WORKING HARD OR HARDLY WORKING?

THE IMPACT OF SOCIAL NETWORKS ON EMPLOYEES' PERFORMANCE

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Abstract

In my dissertation, I analyze the role of social networks on worker's post-hire outcomes in a large retail bank in the United States. More specifically, I am exploring the precise theoretical mechanisms by which a common organization practice —the hiring of new workers via employee referrals— shapes employees' productivity. I argue that social networks not only play an important role in the hiring of employees but also have important effects on post-hire job outcomes which have not been satisfactorily examined. Thus, I seek to deepen our understanding of social ties as a social process that might make employee referrals perform better at work than non-referral hires, other things being equal. I also investigate the level of interdependence among the post-hire attachment and performance of referred employees.

For the first time in this line of empirical research, I present a model of employee performance correcting for the turnover of hires within organizations. I show the extent to which turnover can be good (or bad) for organizations. If poor performers are found to leave and good performers stay, then turnover is clearly good for employers. The model will also provide a better understanding about the nature of performance linkages and career interdependencies. If high-productivity employees stay in the organization and keep good employees, then social relations at work are beneficial for the organization. However, the opposite can happen, and high-productivity employees might be leaving an organization and taking their good referrals with them.

To address this puzzle of the post-hire implications of social relations for organizations, I analyze unique and exceptional data on performance of the hires, information about ties among employees, and their demographic characteristics from a large retail banking organization in the United States. I am therefore in a better position than previous studies to sharply identify and test the theoretical mechanisms at work and better approximate the true magnitude of the effects of social ties on employee performance.

Introduction

Much work has been written regarding the relationship between the disciplines of sociology and economics (see Baron and Hannan 1994; Hirsch, Michaels, and Friedman 1987). In reviewing these studies, one particularly sees the differences in strategies and underlying assumptions between the two disciplines. From a sociological viewpoint, economics appears to reduce all explanations to the economic and individualistic motives and behaviors of individuals, and do not provide an adequate account, even within a strictly methodologically-refined approach, of how individual actions take place within networks of relationships (Granovetter 1988). Economists have been blinded by socially atomistic theories of labor markets, and as a consequence have downplayed the implications of employees' social ties for employees' careers within the organization. But sociological approaches should be also accused of completely ignoring the logical implications of economic theories by following a more empirically grounded approach to theory (see Baron and Hannan 1994; Hirsch, Michaels, and Friedman 1987). Because of this lack of dialogue between sociology and economics, neither approach alone has been able to provide an adequate understanding of how labor market institutions actually function.

In my dissertation, I take an important step toward integrating both economic and sociological approaches to the study of labor market outcomes. More specifically, I include the economic and sociological explanations side by side in a detailed exploration of the performance implications of the hiring of new employees via employee referrals. My study examines performance trajectories and considers the intertwined nature of an economic and social process such as the hiring of employees via employee referrals. Studying the effects of the hiring of new workers via employee referrals on performance has therefore important theoretical implications for organizational studies and economic sociology. I hope to enrich theoretical debates on the nature of embeddedness of labor market behavior in networks of social interaction and demographic constraint (Granovetter 1985 and 1988). I also hope to contribute to the body of research on hiring and post-hiring processes that engages both economists and sociologists in a dialogue.

A second major goal for this research is to advance the study of career dynamics, and gain a better understanding of both individuals' career development over their lives and the nature and effects of career opportunity structures. To date, scholars working in the area of job mobility and career dynamics have not had the opportunity to include post-hire employee behavior in their models. Much of the research on social mobility and career processes has focused on intergenerational mobility, investigating to what extent inequality is reproduced across generations. (For a review of research along these lines as well as recent studies using job histories to identify what factors affect an individual job mobility and its outcomes, see Rosenfeld 1992.) Including performance in these mobility models has great potential to add to our understanding of individual's career dynamics. The effect of individual characteristics such as gender on career differences can only be fully understood if both their direct and indirect effects (through performance) are examined.

Social Networks and Performance

There is by now a large body of literature about the social networks in labor markets (for a review, see Granovetter 1995). On the one hand, a significant number of studies have been devoted to the examination of the supply side of the labor market, comparing the labor market outcomes of job seekers who obtained their jobs via personal contacts with job seekers who found their jobs by other means (e.g., Bridges and Villemez 1986; Granovetter 1995; Lin, Ensel, and Vaughn 1981; Holzer 1988; Wegener 1991; Marsden and Hurlbert 1988). More recently, empirical studies of the demand side of the labor market have increasingly explored the organizational processes at work on the employer's side of the job-person matching process (Fernandez and Weinberg 1997; Petersen, Saporta, and Seidel 2000; Fernandez, Castilla, and Moore 2000).[1]

Although recruiting sources have been linked to employee turnover and tenure, starting wages, and wage growth (as proxies for productivity within the organization), very little work exists which examines

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[1] Only lately, Fernandez and Castilla (2001) have shifted the focus of analysis to the employee's perspective. Individual workers might view their own networks as a source of value: by investing their time and energy in referring candidates for employment in the organization, employees gain in so far as the referral bonus constitutes a return on such investment.

whether recruitment source is systematically related to worker performance. Employee referral programs where employers pay employees to refer candidates are common and widely believed to be valuable to employers (Fernandez, Castilla, and Moore 2000). But while there is a growing literature on how employers fill job vacancies (e.g., Barron and Bishop 1988; Barron, Bishop, and Dunkelberg 1985; Bills 1988), there is little research that examines the validity or basis of employers' perceptions that employee referrals help them hire better workers. In particular, sociologists know very little about the relationship between network recruitment and employee productivity. Even if we take earnings as a proxy for productivity, the empirical evidence on whether networks produce better hires is scant and inconclusive (Granovetter 1995).

