower-ranking members in an

organizational hierarchy (Mobley et al., 1979).

Hypothesis 7 concerning organizational performance was supported, though the effect was also not very strong. Members in low performing firms were shown to be more likely to turnover than those in high performing firms. Again, note that the merged or acquired firms were excluded from the sample, and this sampling bias may have weakened the relationship to some extent, because the variances in financial performance for the current sample are limited to those corporations having survived the observation period (or the years in which those activities did not take place in the cases of truncated firms).

Hypothesis 4 posited a positive relationship between ILM openness and likelihood of turnover. Comparing the results in Table 9 and Table 10 suggests that the collinearity between tenure differences (or mean tenure differences) and the openness of ILM was behind the lack of support for this variable in models of Table 10. Taking the relative values in a group, instead of absolute values, of tenure distances as the measure of tenure similarity also eliminated any sign of a significant independent effect of ILM openness on turnover probability (see Table 11 and 12).

In short, there is no consistent pattern in signs and magnitudes of the coefficients for these variables. It appears that any effects that the ILM structure has on

turnover rate is through its relation with age and tenure similarities. A further check on this possibility, however, reveals that there is no such interaction effect, at least at a statistically significant level.

In sum, the data suggest that the main effects of ILM openness are negligible, and the influence of ILM openness on the turnover process is in its interaction with age.

The group size as measured by the number of people in the group was not found to have any significant independent effect on the rate of turnover. Specification of a curvilinear relationship by including the squared term for group size did not alter the outcome in any significant way.

The annual fluctuations of turnover rate captured by four dummy variables were not shown to be great, with all the major variables of interest in the model. There was, however, some indication that turnover tends to be lower when the economy is bad. Recall that the second oil crises occurred during the years 1978 and 1979. Collapsing the four variables into one dichotomous variable by bracketing 1978 and 1979 together against the rest of years produced a result in which turnover was significantly lower in 1978 and 1979, compared to the rest of the years. This suggests that a bad economy tends to restrict the inter-organizational

voluntary mobility of top management personnel. This finding, however, might not be generalizable to other populations, given that the present sample is a comparatively powerful group, that could buffer itself from market or economic forces. For people at lower levels of an organizational hierarchy, an argument predicting the opposite is equally compelling: in times of bad economic situations, more firings or layoffs can be expected, even controlling for the performance of the firm. The mechanisms behind layoffs or firings of top management personnel might be different from that behind lower-level workers who are less powerful and whose outputs are easily measured, and whose numbers are adjusted more readily to fluctuating demand through the mechanisms of firings or layoffs in times of short demand (Freeman and Hannan, 1975).

Validation [7]

Table 13 shows the full model in which age-distance terms and tenure-distance terms were included in the same model. Adding the five terms related to the tenure distance did not improve the fit of the model significantly over the one without the tenure-related terms (Chi-square values of 313.336 vs 308.331 in model 8 of Table 11). The magnitudes and directions of coefficients of major parameters remained virtually the same, with five more variables in the model. Quite impressive are the interaction terms: all three of the terms related to age distance were significant, despite the considerable correlations with these additional variables.

Model 2 of Table 13 was run using the complementary log-log function in order to see if the results were sensitive to the choice of a functional form. Allison (1982; 1984) showed that when the underlying process of turnover was truly generated by a proportional hazard model, the complementary log-log function is shown to be asymtotically identical to the proportional hazard model. As all the pairs of coefficients indicate, the use of the complementary log-log function did produce the same patterns of coefficients as those produced from the logit model.

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[7] This section was guided by Dr. Kannan's suggestion.

The industrial differences were not controlled for in the present anaysis, and there are two ways that industrial differences can be important. One is the possibility that mobility of top managers may be more prevalent within an industry than across different industries. Thus, availablity of opportunities for the sample may be more closely related to specific industry performance than to general economic conditions. The second possibility is that organizational practices are more similar or isomorphic within an organizational field (Dimaggio and Powell, 1983), and the relationship between demographic similarity and competition or social integration may be dependent on industrial differences[8].

