CHAPTER 22

Labor Markets and Referrals

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Contents

Abstract

The use of social networks and personal referrals in the labor market is very widespread. Both firms and workers may find it beneficial to use these informal channels to produce successful matches between job seekers and vacancies. This Chapter discusses the existing literature and highlights the most robust results. It describes the theoretical literature on the use of informal search methods, both in a micro and in a macro setting, as well as the empirical findings in this area. The empirical evidence comes both from direct surveys of workers and firms and from indirect estimates that exploit structural modeling as well as natural experiments. Finally, the Chapter discusses open questions and possible avenues for future research.
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1. INTRODUCTION

The use of personal networks and referrals in the labor market is very widespread. A consensus estimate, based on studies that span the past three decades and use a variety of data sources both from the U.S. and from other countries, is that at least half of all jobs are typically found through informal contacts rather than through formal search methods.[1] Further, the use of personal contacts has significant implications for job finding probabilities, wage earnings, and turnover relative to other search methods.

The terms "social networks" and "referrals" frequently appear in the common language and in the media, and are sometimes used rather loosely in academic research as well. Formally, a network can be described as a set of nodes and a set of links connecting those nodes. Thus, in general, networks can be used to describe connections among people, firms, computer servers, telephone lines and switches, etc. In the present context, I use the term "social (or personal) networks" to indicate the set of social connections linking individuals.[2]

Individuals may use – or be affected by – the set of social contacts they are linked to in a variety of ways: they may spread (or receive) information; their preferences and tastes may depend on their contacts' actions, outcomes or expressed tastes; their choice sets may also be shaped by the decisions, outcomes and characteristics of their social contacts. Specifically, in the labor market, personal contacts may provide information about job opportunities, may influence one's search effort by affecting one's tastes or value of leisure, or may even provide recommendations to a prospective employer for a potential hire.

This aspect of search and matching in the labor market has been extensively studied from several perspectives both in economics and in sociology at least since Albert Rees (1966)'s seminal paper.[3] It has attracted interest from social network theorists, who use this application to test theories about the effect of different network morphologies on the flow of information and on outcomes. It has been studied in labor economics in the context of search, unemployment and earnings research. This area also lies at the intersection of studies on social interactions and peer effects on the one hand, and on neighborhood effects on the other. Job-finding processes through personal contacts are used as a major instance of local interactions in the space of social relations, as well as in the physical space described by urban neighborhoods. Finally, it has also been studied in personnel economics, in work that examines employers' staffing practices and firms' internal labor markets.[4]

This Chapter discusses the existing literature and highlights the most robust results, in order to summarize what we have learned about the use and implications of informal

[1] In what follows I will define more precisely what is meant by "informal contacts".

[2] See the recent work by Goyal (2007) on the study of networks in economics.

[3] But already before World War II De Schweinitz (1932) reports that in the hosiery industry in Philadelphia about 45% of workers obtained their jobs through friends or relatives.

[4] Several surveys exist on this area. Marsden and Gorman (2001) provide an excellent survey from the sociological perspective, whereas Ioannides and Loury (2004) focus mostly on the economic literature.

search methods and hiring channels in the labor market. In what follows, I begin by describing in Section 2 the more theoretical literature on the use of informal search methods by workers and firms. I then discuss in Section 3 the existing *direct* evidence on the usage and yield of personal contacts in job search. This evidence comes from surveys of workers and firms that ask respondents for direct information about the use of informal methods, and then relate it to individual characteristics and outcomes. Most of the empirical work in this area – in both economics and sociology – has focused on this type of analysis.

Sections 4 and 5 review a more recent strand of this literature, mostly generated within economics, that has focused on identifying the effects of informal job search on labor market outcomes *indirectly*, either through the use of city or neighborhood level data combined with careful identification strategies, or by exploiting various kinds of 'natural experiments' that may or may not have an explicit spatial dimension. These studies yield indirect estimates of the effects of informal hiring channels on labor market outcomes; they also shed some light on neighborhood dynamics and the likely impact of various possible public policy initiatives aimed at urban development as well as improving the functioning of labor markets. In closing, Section 6 discusses some open questions and possible avenues for future research that may be fruitful.