In my research, I begin to address these issues. I explore the relationship between recruitment source and employee performance. More specifically, I provide evidence on the productivity implications of the hiring via referrals. I also examine the effects of worker interdependence between referrals and referrers on performance. Using unique data from a large retail bank, I investigate the precise ways preexisting social connections might influence employee performance in an organization. I structure my argument as follows. First, I start with the central prediction of the "better match" theory common in labor economics. The insight here is that, if referrers help to select better-matched employees, one would expect that after controlling for observable human capital characteristics, those workers hired via employee referrals should be more productive than non-referrals at hire. Second, and independent of this superior initial performance, referrals' performance advantages might manifest themselves in a steeper performance improvement post-hire. In this sense, if productivity improvement is a reflection of learning, network ties might affect both the potential levels of performance, as well as the rate at which employees learn. Third, and irrespective of any differences in performance trajectories between referrals and non-referrals, referrals may exhibit lower turnover than non-referrals. Because turnover and performance are likely to be related, any attempt to answer the question of whether referrals are better than non-referrals requires the examination of performance trajectories controlling for the process of turnover.

Finally, I study the effects of interdependence in performance between referrals and referrers. I look at the performance implications of what has been called the social enrichment process, according to which interdependence between referrals and referrers shapes employee performance. Even if one assumes that referrals are no better employees than non-referrals by looking at their résumé or at the time of the interview (or even by examining their performance trajectories), employers may still hire referrals at a higher rate simply because of the benefits of the social integration phenomenon at work. Referrals might be coached and trained by their referrers in many different ways. At the same time, networks might provide the support that helps reduce turnover and increase work satisfaction (and therefore productivity) in an organization. However, the opposite can also happen: good employees might be leaving an organization taking their good referrals with them. In this case, social relations are not necessarily positive for employers.

In the remainder of this document, I describe and criticize past research on the effect of social networks on performance within organizations. I present a set of testable hypotheses to address the mechanisms by which social connections might affect the performance of employees within organizations. I also examine the phenomenon of social enrichment at work. To empirically address my theoretical propositions, I estimate a dynamic model for employee performance and turnover decision of hires. I propose to do my research on a customer service center of a large US bank in the Midwest. This site has kept meticulous personnel records, unusually objective and precise measures of performance, and tenure information for all its Customer Service Representatives (CSR) hired from January 1995 through December 1996. In addition, I have information about referral ties among employees, and their demographic characteristics. Data like these allow special insight into the post-hire performance of workers. Thus, I am in a much better position than past studies to separate the effects of networks from other factors which impact employee performance. These data also constitute an exceptional source of information for looking at the interdependence on performance and turnover decisions between referrals and referrers. By showing how social networks might play a role as a determinant of employee productivity, my dissertation provides insightful directions for future research on social networks within organizations.

Theory and Hypotheses

Although a few studies have attempted to test whether hires made through personal contacts are better matched than people hired through other channels, to my knowledge, none has focused specifically on the productivity implications of the hiring via referrals in any depth. Many post-hire studies have shown that employee referrals are among the best sources of long tenure employees and that newspaper advertisements and employment agencies are among the worst sources (Decker and Cornelius 1979; Gannon 1971; Reid 1972; Sicilian 1995; Simon and Warner 1992). Personal contact hires' performance have been argued to be superior to that of isolated hires because social connections help to obtain difficult and more-realistic information about the job and the candidate. People hired via personal contacts have been argued to be better matched to a position than people hired in other ways.

However, the few existing empirical studies on whether workers hired through personal contacts are superior performers have a number of important limitations and omissions. First, the great majority of these studies have limited and sometimes inappropriate measures of employee performance. Regardless of whether the purpose was studying the impact of social networks on performance or not, a few sociological studies of performance did not even use actual performance measures.[2] The traditional post-hire indicators of referrals' better matches have been higher starting wages and slower wage growth (Quaglieri 1982; Simon and Warner 1992), lower turnover (Corcoran, Datcher, and Duncan 1980; Datcher 1983; Decker and Cornelius 1979; Quaglieri 1982; Gannon 1971; Simon and Warner 1992; Sicilian 1995; Wanous 1980) and the time path of turnover, and even lower absenteeism (Breaugh 1981; Taylor and Schmidt 1983). Some studies have showed that people hired through social contacts received better performance evaluations (Breaugh 1981; Breaugh and Mann 1984; Caldwell and Spivey 1983; Medoff and Abraham 1980 and 1981; Swaroff, Barclay, and Bass 1985). However, there is little research that uses direct measures of employee productivity to study the notion that employers might hire referrals because they are simply more productive.[3]

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[2] For example, Wiley and Eskilson (1983) used expectations of performance.

[3] Among the pioneer studies systematically expanding the scope of source of recruitment by including employee

But even if we take earnings and tenure as a proxy for productivity, the empirical evidence on whether networks produce better hires still has an additional drawback: post-hire studies might be unreliable in so far as they have ignored the dynamic aspects of performance. To my knowledge, this line of research has not analyzed employee performance as a feature of career dynamics —a process whereby workers learn and improve their performance over their work lives. Previous empirical studies have mainly focused on the link between social ties and post-hire outcomes at hire. But these past research accounts of the better match story might have underestimated the tendency for networks to recruit employees with superior performance careers. By design, any cross-sectional analyses may miss the role of personal contacts in building such a performance career. If the benefits of good early jobs found through contacts then translate into later labor market advantage, more effect should be attributable to social networks than can be captured in the cross-section. So the possibility that network ties themselves influence productivity and other job outcomes over time needs to be further explored with longitudinal information about employee performance.