Model 3 of Table 13 reports the coefficients of the model including the variable of average return on equity of an industry. No significant changes in the coefficients took place, and the coefficient for the industry variable was not significant.

The second possibility is harder to test, since it is concerned with the qualitative differences by industries

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[8] The concept of an organizational field is harder to operationalize than the industries. An industry, however, can be regarded as a subset of an organizational field which conceptually includes populations of organizations linked horizontally as well as vertically (for more detailed discussion, see Dimaggio and Powell, 1983; Scott and Meyer, 1991).

and there is no a priori theoretical reason to believe that inter-personal competition (or social integration) between similar members is more prevalent in one industry than in another. My strategy was to construct a dummy variable differentiating a particular industry (coded as 1) from all the other industries (coded as 0) and run a model including a triple interaction term (age * age-similarity * dummy for industry). I repeated the procedure for all the major industries one by one, and no new pattern was found. It seems that the reported relationships are not specific to a particular industry. Note, however, that a lot of industries were represented in the sample and the greatest number of firms in an industry was nine in the case of food and beverage industry (see Table 1).

In order to check on the possibility that the large sample size[9] might be responsible for the significant relationships reported above, the same models were run using the half of the sample randomly divided from the original sample (a SAS data step was used to randomly split the sample in half). The results are presented in Table 14. The coefficients in models 1 and 2 show no significant departure from the models estimated from the original

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[9] The sample size of 4519 cases appears rather large. Note, however, that there were only 325 events (turnovers) out of 4519 cases. The 325 turnover events for the analysis are not extremely large cases.