2. THE THEORETICAL LITERATURE

Albert Rees (1966) argues that both employers and job seekers may prefer to use informal job matching methods rather than formal ones. One the employer side, "Employee referrals – the most important informal channel – usually provide good screening for employers who are satisfied with their present workforce. Present employees tend to refer people like themselves, and they may feel that their own reputation is affected by the quality of the referrals [they provide]". On the job seeker side, ". . .informal sources also have important benefits to the applicant. He can obtain much more information from a friend who does the kind of work in which he is interested than from an ad in the paper or a counselor at an employment agency, and he places more trust in it."

Thus Rees (1966) identifies one key motivation for the use of informal hiring channels on both sides of the labor market. For the employer, relying on referrals from current employees may reduce the adverse selection problem he or she faces when trying to hire someone, if there is uncertainty about the worker's or the match's quality. Similarly for the job seeker, there may be an information advantage in relying on a personal contact to gather information about the employer's characteristics or the prospective match quality.

Montgomery (1991) formalizes this idea in a model of the labor market in which formal and informal methods coexist in equilibrium. Firms have to set their wages before observing a new worker's productivity; current employees are likely to know someone

of similar quality given assortative matching in personal networks.[5] This implies that by relying on referrals employers can alleviate the adverse selection problem they face.

In equilibrium, wages of jobs obtained through referrals are higher than wages of jobs found through other means. Montgomery (1991) also derives some interesting comparative statics: an increase in either network density or assortative matching increases referral wages relative to market wages, and increases the dispersion in the wage distribution.

A key attribute of social networks in the context of job search concerns the nature of the links connecting individuals (the nodes of a given network). In particular, many studies focus on the distinction between weak and strong ties. Formally, links between two individuals A and B in a network are considered strong if there is high overlap between the set of nodes directly connected to A and the set of direct contacts of B. Conversely, links are defined as weak if there is very little overlap between A's and B's direct contacts. In other words, weak ties are viewed as "bridges" between distinct groups that do not interact much otherwise, and may thus be very valuable in spreading information across groups. In addition, some studies attribute a qualitative notion of differential intensity (or frequency of contact) to strong and weak ties, respectively.

Granovetter (1995), in addition to noting the information advantages provided by informal referrals, also argues that weak ties within social networks may be better suited than strong ties to transmitting useful information about job opportunities among job seekers. When two individuals are connected by a weak tie, there is likely to be less overlap between their respective personal networks. Thus information can percolate more effectively through a network of individuals.

Montgomery (1992) analyzes the impact of tie strength on equilibrium outcomes in a model of job search in which informal search methods coexist with formal job application processes. He finds that a worker's reservation wage is increasing in the proportion of weak ties in his or her personal network, under any of these conditions: (a) weak ties relay job offers more often than strong ones, or (b) the wage offer distribution under weak ties stochastically dominates that for strong ties, or (c) the wage offer distribution for weak ties has the same mean but is more dispersed than that for strong ties.

This paper also makes the important point that in order to test for the validity of these model predictions, one has to look at the empirical relationship between *reservation* wages and the proportion of weak ties in one's network. Often, however, studies analyze the empirical relationship between *realized* wages and the type of network link actually used to generate that offer. Montgomery argues that this easily leads to observing negative wage effects of the use of weak ties: if a realized wage offer was obtained

[5] Marsden (1987, 1988) uses data from the General Social Survey (GSS) to document the large extent of assortative matching present in social networks of Americans. McPherson et al. (2006) discuss changes in these patterns between the 1980's and the 2000's, also using the GSS.

through a strong tie, in order for it to have been accepted it must be the case that it was superior to any offers generated through weak ties. Therefore there is selection bias at play that can mislead the researcher.

More recently, Calvo-Armengol and Jackson (2004) have embedded a model of informal job search and referrals into an explicit network structure. Agents randomly receive information about job openings. If they are unemployed, they take the job themselves; if they are already employed, they pass on this information to one unemployed contact. A full analysis of the employment dynamics on the network is important here: in the short run, the employment states of two nearby unemployed agents may be negatively correlated because they are competing for the same pieces of information about jobs from common contacts; in the long run however, each agent is more likely to hear about a job if the other is employed, thus giving rise to positive spatial correlations. Extensions of this simple model generate very interesting implications that are consistent with data: positive correlations of employment and wages across agents both in a cross-section and over time; long run inequality in expected unemployment rates and wages across groups; dependence duration in unemployment spells; and decreasing marginal value of additional employed contacts.