The third problem is that most studies have started their analysis with hires and their results are therefore subject to the possible effects of selection bias (Berk 1983; Heckman 1979). While referral hires may be particularly well-matched to their positions, it is important to remember that non-referral hires are also survivors of a screening process that attempts to select recruits who are best suited to the job. Without controlling for the screening process, it is difficult to make inferences about the relative performance of applicants with and without personal ties (Fernandez and Weinberg 1997).

The fourth problem with all of these studies is that they ignore the interdependence of turnover and performance. By only examining the performance trajectories of survivors, one could observe a faster productivity improvement for a particular employee when all is really happening is that poor performers are leaving earlier as bad matches dissolve quicker than good matches (Tuma 1976; Price 1977;

performance evaluation, Breaugh (1981) shows that the source through which an employee was recruited is strongly related to subsequent job performance evaluation, absenteeism, and work attitudes, with individuals recruited through college placement offices and via the newspaper being inferior in performance (i.e., quality and dependability) to individuals who made contact based on their own initiative or were referred by another employee.

Jovanovic 1979). From the perspective of both the determinants and the consequences, it is necessary to evaluate the individual performance-turnover relationship of employees. A very few researchers have conceptually examined this relationship in any depth (Porter and Steers 1973; Price 1977). In general, the findings of such studies are quite mixed (Martin, Price, and Mueller 1981). For example, Bassett (1967) found that high-productivity performers were more likely to leave the organization; Seybol, Pavett, and Walker (1978) found higher performers less likely to leave; and Martin, Price, and Mueller (1981) found no relationship between performance and turnover. Thus, the evidence about the nature of the performance-turnover relationship is rather ambiguous. Regardless of whether turnover in the organization is getting rid of the bad matches or the good ones, to assess whether referrals are better than non-referrals, the study of growth differences in performance between referrals and non-referrals needs to account for the turnover process.

Another problem with most of these studies is related to the previous ones: all of the performance studies testing the better match theory see no role for post-hire social relations in affecting employee's behavior. This socially atomistic theoretical line of research has ignored workers' interdependence at work, i.e., to what extent post-hire social relations affect workers' behavior, particularly in performance and turnover decisions, and how such interdependence might not be necessarily positive for employers (Fernandez, Castilla, and Moore 2000).

In my dissertation, I take an important step toward correcting the problems and omissions in previous research on the post-hire implications of hiring via referrals. To my knowledge, this is the first study to overcome all these important limitations of previous research and provide evidence of the productivity implications of the hiring via referrals. Using data from a large retail bank, I am in a better position than past studies to investigate the precise theoretical mechanisms by which referral connections might influence employee productivity. My study also provides a further understanding of worker interdependence in performance.

Better Match Implies Better Performance at Hire

In general, referral hiring has been argued to be a practice in which social connections provide benefits to the hiring organization, thereby improving the quality of the match between worker and job.

This argument about personal contacts improving the match between the person and the job is common in economic studies of hiring via referrals, and has been referred as the "better match" account in the literature on referral hiring. Personal contact hires' performance have been argued to be superior to that of isolated hires because social connections help to obtain difficult and more-realistic information about the job and the candidate. [4]

As mentioned above, evidence for the better match hypothesis is mixed (Fernandez, Castilla, and Moore 2000). Perhaps the main reason for the inconclusive nature of these studies is that none of these studies has satisfactorily analyzed performance, the most important indicator to test whether a referral employee is a better worker than a non-referral employee.[5] Therefore, it is difficult to claim to have examined the match quality in depth without measuring productivity, one of the bases upon which employees are evaluated and compensated. In this research setting, I have a direct measurement of being "better": an objective measure of employee productivity. Thus, I can provide a strong test of whether referrals are better matched than non-referrals. If referrals are better matched to the job than non-referrals, one would then expect some performance advantage associated with referrals at hire:

HYPOTHESIS 1. *Referrals should perform better than non-referrals at hire.*

Support for this hypothesis could be due to the fact that employees have been screened. Employees are selected on observable individual characteristics from their résumé or during the interview. If one does not account for the fact that employers hire people who made it over a threshold

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[4] Previous theoretical accounts of the role of networks in hiring offer an extensive understanding of the mechanisms that could be producing the better match (see Fernandez, Castilla, and Moore 2000 for a review).

[5] Ultimately, the "better match" theory posits that employers may benefit from referral hiring because referrals simply exhibit superior performance and are therefore better workers than non-referrals. Wanous (1978, 1980) posits that individuals who possess more accurate and more complete information about a job will be both more productive and more satisfied with the organization than will individuals who have less accurate and less complete information. This is mainly because individuals who have more complete, relevant, and accurate information will have a clearer view of what the job entails (role clarity) and thus be more likely to perform the job well than will individuals lacking such information.

during the organization's screening process, the effect of the referral variable on initial performance might be biased down. In this sense, any of the previous studies relating recruitment source and turnover or productivity might be biased because they only analyze hires (e.g., Breaugh 1981; Breaugh and Mann 1984; Quaglieri 1982; Taylor and Schmidt 1983). In my study, I am in a better position to test hypothesis 1 correcting for the selection of hires in pre-hire screening. This is an improvement over past studies given that the correction will help to perform the mental experiment of what the initial performance of all applicants would have been if there was no screening process and they had been hired, and whether there exists any difference in initial performance between referrals and non-referrals at the time of hire.