(Table 14) Estimates for Two Random Sub-samples

Maximum Likelihood Estimates for Covariates

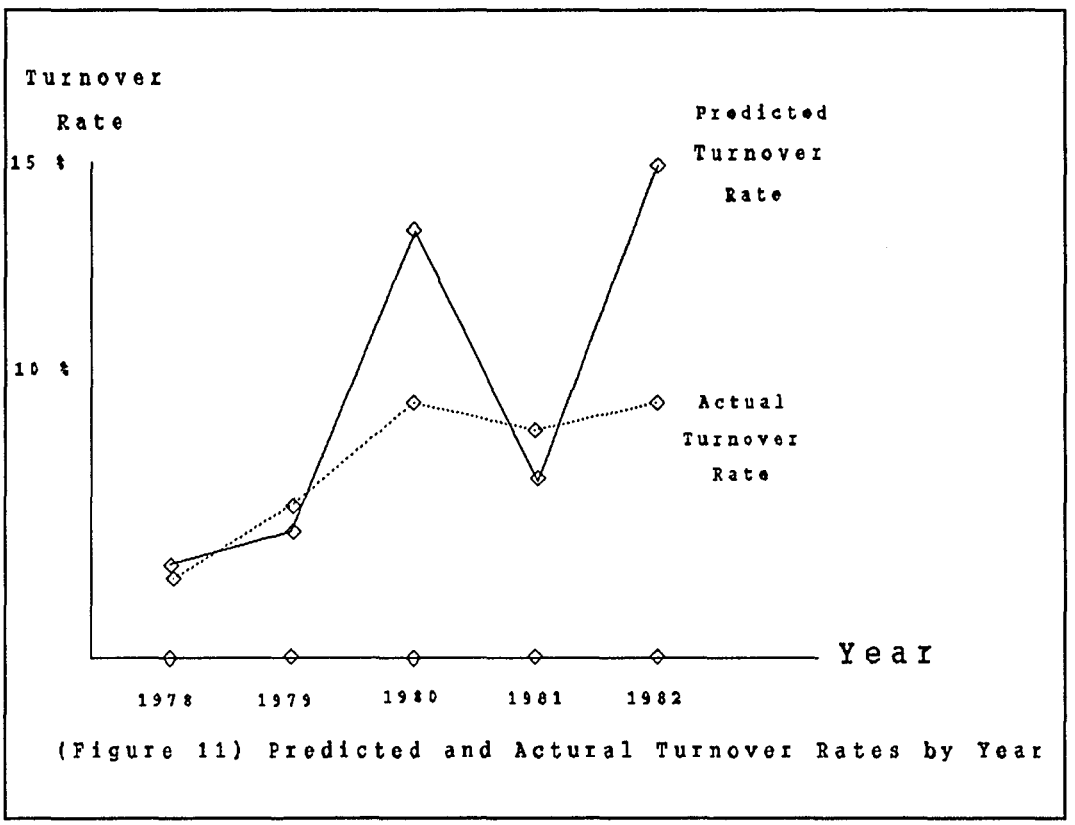
Covariates	Models	
	Sub Sample 1 (N=2312)	Sub Sample 2 (N=2207)
Distance (Age)	.3858	-.0614
	(.1968)	(.2252)
Distance Squared (Age)	-.0956	-.1312
	(.0850)	(.1025)
Age	.0473 *	.1015 **
	(.0195)	(.0213)
Age Squared	.0061 *	.0105 **
	(.0023)	(.0026)
Tenure	-.0013	-.0194 *
	(.0092)	(.0095)
Tenure Squared	.0009	-.0000
	(.0007)	(.0007)
Heterogeneity Measure # 1 (age)	.0483	-.0334
	(.0499)	(.0502)
Openness of ILM	.0112	.0027
	(.0066)	(.0064)
Group Size	.0058	.0118
	(.0077)	(.0089)
Performance	-.0045	-.0337 *
	(.0116)	(.0121)
Year 78	-.4155 *	-.2992
	(.1988)	(.2017)
Year 79	-.0861	-.2992
	(.1728)	(.1975)
Year 80	.1560	.3015
	(.1631)	(.1704)
Year 81	.1036	-.1596
	(.1620)	(.1965)
Interaction # 1	.0425 *	.0451 *
	(.0165)	(.0205)
Interaction # 2	.0110	-.0112 *
	(.0099)	(.0097)
Interaction # 3	-.0169 *	-.0128 *
	(.0065)	(.0063)
Intercept	-3.7006 **	-2.5760 **
	(.5547)	(.5750)
Chi-Square for Covariates	154.730	170.159

Interaction #1 = distance on age * age
Interaction #2 = distance on age * tenure
Interaction #3 = distance on age * openness of ILM
** p < .0001, * p < .05.

sample: the only noticeable differences were the emergence of a significant relationship for the tenure variable in model 2, and the loss of statistical significance for the performance variable in model 1 (the coefficient is still in the right direction). For all the remaining variables, identical patterns of coefficients were generated, adding confidence to the analysis conducted above.

Finally, I applied the coefficient estimates of model 1 (obtained from the calibration sample) to the second sample (which was used to generate the estimates for model 2, but not model 1, the holdout sample) to evaluate the predictive validity of the model. The model predicted 7.2344% of the cases to turnover for the holdout sample, and the actual number of turnovers was 173 out of 2312 cases (or 7.4827%). The standard deviation for the prediction was .266, suggesting that the actual turnover rate is well inside the 90% confidence interval. Figure 10 plots the predicted annual turnover rates for the holdout sample against the actual turnover rates. The 90% confidence interval, though not drawn, included the points of the actual annual turnover rate.

In sum, these validation procedures confirmed the results the earlier analysis produced.



(Figure 11) Predicted and Actural Turnover Rates by Year

5. DISCUSSION

The guiding argument of this project was that the demographic similarity in an organizational setting was related to the competition as well as the social integration (or facilitation of the communication). The empirical analysis appears to give strong support for the hypotheses derived from this new theoretical perspective. Specifically, the analysis suggested that the relationship between age similarity and turnover is curvilinear, reflecting the presence of competition effects as well as of social integration forces. The highest rate of turnover occurred for considerably distant members and the turnover rate for quite similar members appears to be very low, suggesting a positive relationship between similarity and turnover rate for this range. This may mean that social integration effects of demographic similarity are responsible for at least some part of the link between age similarity and turnover.