Finally, Kuzubas (2009) represents an early attempt to embed endogenous social networks in a dynamic macro model of job search with an aggregate matching function. The labor market is characterized by a standard aggregate matching function (as in the seminal work by Burdett and Mortensen (1980)), where matches between employers and job seekers are a function (constant returns to scale, increasing and concave in each argument) of the number of unemployed and of the number of vacancies available on the market. The contribution of the paper is the introduction of a very stylized network that affects the probability of a successful match between firms and workers. Employed workers enter the network and engage in costly transmission of job information to unemployed contacts as an insurance mechanism, since participation in the network yields the benefit of a higher offer arrival rate when unemployed.[6] The standard matching rate is increasing in the size of the network (more information is available), but in a concave fashion (because the information is shared with a larger number of job seekers – as in the basic Calvo-Armengol and Jackson (2004) framework).[7]

Two stationary equilibria exist, one with an empty network, the other with a positive measure of workers joining the network. The comparative statics are interesting: in the equilibrium in which a positive measure of workers joins the network, those with a higher probability of job loss are more likely to join, since they benefit more from

[6] This is the same mechanism at work as in Topa (2001), discussed in Section 4 below.

[7] Calvo-Armengol and Zenou (2005) also derive an aggregate matching function in the labor market from a micro structure in which workers decide whether or not to establish network links with other agents. The resulting matching function is increasing and concave in both unemployment and vacancies. As the network size increases, job finding rates first increase then decrease because of the congestion effect from other unemployed workers.

participating. Members of the social network experience on average shorter unemployment durations, but obtain lower wages. In aggregate terms, a higher unemployment rate in the economy is associated with a smaller network size. This is because the expected benefit from joining the network is lower if a higher fraction of network members is unemployed. Finally, more generous unemployment benefits reduce the equilibrium size of the network, again because they decrease the potential benefits from joining.

3. DIRECT EVIDENCE ON USAGE OF INFORMAL SEARCH METHODS

A rich and growing literature, both in economics and in sociology, has been documenting the use of personal contacts by job seekers, and that of referrals from current employees by firms. I define here as 'direct evidence' that coming from survey data on job search methods and intensity, in which respondents were asked whether and how they used friends, relatives, neighbors, or acquaintances to search for jobs.[8] These studies use very heterogeneous data sources: they range from nation-wide representative surveys of households to small in-depth surveys of workers in specific cities or neighborhoods; from multiple-firm to single-firm studies; from analyses of specific subsets of the population (males, low-income households, minorities) to studies that look at variation across demographic groups. I will be more specific on the actual data sources used in these studies in what follows.

The literature examines a variety of questions. One set of questions has to do with usage of such informal methods by workers and firms, relative to other search and recruiting methods. Related to this, several studies have focused on the "productivity" of personal contacts: here the productivity or yield is defined in terms of job offers received per unit of search effort or per number of personal connections, as well as in terms of the probability of accepting an offer conditional on having received one. A distinct set of studies has examined the impact of informal search methods on labor market outcomes such as wage earnings, job status, job satisfaction and turnover. One simple hypothesis is that, if personal contacts and referrals reduce the adverse selection problem and the uncertainty about the quality of the match between worker and job, then we should see – ceteris paribus – higher starting salaries, higher wage growth over time, and lower turnover for jobs found through personal contacts than through other means.

Many studies also explore the variation of usage and productivity of informal search methods across demographic groups: are there significant differences across gender, racial, ethnic, education and age lines? Further, a number of studies have tried to relate these differences to observed attributes of the personal networks and types of contacts used by job seekers; for instance, one maintained hypothesis is that weak ties are more productive than strong ties in terms of job finding probabilities and attributes of those

[8] The exact wording of the questions varies across studies.

jobs; other studies have looked at the effects of network range, density and composition on match outcomes.

A pervasive limitation of this broad set of studies is the near-absence of a serious discussion of selection issues. If, for instance, a common result is that jobs found through personal contacts tend to have better attributes than those found through formal search methods, it is not clear whether this is due to the particular search technology per se, or rather to different types of workers selecting into different search methods. Thus, this is an important caveat to keep in mind as one considers the existing literature.