So far, hypothesis 1 has emphasized how referrals might have an initial performance advantage over non-referrals. There is another way in which referring employees might provide extra information to employers about the performance quality of referral candidates. Employers can access "upstream" information that could be available because of the tendency of people to refer others like themselves; this is the "homophily" mechanism. According to this mechanism, referrals are more likely to be like referrers, and since referrers have already survived a prior screening process, the "homophily" process would lead the applicants referred by employees to be better performers than non-referred applicants. Thus, "homophily" highlights the necessity of including information about the referrer who is doing the referring as a predictor of employee's productivity.

Montgomery's (1991) theoretical model argues that employers are aware of homophily in referral networks and, consequently, use the characteristics of the referrer as an "upstream" signal of the qualities of the referred applicant (see Miller and Rosenbaum 1997; Ullman 1966). Although Fernandez, Castilla, and Moore (2000) did not find evidence that referrers' characteristics affect the firm's screening decisions, independent of the applicant's characteristics; there are still post-hire implications in the homophily mechanism that have not been investigated yet. The same arguments for which referrers' characteristics might affect the firm's screening decisions should apply to the recruiting of better hires. This yields to Hypothesis 2a:

HYPOTHESIS 2a. *Referrer's characteristics predict the referral's initial level of performance.*

By referrers' characteristics I mean variables that measure different aspects of the referrers' quality as an employee such as wage, tenure, and education. Studies show that when employees find their jobs through contacts with high rank and prestige, they tend to get jobs themselves (Lin, Ensel, and Vaughn 1981; Marsden and Hurlbert 1988; Wegener 1991). In addition, one should also include a variable about the referrer's structural accessibility to successful referrals (Fernandez and Castilla 2001). The structural accessibility to workers with superior performance is likely to be associated with the fact that the referrer might have worked in the job position for which she is referring. A referrer with such job experience is also likely to refer more productive candidates to the very same position.[6]

However, the productivity of referrers is the ultimate variable of interest here (since wage, tenure, and education are merely proxies for their productivity). At this point, there is no research on whether employers are sensitive to the productivity of the referral source. Employers might hire referrals from high productivity employees because they are themselves good performers. These leads to a hypothesis about how referrals' initial performance measures are predicted by the performance of the referrer. If the productivity of the referrers provides information about the performance qualities of the referred hires, it follows that:

HYPOTHESIS 2b. *Referrer's performance predicts the referral's initial level of performance.*

Better Performance Trajectories: Is it Performance Improvement or Vetting?

Hypotheses 1 and 2 by which referral hiring might improve performance at hire emphasize referrals' advantages over non-referrals at the beginning of their work contract with the organization. However,

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[6] There is clear evidence that people tend to refer people like themselves in this setting (Fernandez, Castilla, and Moore 2000); thus, former customer service representatives should be more likely to know people who might be better for the job.

these accounts of the better match story are still incomplete since they ignore the tendency for networks to recruit employees with superior performance careers. While referrals might not have an initial advantage over non-referrals, the advantage may manifest itself over time: referrals might exhibit better performance measures at later stages of job tenure than non-referrals. Cross-sectional analyses may miss the role of personal contacts in building such a performance career. If the benefits of good early jobs found through contacts then translate into later labor market advantage, the effect attributable to social networks is attenuated in the cross-section.

The possibility that network ties themselves influence productivity over time needs to be explored with longitudinal data on employee performance. Even if hypotheses 1 and 2 were not supported, the recruit's pre-existing ties to other employees could have two effects. First, referrers may provide information that help employers choose recruits who can learn the job and adjust more quickly to the workplace than other applicants. Second, because the referrer may be helping the recruit while on the job, referral hires might be able to adjust quicker to the job requirements than non-referrals.

[Figure 1a. About Here]

Thus, it is of interest to examine the performance trajectory of the employees in a firm. The path of performance likely reflects learning and skill acquisition within the organization. According to human capital theory, skill acquisition can be acquired in a number of ways, with formal education being perhaps the primary one. However, the second most important method of acquiring human capital is on-the-job training: "learning by doing" (Arrow 1962). On-the-job training makes a worker more productive at the current firm (and at some other firms in the same industry).[7] In a classic study of performance and tenure, Staw (1980) identifies three hypothetical functional relationships between performance and tenure within the organization (see Figure 1a for an illustration of some hypothetical relationships). He suggests that the traditional perspective (in labor economics, and also in the learning literature) assumes that performance of a new employee will initially be poor, will accelerate, and

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[7] Given equal performance trajectories, the more general on-the-job training is, the more the firm wants to employ workers with low turnover probabilities whose productivity will be greatly enhanced by the tenure in the firm.

eventually reach a plateau (that is, an S-shape function). However, for some other reasons such as stressful jobs, physically demanding or tiring tasks, a U-shape performance curve might be more descriptive. Some jobs, especially service-oriented ones, may be simply characterized by good early performance and subsequent "burn out." Greater attention should be paid to the studying of the tenure and performance relationship so that the most appropriate performance growth model can be identified. At this point, none of the post-hire studies of referral/non-referral differences has examined the trajectory of performance over the tenure of employees. This has been mainly because productivity is never easily measured; and it is even harder to have those productivity measures during the work life of workers.