However, the relationship between age similarity and turnover appears to be non-linear. For extremely distant members on the age-distance scale, the turnover rate dropped considerably. Furthermore, I found that the relationship between age similarity and turnover was moderated by age, tenure and the openness of an ILM, all in the hypothesized

directions. When age is younger, tenure is shorter, or the group is relatively open to outside recruits, the impact of age similarity on turnover tends to be negative: the more similar an individual is to the other group members (or the more people with similar attributes), the more likely he or she is to turnover.

The social integration arguments, or the similarity-attraction framework in general, should have difficulty explaining the empirical results I reported above. The new perspective incorporating competition arguments as well as social integration arguments not only proved valid for the present data but also provided a theoretical framework that explains the seemingly inconsistent findings of Wagner et al.'s (1984) study, which found a positive relationship, and O'Reilly et al.'s study, which found a negative relationship between demographic similarity and turnover.

The data failed to support the group level effects of demographic similarity. The direction of the coefficient for the group similarity variable was consistent with previous findings, but my analysis showed no sign of a statistically significant relationship, when controlling for individual level similarity and other relevant variables.

Furthermore, the proposed model of demographic similarity highlights the need to consider group structures other than demographic composition for a balanced

understanding of the demographic process in a particular organization. Only one interaction hypothesis was tested regarding the structural effects in the relationship between demographic similarity and turnover, although it is very likely that there may be many other structural dimensions capable of shaping, or at least interacting with, the demographic process. In sum, the analysis of the data supports the existence of the structural effect on demographic processes.

There was, however, no consistent effect of tenure similarity on turnover: distance scores based on tenure were not related to turnover probability with any certainty. This suggests that tenure is not an important basis of association or competition for top management groups. Along with a lack of consistent main effect of tenure on turnover, this result raises the suspicion that tenure is important only at relatively early stages of an individual's work life and its influence as a basis of attraction or competition is at best marginal at later stages. The findings of the current analysis are, however, consistent with, and add generalizability to, Zenger and Lawrence (1989)'s arguments that the effect of tenure differences tends to diminish over time, while that of age differences persists. Because there is little work on tenure effect at the late stages of organizational life, I can not draw firm conclusions on

this point. More attention to the effects of tenure at the late stage seems warranted in future studies.

These differential effects of age and tenure, as well as age- and tenure-similarities highlight the fact that little is known at this point about the relative importance of different demographic variables as a basis of attraction and/or competition.

Although age and tenure have been two of the most important and also frequently included demographic variables in different settings, it should be admitted that the variables potentially affecting the turnover processes were not exhaustively included in the current analysis. Also, the heterogeneity of the present sample left many valid variables unaccounted for in the models. A more homogeneous sample might have been desirable to avoid the problems associated with omitting important variables. To some extent, this was unavoidable, since heterogeneity at the group level in the sample was necessary in order to test the hypothesis relating to structural variability.

6. IMPLICATIONS

People associate with other people similar to themselves. People also compete against each other, and the competition, almost by definition, is between people with similar attributes. To date, research in organizational demography has been guided primarily by the similarity-attraction argument. I argued that the similarity-attraction argument alone represents an incomplete part of the picture on the effects of demographic similarity, and tried to develop a model that gives a balanced theory by incorporating the competition aspects as well as social integration aspects.

If we agree that similar people are attracted to each other and compete against each other, the next fundamental question should be when and how these two apparently different forces produce behavioral outcomes. Little is known at this point to answer the question adequately. It is strange that the vast literature in organizational studies does not provide a conceptual model in which the interaction of the two basic forces of interpersonal relations, competition and social integration, is dealt with adequately. Studies in social psychological tradition have argued for the importance of on-going social relations and, in so doing, have neglected the structural

constraints: social integration rather than inter-personal competition was emphasized. On the other hand, the inter-personal relations pictured in organizational mobility models are those of competition shaped by the structural characteristics: the social relations' aspect of organizations is missing in these models. Organizations should be both, just as light has the properties of both a wave and a frequency at the same time. Accordingly, any balanced theory of demographic similarity should treat them as such.