3.1 Usage by job seekers

Studies covering both the U.S. and other countries report the surprisingly strong result that roughly half (or more) of all jobs are found through personal or informal contacts. These are usually defined as friends, relatives, neighbors, acquaintances, former teachers, or business contacts, who facilitate in some form the match between job seeker and employer. The form of the help provided by one's social contacts varies from the simple provision of information about the existence of a job opening at a given firm, to a referral provided to the employer about a particular job applicant, to the use of direct influence to get the person hired.

For the United States, papers that report survey results in which respondents were allowed to list multiple job search methods tend to report the highest estimates of informal contact usage by workers. Holzer (1987a) uses data from the 1981–82 modules of the National Longitudinal Survey of Youth (hereafter, NLSY) and finds that 87% of currently employed and 85% of currently unemployed workers used friends and relatives in their job search, alongside other methods. Elliot (1999) studies a sample of low-education (no more than high school) labor force participants in the Multi-City Study of Urban Inequality (MCSUI), and finds that among respondents between the ages of 21 and 64 who searched for a job within the past five years, 77% used informal methods in their job search.[9] Corcoran et al. (1980) analyze national data from the Panel Study of Income Dynamics (PSID) and find that between 52% and 58% of male workers under the age of 45 heard about their current job from friends or relatives; for their first job these estimates range between 55% and 67% (see also Datcher (1983)).[10]

Surveys that ask respondents to list a single search method that was used to find a job typically report somewhat lower estimates of usage, but still above 50%. Granovetter (1995) in a famous study of male white-collar workers in a Boston suburb reports that 56% found their current job through personal contacts. Lin et al. (1981) use data from

[9] The MCSUI consisted of three survey instruments (households, employers, face-to-face interviews of employers) administered in four metropolitan areas (Atlanta, Boston, Detroit and Los Angeles) during the period 1992–94. See http://www.sociology.emory.edu/MCSUI/ for related documentation.

[10] Gottfredson and Swatko (1979) also report high estimates (between 80% and 90%) of informal contacts usage by unemployed psychologists.

a survey conducted in Albany (New York) and find that 59% (57%) of respondents found their current (first) jobs through informal contacts. Bridges and Villemez (1986) report similar estimates from a 1981 survey of employed individuals in the Chicago SMSA.[11]

The international evidence is remarkably similar to the U.S. based one. Using British data on unemployed workers in 1992 from the Labour Force Survey, Gregg and Wadsworth (1996) find that 70% of job seekers used friends or other personal contacts to search for a job. Alon and Stier (1997) also report very high usage of friends and relatives in a study of unemployed job seekers in Israel. Wahba and Zenou (2005) study Egyptian data from the 1998 Labor Market Survey and report that friends and relatives were the most commonly used job search method: 52% of unemployed workers used this channel, and about one third of all jobs were found using this method. In contrast, Addison and Portugal (2002) use Portuguese Labor Force Survey data and find that only about 25% of unemployed job seekers used informal contacts in their search – but together with public employment agencies, this was still the most commonly used search method.

Pellizzari (2004) uses a large panel dataset of European households (the European Community Household Panel) to investigate job search methods and wage differentials across formal and informal methods. The sample includes individuals aged 16–64 in 14 European countries over the period 1994–99. When asked "*By what means were you first informed about your current job?,*" between 25% and 40% of respondents in most countries[12] chose "*through family, friends or other contacts*". This study also finds high variation (both across countries and across industries) in the wage premium (or penalty) associated with the use of informal search methods relative to formal ones.

3.2 Usage by employers

Several studies have documented the widespread use of referrals and word-of-mouth techniques by employers as a recruiting method. Marsden (2001) reports that about 37% of establishments surveyed in the 1991 National Organizations Survey (NOS) often used referrals from current employees when publicizing vacancies.[13] Holzer (1987c) finds that in a 1982 survey of firms from the Employment Opportunity Pilot Project (EOPP), 36% of firms reported that the most recent employee was hired through a referral. Neckerman and Kirschenman (1991) and Miller and Rosenbaum (1997) both use Chicago-area surveys of firms and report that between 65% and 88% of all employers used referrals from employees in their recruiting.

[11] See Marsden and Gorman (2001) for other studies that report similar results.