[Figure 1b. About Here]

[Figure 1c. About Here]

Building on previous research, I am able to extend my hypotheses about the effects of social networks on post-hiring outcomes and examine differences in the performance growth trajectories by recruitment source. I conceptualize performance careers as the process whereby people improve performance over their work lives to approach some potentially best level of performance. This naturally suggests two additional means by which referrals might be better matched than non-referrals. Network ties might affect both the potential levels of performance as well as the speed of performance improvement of employees within an organization. In this sense, if referrals are better matched to the job than non-referrals, they might not only perform better right after being hired, but they should also perform better than non-referral hires in the long run. Figure 1b illustrates a general performance growth trajectory for a given individual (I assume that a higher Y means *lower* productivity).[8] Y^0 is the initial productivity in the job and it is a worse level of productivity than Y^*, the target level of performance that the employee might be able to achieve in a given work life, holding constant individual and contextual characteristics. If referrals were better matched to the job, this would be translated in a much lower

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[8] Negative Y-axis because the variable I will use to measure productivity in my research setting (handle time) is a negative measurement of performance (see later in this document).

target performance than non-referrals, after controlling for other individual and environmental factors. This leads to my next hypothesis, if referral workers are better matched to the job than non-referrals:

> HYPOTHESIS 3a. *Referrals should show potential performance superior to non-referrals.*[9]

A second proposition is that network ties might accelerate performance improvement over time — referrals might be faster at achieving their target level of performance than non-referral workers. This would mean a faster rate of performance improvement, and therefore a steeper performance growth curve. Figure 1c illustrates three performance curves with different rates of performance improvement (i.e., slower improvement, average, and faster improvement employees). If referrers help to identify faster-learners who are recruited to work for the organization, then it follows that:

> HYPOTHESIS 3b. *Referrals should improve their performance faster than non-referrals.*[10]

The same correction for selection bias suggested for Hypotheses 1 and 2 will be done for hypotheses 3 on differences in performance growth between referrals and non-referrals.

But in assessing whether referrals are better than non-referrals, there is also the issue of turnover. There obviously exists a relationship between turnover and performance which has not been explored in empirical studies at any length.[11] Generally, productivity can appear to improve due to two separate processes. The first process has to do with the fact that particular individuals show true improvement in performance over time. This process is consistent with the learning theory.

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[9] This means that referrals will exhibit a lower Y^* than non-referrals (see Figure 1b).

[10] What this means is that referrals will reach their potential performance level much quicker (earlier in their job tenure) than non-referrals. At the end what hypotheses 3a and 3b imply is that referrals will have better performance trajectories than non-referrals.

[11] A number of authors began a conceptual exploration of the positive organizational consequences of turnover (Dalton and Todor 1979; Mobley 1980, 1982; and Staw 1980).

However, there is a second process whereby the performance trajectory curve is affected by turnover. Since turnover may change the composition of the work place, the observed positive correlation between tenure and performance when measured across the cohort of workers (not for any particular individual) could be entirely due to population heterogeneity. If low-productivity performers are leaving first (Tuma 1976; Price 1977; Jovanovic 1979), what looks like productivity improvement is actually due to a creaming or selectivity effect.[12] Thus, the average workers' productivity will simply improve as long as low-productivity employees leave the organization at a higher rate than good employees. The net effect of the different rates at which low and high productivity employees terminate could look like productivity improvement over time when measured across the cohort of workers. But this is not *true* longitudinal productivity improvement because of the change in the composition of the work force.

Any attempt to assess whether referrals are better matched in this dynamic context, requires separating these two processes. Therefore, a test of differences between referrals and non-referrals with respect to performance should take into account the risk of termination. To my knowledge, nobody has ever attempted to present such a model of employee performance careers controlling for turnover. It could be that referrals might be leaving at a lower rate because they are better matched from the very beginning than non-referrals. This leads to my third hypotheses. Compared to non-referrals, if referrals are better matched to the job, they will have better real performance trajectories than non-referrals:

> HYPOTHESIS 4a. *Controlling for the risk of turnover, referrals should exhibit a better real target performance than non-referrals.*

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[12] Bartel and Borjas (1981) already introduced the question about the effect of labor turnover on wage growth within the job. They argued that the observed positive relationship between tenure and wage growth (i.e., longer tenure associated with a steeper wage growth) could be entirely due to population heterogeneity. There exist some unobserved individual characteristics which lead to low wages and high turnover rates for some persons, and to high wages and low turnover rates for other individuals. Then a cross-section correlation of wages and tenure would be positive even if wages did not grow at all in the job.

HYPOTHESIS 4b. *Controlling for the risk of turnover, referrals should exhibit a faster real rate of productivity improvement than non-referrals.*

So far, hypotheses 3 and 4 have examined how referrals might have better performance trajectories than non-referrals. Again, I will include information about the referrer who is doing the referring as a predictor of employee's productivity given the propensity of employees to refer people like themselves. This yields Hypotheses 5 and 6:

HYPOTHESIS 5a. *Referrer's characteristics predict the referral's potential level of performance.*

HYPOTHESIS 5b. *Referrer's characteristics predict the referral's rate of performance improvement.*

HYPOTHESIS 6a. *Referrer's performance predicts the referral's potential level of performance.*

HYPOTHESIS 6b. *Referrer's performance predicts the referral's rate of performance improvement.*

Post-Hire Interdependence in Performance

The last mechanism by which referral hiring might yield advantages is sociological and emphasizes post-hire social processes that occur among connected employees. The idea is that the match between the new hire and the job is enriched by the interaction between the referral and referrer at the new job setting. There is abundant literature on the socialization of the newcomers (Reichers 1987). Co-workers can help train, mentor, and monitor the new employees they refer (Bailey and Waldinger 1991; Grieco 1987). But the experience of the referral hire might simply be richer and more gratifying because the referrer is around to answer questions and give feedback, and participate in non-work related social activities.