I attempted to formulate a model in which several contingency relationships between demographic similarity and social integration and competition are delineated. As a first cut, I examined the effects of the differences in ILM structure and age and tenure on turnover. The data appeared to give support to the presence of competition effects as well as social integration effects associated with age similarity. But these should be only a few of the many potential factors influencing the relationship between demographic similarity and organizational outcomes. Also, the emphasis on competition in the proposed model highlighted the relevance of structural constraints in the demographic process, and there should be other structural or environmental variables with implications for the way people associate and compete. More studies need to be done

investigating the effects of other relevant structural dimensions in the relationship between demographic similarity and organizational outcomes.

The sample I studied included top management groups, whose power and prestige make them an unusual sample. Studies of similar design on a sample at relatively lower levels of organizational hierarchy might offer a meaningful attempt to test the validity of the proposed model further.

The extant theories in organizational demography still do not provide a good conceptual tool with which to differentiate the effects of a countless number of demographic attributes. I argued that one criterion for differentiating different demographic attributes would be to examine their relevance in the allocations of organizational rewards. More work needs to be done on what attributes matter how much in intra-organizational resource allocations. What are the other variables having many implications in intra-organizational reward allocations? If a demographic variable turns out to be relevant, does it moderate the relationship between demographic similarity and turnover likelihood?

It should also be recalled that turnover is only one outcome behavior resulting from demographic process. Application of the proposed model in studying other organizational outcomes would not be only possible but also

desirable.

One important aspect of demographic studies such as the current analysis is the use of objective demographic data which can still explain a great amount of the variation in organizational outcomes. However, the amount of information gained from this kind of approach may not be so rich as that obtainable from careful case studies. Case studies may be quite useful and desirable when the dynamics of a phenomenon we are interested in are poorly understood. The interacting dynamics of attraction and competition in intra-organizational settings are not understood well at this point. Organizational structures are not static: they can change and are constantly being defined. It would be erroneous to view organizational structures as determining members' behaviors without being influenced by them. I agree with Baron and Pfeffer (1991) that the structure itself is formed and continuously modified by social psychological interactions, although it may not be as fluid as they indicated. The dynamics of the interplay between organizational structure and demographic processes are not well understood. For the investigation of these dynamics in rich detail, a case study of a new cohort in an organization over a certain time period would be illuminating and desirable for understanding the demographic processes.

Although I admit that more empirical work testing

and extending the validity of the model should proceed before we can make confident assertions, some practical implications of the proposed demographic model can be tentatively drawn. First, the results of the present analysis suggest caution against any practices to make a group demographically homogeneous in the hopes of encouraging social integration, group cohesiveness or lowering turnover, before evaluating the group members' characteristics and the formal and informal reward systems operating in the group. For example, if the current promotion policy is vacancy-based and promotions or other reward allocations are influenced by demographic attributes such as age and tenure, adding people with similar attributes to the existing members may intensify competition, and the organization might end up losing existing members instead. The present analysis also confirms the possibility that highly similar members tend to be less likely to turnover than less similar members for the case of the relatively old people, giving support to the idea that a large cohort could become dominant, and thus dysfunctional, by forcing out dissimilar members who might be needed for the organization's sake to turnover. Turnover itself is not always an undesired outcome, and members of a large cohort who are highly socially integrated and thus not exiting can also be dysfunctional for the group.

From the individual's perspective, the decision to join a group or a firm should reflect not only how his or her demography is comparable with the existing members, but also an appreciation of the reward systems working in the group. Many members with similar attributes might facilitate his or her integration into the group socially, but it might well breed discontent and turnover if they find that the rewards, formal or informal, are competitively allocated on a demographic basis, and his or her share is less than expected because of competition from relatively many people with similar attributes.

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