[12] Respondents could choose only one answer among six possible search methods. The countries with the lowest incidence of informal contact use were Finland (13%) and the Netherlands (17%); those with the highest incidence were Spain (45%), Greece (41%), and Portugal (39%).

[13] The National Organizations Survey is a study of a representative sample of U.S. work organizations, focusing on human resources policies and practices. See http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/06240 for related documentation.

In addition, several single-firm studies have analyzed the firm's staffing practices. Fernandez and Castilla (2001) and Fernandez et al. (2000) use data from hires for entry level jobs at a large phone center within a global financial services institution. Referrals from current employees are widely used, and these studies find strong evidence of assortative matching between the referrer and the referred applicant, lending support to the mechanism hypothesized by Montgomery (1991). They also find that the referrer has meaningful information about the applicant's attributes that can be passed on to the employer. Marsden (2001) reports that referrals from employees or outside business contacts are used in at least half of all hires. He finds that for managerial, professional or sales/service positions, referrals from outside contacts are more commonly used than from internal ones. Finally, informal referrals are used more extensively by smaller, single-establishment firms than by larger, multisite organizations.

3.3 Variation in usage across demographic groups

There exists a robust consensus in the literature that informal search methods are used more by workers with lower socio-economic status and lower education levels, and for 'lower-status' jobs. This finding is consistent with various theoretical models. Lower education and lower socio-economic status are associated with a higher probability of job loss (see Elsby et al. (2010)); this, in turn, implies a stronger incentive to join a network that shares information on job opportunities, as in Kuzubas (2009). Other stories could be related to differential adverse selection and signaling problems across education levels or occupations, as in Pellizzari (2004).

Ornstein (1976), Corcoran et al. (1980), Datcher (1983), Marx and Leicht (1992), all report higher usage for less educated job seekers. Elliot (1999) finds that informal contacts are more frequently used in high-poverty neighborhoods than in low-poverty ones. Similarly, Green et al. (1995) report that poor job seekers in Atlanta were more likely to use friends and relatives than nonpoor ones. Rees and Schultz (1970) and Corcoran et al. (1980) both find that informal search methods are used more often for blue-collar than for white-collar occupations.

With regard to gender differences, some – mixed – evidence suggests that women are less likely to use informal contacts than men (with regard to both information about vacancies and direct influence). Studies that report findings in this direction include Bradshaw (1973), Corcoran et al. (1980), Bortnick and Ports (1992), Ports (1993), Rosenbaum et al. (1999). Other studies however, such as Marsden and Campbell (1990), Moore (1990) or Morrison and von Glinow (1990) find that women use informal networks and find jobs through informal methods as often as men; all the same, as I discuss later, similar network usage yields larger returns in terms of salary and promotions for men. Campbell (1988) also finds that men have wider occupational range in their networks than women, i.e., they have contacts in more distinct occupations than women.

There is also evidence of racial and ethnic differences in usage of informal contacts in job search. Early studies indicate higher usage by Blacks than by Whites: see, for instance, Corcoran et al. (1980), Datcher (1983) and Campbell and Rosenfeld (1985). Falcon and Melendez (1996) and Green et al. (1999) both report significantly higher usage by Hispanics in Boston. In addition, Datcher (2006) reports slightly higher usage of informal contacts by Hispanics than by Whites or Blacks. However, as I mention below, there is also some evidence that informal channels are less productive for Blacks than for Whites: Holzer (1987b) analyzes a sample from the 1981–82 NLSY, and finds that the probability of using personal networks does not differ significantly between Whites and Blacks, but the probability of receiving an offer conditional on usage is consistently higher for Whites than for Blacks, across all methods; the racial difference is especially high for informal search methods. Korenman and Turner (1996) and Marx and Leicht (1992) also find that minorities are less likely to have found jobs through personal contacts: again, this possibly reflects differences in both the usage of contacts and the "yield" of informal channels in terms of offers.

Finally, with regard to age, some studies find that younger and less experienced workers are more likely to use informal search methods. These include Corcoran et al. (1980), Marsden and Hurlbert (1988) and Wegener (1991). Other studies however, such as Hilaski (1971) and Falcon (1995) report insignificant age differences.