Referrals could be serving as mentors and aid newcomers in the organizational socialization process, accelerating integration and enhancing training and performance at the work place. This process has been termed as the "social integration" or "social enrichment" process (Fernandez, Castilla, and Moore

2000); this mechanism is distinct from the better match argument common in labor economics because it occurs post-hire.[13] Thus, social relations between referrals and referrers affect new-hires' attachment to and performance in the company. While the economic theories such as the better match theory sees no role for post-hire social relations in affecting referrals' behavior, the "social enrichment" model posits that there will be interdependence between the post-hire attachment of the referrer and referral (Fernandez, Castilla, and Moore 2000). In my research, I look at the performance implications of the social enrichment process.

To understand these social processes requires analyzing the nature of worker's interdependence at the work place. More particularly, it is necessary to incorporate such interdependence between the referrer and referral when studying workers' performance. In this sense, all the previous hypotheses about the better match argument could be now complemented or even reframed as being about social enrichment. Thus, it can be the case that the referrer teaches the referral the ins and outs of the job at the very beginning of the job contract, even during the training period. In this case, it is the presence of the referrer which accounts for any performance differential between referral and non-referrals, and even between referrals whose referrer is around and referrals whose referrer is not around during the first months in the company. This leads to the following hypothesis:

> HYPOTHESIS 7. *The presence of the referrer during the training period should improve referrals' starting level of performance.*

Similarly, the referrer could help the referral along a quicker performance improvement trajectory. In fact, one could argue that, if the referrer is going to influence the referral, this influence should be strongest at the very beginning. Later on, non-referrals might be able to build a social network such that the referral's initial advantage dissipates. This leads to Hypothesis 8:

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[13] The better match mechanism (explored in the previous sections) ignores any post-hire interaction between referrer and referral. Assuming no post-hire interaction is like accepting that the firm has a policy of "shooting" the referrer right after the referral has been hired.

HYPOTHESIS 8. *The presence of the referrer should improve referrals' performance improvement trajectory.*

Regarding interdependence in turnover decisions, Fernandez, Castilla, and Moore (2000) show that referral ties have effects on employee attachment to the firm. They present evidence for interdependence of referrals' and referrers' turnover patterns. But the turnover of the referrer may also have some implications for performance even after the referral has been in the company for a while. For example, the leaving of the referral in itself may be a piece of information prompting the referral to re-evaluate her own satisfaction with the current job, which consequently may lower her performance. Another mechanism could be that the referrer's exit may reduce the quality of the work setting to an unsatisfactory level, also lowering referral's performance. In this sense, the referrer's decision to quit may negatively affect referrals' performance which might lead the referral to quit. On the other hand, the referrer's employment termination might not affect the referral's level of performance; instead it might only increase the referral's likelihood to quit. Referrers who leave the company may convey information about external job opportunities back to referrals (Fernandez, Castilla, and Moore 2000). If there is social interdependence affecting performance, it is of great interest to see what happens to the performance curve of those whose referrer leaves (and compare the performance curves among non-referrals, referrals whose referrer leaves, and referrals whose referrer stays). This leads to the following set of hypotheses:

HYPOTHESIS 9a. *The turnover of the referrer should affect the referral's potential level of performance.*

HYPOTHESIS 9b. *The turnover of the referrer should affect the referral's rate of performance improvement.*

At the same time, it would be worth exploring whether the positive effect of such interaction between referrer and referral at work is enhanced when the referrer's level of performance is taken into account. It is conceivable that only referrals from high-productivity referrers would perform at their best

when they have her referrer currently working for the organization. Conversely, social interactions with a low-productivity referrer at work might have a negative effect on referrals productivity. Jones (1990) shows workers interdependence in their productivity at the Hawthorne plant, and demonstrates that, allowing for a wide range of other factors mediated by the social interactions in the working group, workers' productivity levels are indeed highly interdependent. If referrals are exposed to high-performance referrers, their performance should be much higher than the performance of non-referrals or individuals referred by low-productivity referrers. This will imply that, irrespective of whether network hires are on average more productive, it is possible that there is a perceived or actual relationship between the performance of the referred and referring employees. If referrals' performance is affected by the amount of exposure to the referrer, one should explore whether exposure to a high-performance referrer is different from exposure to a low-performance referrer employee.

So in addition to examining differences in performance curve among non-referrals, referrals whose referrer leaves, and referrals whose referrer stays, I will study the effect of the performance of the referrer on the referral's performance. Performance trajectories might depend on the performance level of the referrer who is turning over. This will allow me to compare the performance trajectories of non-referrals with the performance trajectories of four other subsets of employees: (1) referrals whose high-productivity referrer stays, (2) referrals whose high-productivity referrer leaves, (3) referrals whose low-productivity referrer stays, and (4) referrals whose low-productivity referrer leaves. This yields Hypotheses 10:

> HYPOTHESIS 10a. *The turnover of a high-productivity referrer should affect the referral's potential level of performance.*
>
> HYPOTHESIS 10b. *The turnover of a high-productivity referrer should affect the referral's rate of performance improvement.*

Research Setting

The hypotheses described above explicitly address the different ways through which the hiring of referral employees might affect the future performance and career of the hires in one organization. The evidence required for a full evaluation of the arguments presented earlier is rather formidable. To my knowledge, no previous data that I am aware of contain anything like the full set of variables needed to assess these arguments. There are no empirical studies of the influence of network recruitment on employee performance that delineate the precise mechanisms at work in the hiring of employees via referral programs. The research setting and data I am using to test these hypotheses provide unusual opportunity to address the limitations of past research and further our understanding of the performance implications behind the hiring of employees using referral programs.