3.4 Productivity of informal vs. formal search methods

The literature reports some mixed evidence on the productivity of personal contacts and referrals in generating offers, relative to formal search methods. In Hilaski (1971), several measures of offer yield per employer contacted across search methods indicate that personal networks rank highly in yield relative to formal methods. Holzer (1987b) finds that the probability of obtaining a job or receiving an offer through personal contacts is higher than that through formal methods.[14]

Holzer (1988) also finds that among all search methods, informal methods (personal contacts and direct applications) generated the most offers and acceptances conditional on offer. The high fraction of jobs found through informal means reflects both high usage and high productivity of these methods. Further, 81% of all offers received through personal contacts are accepted (a much higher percentage than for any other search method), which suggests that jobs offered through personal contacts exhibit higher wages or more appealing nonwage features than jobs found through other methods.

In terms of relative productivity across demographic groups, Bortnick and Ports (1992) find that personal networks are slightly less productive for women as compared to men. Holzer (1987b), Bortnick and Ports (1992), and Korenman and Turner

[14] The probability of receiving a job offer is computed as the percentage of users of a particular search method who obtained an offer. The probability of accepting an offer is computed as the percentage of users who received offers (through that particular channel) over the number of users that received an offer through that method.

(1996) find that such networks are substantially less productive for Blacks. In particular, Holzer (1987b) analyzes the difference in employment probability between White and Black workers, and finds that most of this racial difference comes from a differential probability of receiving offers, especially in the direct application method (with 1981 NLSY data) and in the personal contacts method (with 1982 NLSY data). These differences in employment probabilities generated by informal search methods explain about 57%–72% of the overall difference in unemployment between White and Black youths.

Finally, firm-level studies also report that applicants who use informal referrals are more likely to receive an offer than those who use formal search methods: see Kirnan et al. (1989), Fernandez et al. (2000), Fernandez and Weinberg (1997).

3.5 Impact on labor market outcomes

Many studies have asked whether jobs found through informal search methods (personal contacts and referrals) have better attributes than those found through formal means. Again, a big caveat here concerns the possibility of selection into different search methods, as well as the selection bias discussed by Montgomery (1992). The literature has looked at wage earnings, as well as the impact on job turnover and quits.

With regard to wage effects, the bulk of the evidence goes in the direction of supporting positive wage effects of the use of informal contacts. Corcoran et al. (1980) find a positive effect of informal contacts on starting wages. Green et al. (1995) study a 1993 survey on urban inequality in Atlanta and find that the use of personal networks to find the most recent job yields an average increase in annual earnings of about $1,800. Korenman and Turner (1996) also find that the use of social contacts increases wages by about 20% in a survey of Boston youth, and by about 7% in a sample of young urban males from the 1982 NLSY. Simon and Warner (1992), in a 1972 survey of male scientists and engineers, report that use of informal search methods raises starting salary relative to other methods. Finally, Datcher Loury (2006) shows that young men who found their current jobs thanks to prior generation male relatives who knew their boss or served as a reference have significantly higher wages than if they used other contacts or formal methods.[15]

A few studies find no earnings effects: Campbell and Rosenfeld (1985) report no difference in wages or earnings between formal and informal methods; Elliot (1999) shows that less educated workers using informal methods receive lower wages than if they use formal methods – but only in low-poverty neighborhoods; in high poverty areas the use of informal means does not have a negative effect on wages. As reported earlier, Pellizzari (2004) finds large cross-country and cross-industry variation in wage premiums associated to informal search. When firms invest more in formal recruiting,

[15] Similar positive wage effects are also reported in Devine and Kiefer (1991), Rosenbaum et al. (1999) and Marmaros and Sacerdote (2002).

this lead to better matches on average than is the case with informal methods. In turn, firms tend to invest more in formal recruiting for jobs with high value added and that require relatively more specific human capital (and thus on-the-job training).

There is significant variation by race in these reported wage effects. Korenman and Turner (1996) report a more positive wage effect of personal contacts for Whites than for Blacks (26 percentage points for Whites, eight percentage points for Blacks in their Boston survey; they estimate a lower payoff to contacts among Hispanics in their NLSY sample). Corcoran et al. (1980) report positive wage effects for Blacks but not for Whites. Green et al. (1999) find no earnings effect for Blacks, negative effects for Whites and Hispanics.