In my dissertation, the job I am going to study is the Customer Service Representative (hereafter CSR), an entry-level position job at a large, Mid-Western phone center, within a large, globally diversified financial service institution in the United States. This is a full-time, hourly position whose duties consist of answering customers' telephone inquiries about their credit card accounts. New hires into this position are given approximately two months of classroom and on-the-job training before working on the phone. CSRs are trained in order to improve accuracy, speed, and efficiency while processing phone calls. CSRs can expect to handle up to 5,000 phone calls per month. Phone calls are often monitored by managers to insure that the CSRs' courtesy and accuracy goals are being met.

I study records of the phone center's hiring activities during two years (from January 1995 through December 1996). The phone center's human resources department (hereafter PCHR) tracked more than 4,100 external employment inquiries for PCSR jobs over this two-year period. To address the post-hire consequences of the recruitment practices, I examine the monthly productivity histories of over 300 individuals who were hired during the two-year hiring window.

About the Organizational Site Under Analysis

There are two important features of the organization under study. First, the Mid-Western phone center is a single site with a centralized human resources function. It keeps particularly clean and

orderly databases, which allow every phase of the hiring process to be identified. As a centralized site, the phone center has near-perfect coverage of hiring into the phone service representative jobs.

There is a second important feature of the Mid-Western phone center particularly relevant to my dissertation research. The phone center routinely codes detailed measures of on-line performance in a central database. In addition to recording subjective supervisor ratings of performance, the phone center collects objective and precise measures of productivity for its phone service representatives as part of its standard operating procedure. This feature of the phone bank yields both statistical and theoretical improvements over previous studies of performance. The phone center's uniform and central collection of data makes for much cleaner measures of key dependent variables. This would greatly improve the estimates of the impact of recruitment source on employee productivity.

Measuring Employee Performance

Performance will be measured by an objective productivity referred to as handle-time. This performance measure available for CSRs is the average time a CSR takes to complete a phone call. Because calls are randomly routed to CSRs by the phone center computer, average difficulty of calls is similar, and thus, handle-time provides a good measurement of how efficiently a CSR answers the typical query. Compared with most performance measurements that are available in organizations, handle-time is exceptionally accurate. It is measured across a large sample of calls, and thus difficulty of task is equated across CSRs. It is measured automatically, and therefore is not subject to the normal problems of subjective performance ratings (e.g., supervisor ratings). Furthermore, it is measured across a large number of performance events (over 5,000 calls per month for the typical CSR at about two-and-a-half minutes per call). The maximum observed value was approximately 7 minutes, and the minimum was 1.65, with a mean of 2.69 minutes and a standard deviation of half a minute.

On a monthly basis, the performance of each CSR is also evaluated across different dimensions including two measures of quality (courtesy and accuracy). Quality is rated by unit managers, who listen to a sample of calls for each CSR. Both measures of quality are typically at ceiling and exhibit little variance across people and/or over time. The range is from 0 up to 1 (when all monitored calls are of maximum accuracy and/or courtesy) for the whole sample during the months of observation. Because

of the lack of variation across observations, I will not be using directly these measures of employee productivity. Instead I will divide handle-time by both quality measures to compute a quality-adjusted average handle-time for each employee. The maximum and minimum observed values for quality-adjusted average handle time are the same as for the non-quality adjusted average handle-time, with a mean of 2.72 minutes and a standard deviation of half a minute. Not surprisingly, both measures (average handle-time and quality-adjusted handle time) are highly correlated (with a correlation coefficient of .99 significant at the .001 level).

[Figure 2. About Here]

Figure 2 presents the observed average handle-time (in seconds) over employee time on the CSR job together with its 95 percent confidence interval (without correcting for the process of turnover of employees at this point). The curve shows that the productivity of a new employee is on average initially low, but improves over time. Eventually the level of productivity worsens slightly (after 12 months in the firm), although variance in productivity also widens (and the number of survivors decreases).

[Figure 3. About Here]

Figure 3 shows how there are differences in the levels of productivity by application source. The performance of referral workers appears to be superior to the performance of non-referrals, especially during the first year of tenure (i.e., referrals' average handle time is lower than non-referrals').

Independent Variables

Two different sets of variables will be used in this study to predict the employee trajectories of performance: individual demographic and professional characteristics and referrer's characteristics. The first set of variables includes human capital variables which are believe to influence not only screening decisions but also individual's post-hire outcomes such as productivity. Education and experience in previous jobs are some of the most important variables. Experience includes variables such as months of bank experience, months of non-bank experience, number of previous jobs, whether the hire was working at time of application, tenure in last job, and wage in last job (as a proxy for job status prior to the job at the bank site). I will also include in the analyses measures of different individual skills and capabilities such as having some computer knowledge, speaking another language (both are dummy

variables). Other sociological variables are included: male (coded 1 when the respondent is male), and marital status (1 being married, 0 otherwise).

The second set of variables includes variables measuring the availability as well as the characteristics of referrers that referrals have not only at time of application but also during their employment at the bank. In my dissertation, I explore whether the effect of referral ties on employee's performance continue beyond the hiring process and have effects later on performance in the firm. A dummy variable for whether the respondent is a referral or not is the first variable included as a network variable. My analyses are therefore conservative tests of the effects of social embeddedness of workers on productivity, given the fact that I have only one of an employee's network ties. The second set of variables measures the characteristics of the referrer, including variables such as education, wage, tenure in the firm, and performance rating in the company. I will also include variables about the referrer's structural accessibility to successful referrals like having worked as a CSR before. All referrer's characteristic variables are allowed to change over time except for education which is considered constant. Finally, a time-varying dummy variable is coded as 1 when the referrer leaves the organization.

Table 1 presents descriptive statistics for the independent variables included in the performance models for applicants, hires, and employees who stayed in the company at least a year.

[Table 1. About Here]

Methodology

My arguments pertain to the performance implications of the hiring via referral programs. Accordingly, my methodological approach is to break down the post-hire employee process into individual components and to model each of these important pieces to understand performance careers within organizations. The model about the performance growth will be corrected for the turnover propensity of employees.

Starting Performance Models

In order to analyze the determinants of starting performance measures, the dependent variable I use is the starting performance measure (by starting, I mean the starting performance measure after the initial two-month training period). Using OLS, I will estimate the parameters of models of the form:

$$Y_o = \theta'X + \varepsilon \qquad (1)$$

where Y_o is the first performance measure in the job as a phone customer representative after training and is normally distributed, X is a vector of covariates that contains characteristics of the individual at the time of entry into the organization (i.e., as coded from their job applications), as well as the state of the market at time of application, and ε is the disturbance term assumed to be well-behaved (uncorrelated with the covariates).

The OLS performance equation proposed above has been traditionally estimated for the hires, mainly due to the lack of information about job applicants. Thus, this past models do not correct for selection bias as the result of only observing initial performance for the applicants who got hired and survived the two months of training in the site. In order to correct for such selection bias, I use the Heckman selection model (Gronau 1974; Lewis 1974; Heckman 1976). This model assumes that there is an underlying regression relationship like the one described in the regression equation (1). The dependent variable, performance, is however not observed for all applicants or hires that were terminated during the two-month training. So there is a selection equation; and the applicant is hired and survives the initial training period in the organization (i.e., the applicant is therefore "selected") if:

$$\Upsilon'Z + \mu > 0$$

where Z is a vector of covariates that affect the chances of observation of performance for a given applicant (i.e., being hired and surviving the training period), μ is normally distributed with mean 0 and standard deviation of 1. The correlation between ε and μ is some parameter ρ; so that when ρ is different than zero, standard regression techniques applied to equation (1) yield biased results, and the Heckman selection model provides, instead, consistent, asymptotically efficient estimates for all the parameters of such models.

Performance Growth Models

Performance careers are the process whereby people move up in performance, over their work lives, to approach some potentially highest position. For my study of performance trajectories careers I will analyze longitudinal data. While a comparison of cross-sectional analyses at different points in time provides some insight into this process, models of change represent it explicitly. Here the concern is to account for the social and economic conditions that differentiate employees on two distinct dimensions: the speed of their performance improvement and the extent of their performance improvement. Since productivity measures were reported every month, I can attempt to model the exact time path of change. To test my hypotheses about the determinants of change in productivity, one of the models I will employ is the partial adjustment model (see Tuma and Hannan 1984 for more information).[14] Partial adjustment is specified by two parameters: a "rate of adjustment" and a "target." In the present context, it is useful to consider the target as the maximum productivity level that an individual can can achieve, and the rate of adjustment as the speed at which the individual is moving to that level. The stochastic partial-adjustment model may be written in continuous time as:

$$d[Y(t)]/dt = r\,[Y^{*} - Y(t)] + v(t) \qquad (1)$$

where, $d[Y(t)]/dt$ is the instantaneous rate of change in performance, r the rate of adjustment, expressing how quickly each individual is approaching her target level of performance at time t; and $Y(t)$ is the level of performance achieved at time t. Here Y^{*} is the potential level of performance; so that $Y^{*} - Y(t)$ is the gap between the present performance level at time t and the target level Y^{*}. The partial adjustment implies that each individual moves a fraction r of the gap closer to the target in each unit of time (hence, the name). Figure 1b illustrates a general performance growth trajectory for a given individual (and I assume that a higher Y means *lower* productivity).[15] Y^{0} is the initial productivity in the job and it is a

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[14] This approach has been used in analyses of the relation between organizational size and formalization (Hummon, Doreain, and Teuter 1975), the expansion of national educational systems (Nielsen and Hannan 1977), the dynamics of political mobilization (Nielsen 1980), and organizational growth and decline processes (Freeman and Hanna 1980), the effects of organizational dynamics on gender integration among California state agencies (Baron, Mittman, and Newman 1991). A systematic discussion of the model and its estimation is provided by Tuma and Hannan (1984).

[15] Negative Y-axis because the variable I will use to measure productivity in my research setting (handle time) is a negative measurement of performance.

worse level of productivity than Y*, the target level of performance that the employee might be able to achieve in a given work life, holding constant individual and contextual characteristics. The model incorporates a disturbance term, v(t), which is assumed to be a random white noise process with a mean of 0. It is this disturbance term which makes the model in Equation (1) a stochastic differential equation. So according to Equation (1), the rate of change in Y (d[Y(t)]/dt) is proportional (by r, which is positive, as explained below) to the gap that exists between the achieved level of Y and the potential or target level (Y^*).

The performance growth model will allow me to explore the productivity differences between those workers hired via employee referrals and isolate workers. If referrals are better matched to the job than non-referrals, they might not only perform better right after being hired, but they should also be potentially more able to perform better than any non-referral hire in the long run. In this sense, network ties might affect both the potential levels of performance as well as the speed of performance improvement of employees within an organization. I will also incorporate the level of interdependence among socially connected employees to understand its performance implications.

Any of these estimated longitudinal models will have to be corrected for the turnover process. In order to perform such correction, I will estimate the longitudinal model using the Heckman selection procedure. This selection procedure once again assumes that there is an underlying regression. The growth in the dependent variable, performance, is however (and clearly) not always observed for hires who were terminated during the period under analysis. So there is a turnover equation that determines whether the applicant quits during the period under observation.

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