Finally, several studies have examined the effects of informal search methods on turnover and the duration of job matches. Coverdill (1998) finds lower turnover for referred applicants than for those hired through formal means. Simon and Warner (1992) report longer duration of job matches for jobs obtained through contacts than through formal methods. Single-firm studies also find lower turnover: see Kirnan et al. (1989), Petersen et al. (2000). Datcher (1983) finds lower turnover (quit rates) in jobs found through personal contacts rather than formal means, for blacks and for college educated but not for those with high school or less. Blau (1990) finds that workers hired through informal methods exhibit higher performance than those hired through other channels. These findings are consistent with models in which personal contacts or referrals reduce the ex-ante uncertainty about the quality of a worker-employer match, thus resulting in higher job satisfaction and longer tenure.

3.6 Variation across network attributes

Granovetter (1995) conjectures that the use of weak rather than strong network ties in job search may lead to better outcomes. Granovetter (1973) defines strong ties as those between family members or close friends, based on the frequency and intensity of interaction. Weak ties are characterized by more occasional and less intense contact. As mentioned above, a more formal definition, in the context of network theory, is based on the overlap in personal networks: two agents A and B are said to have a weak (strong) tie if the overlap in their sets of social contacts is small (large). Granovetter (1995)'s conjecture is based on the idea that weak ties are better able to transmit nonredundant information about job openings, because of the more limited overlap across individual networks.

Montgomery (1994) formalizes this idea in a theoretical model. The network structure is quite stylized: the economy is divided into small groups (pairs of individuals, or *dyads*). Strong links are defined as connections within dyads (intra-group), whereas weak links are connections across dyads (inter-group). Weak ties are also more transitory (one-time random matches) than strong ties (permanent links). Montgomery (1994) shows that an increase in the proportion of weak ties lowers inequality in employment outcomes across groups. Further, if inbreeding by employment status

among weak ties is sufficiently low, an increase in weak links also raises the overall employment rate.[16]

The existing empirical evidence lends some support to Granovetter (1995)'s and Montgomery (1994)'s ideas. Yakubovich (2005) uses a large-scale survey of hires made in 1998 in a major Russian metropolitan area and finds that a worker is more likely to find a job through weak ties than through strong ones. Weak ties tend to provide timely access to nonredundant information, and influence employers directly. These results come from a within-agent fixed-effect analysis, so are independent of workers' individual characteristics.

Lin et al. (1981) study the tie strength dimension, but further posit that there is a hierarchical dimension to personal networks, that has to do with the prestige, status, or wealth of one's contacts. They use data from a survey of male workers from the Albany NY area in 1975, and they measure prestige by occupational status. They find that job seekers seem to reach up when they use contacts to find a job: occupational status of one's job contacts is on average higher than own status. Weak ties have a positive effect on attained occupational status (in the job found through these contacts), but only through the occupational status of job contacts used. In other words, weak ties allow the job seeker to reach higher status contacts than strong ties; these contacts in turn facilitate achieving a higher status job for the job seeker; this result is robust to the inclusion of controls for individual and family background.

Further, weak ties in an individual's network yield consistently high status contacts regardless of the initial status of the individual, whereas for strong ties the relationship between own status and contacts' status is monotonically increasing: strong ties only allow access to contacts of similar status, whereas weak ties allow one to reach higher status contacts regardless of one's initial status (see also Lin and Dumin (1986) for a similar result). Lai et al. (1998) and Marsden and Hurlbert (1988) also find that weak ties facilitate the reach to a contact person with higher occupational status, who in turn leads to better jobs, on average.

The use of weak ties in job search also tends to lead to higher wage outcomes (see Granovetter (1995)), but the evidence is not very robust. Green et al. (1995) find that incomes are lower for those who use within-neighborhood ties, or ties to relatives – which tend to be strong rather than weak links. Green et al. (1999) find that the use of strong ties is negatively associated with annual earnings, especially for Hispanics. Bridges and Villemez (1986) also find that weak ties are linked to higher incomes than strong ties; however, the income effect of tie strength is greatly reduced when controls are added for education, experience, race, and gender. Campbell (1988) shows that women have more limited occupational range in their networks than men; further,

[16] Inbreeding here is defined as excess correlation in employment status between members of a weak tie pair, relative to an extreme case in which employment status is uncorrelated.

women's networks tend to have higher proportions of kin than men's; finally, women are more likely to have female job contacts, who are less likely to be in high status positions (see also Leicht and Marx (1997)). All three factors make it more likely that the earnings effects of informal search methods for women are lower than for men.

There is also some evidence that residents of high poverty neighborhoods rely more on strong ties, and on more geographically concentrated networks. Elliot (1999) shows that less educated workers in high poverty neighborhoods are twice as likely to have found a job through *neighbors* (local contacts in the same group of city blocks) than in low poverty areas; this is consistent with evidence on the geographic concentration of social networks of poorer individuals, as reported in Fischer (1982) and Kadushin and Jones (1992). Moreover, jobholders in high poverty areas are more likely to have found jobs through strong rather than weak ties than in low poverty places (73% vs. 48%). Elliot (1999) finds a negative wage effect when the source of job information was a nonwhite *neighbor*.

Finally, Campbell et al. (1986) construct measures of individual networks' range and composition, and relate them to one's socio-economic status. Range is measured as heterogeneity in contacts' attributes, as size of the individual's network, or as the inverse of network density.[17] They also measure the spatial aspect of networks via the mean geographic distance of network contacts from a respondent. They find that a respondent's socio-economic status (SES) is positively correlated with network size, complexity (the number of different contents/topics discussed in pairwise network links), and ethno-religious diversity. So people with higher SES have access to greater social resources (as measured by their networks' range). High SES is also negatively associated with density: i.e., higher status respondents have more loosely knit personal networks. Since geographic distance is negatively related to density, this also means that higher SES people have on average more geographically dispersed networks, as in Fischer (1982).

4. LABOR MARKET REFERRALS AND NEIGHBORHOOD EFFECTS

The study of informal hiring practices and labor market referrals has been closely related to the study of neighborhood effects. A rich literature has analyzed the effects of neighborhood context on a variety of socio-economic outcomes, studying the possible effect of various mechanisms, such as access to information, local networks, peer effects, the presence of adult role models, the quality of neighborhood level institutions.[18] Labor market outcomes are among the many applications that have been studied in the context

[17] Network density is measured as the fraction of potential links between pairs of alters that actually exist, or the average strength of ties linking alters. Thus density is lower if one's network is mostly composed of weak ties, or if it is relatively sparse.

[18] See Durlauf (2004) for a recent review of the literature and Jencks and Mayer (1990) for a survey of the older literature on neighborhood effects.

of neighborhood effects, alongside social pathologies (such as crime, alcohol and drug consumption, teenage pregnancies, etc), health and education outcomes and – more recently – consumer credit issues, such as personal bankruptcies and home foreclosures.

A direct link between the use of personal networks in job search and the presumed presence of neighborhood effects is given by the observation that social networks have, to some extent, a local dimension in a geographic sense. In a study of Toronto residents in 1978, Wellman (1996) finds that 42% of yearly contacts in individual networks took place with neighbors that lived less than one mile away. Guest and Lee (1983) perform a similar analysis for the city of Seattle, and find that for about 35% of respondents the majority of their nonkin social contacts resided in the same local community. Otani (1999) uses 1986 General Social Survey data for the U.S. (in a comparative Japan-U.S. study) and finds that roughly one in five contacts listed in individual networks are physical neighbors.

Most relevantly to the study of labor market referrals, Lee and Campbell (1999) use data from a 1988 survey of Nashville, Tennessee to look at social ties with immediate neighbors. Their definition of "micro-neighborhoods" consists of "partial face blocks consisting of 10 adjacent housing units each, five on either side of a single street." They find that 31% of these immediate neighbors are judged close or very close by respondents. Further, they specifically ask respondents to whom they would turn for help in finding a job. About 13% of helpers in these networks resided in the respondents' micro-neighborhoods; 73% resided elsewhere in Nashville; the residual 14% were not Nashville residents.

Given this premise, a number of recent studies have looked for evidence that local social interactions within urban neighborhoods affect employment and wage outcomes. The main estimation problem in the analysis of neighborhood effects (and in the social interactions literature in general) is the possibility that any co-movements in outcomes among members of the same neighborhood (or reference group, more generally) may be due not so much to social interactions but rather to the presence of correlated factors at the neighborhood level, which are unobservable by the researcher. Correlation in unobserved attributes may arise because of positive sorting, or because of unobserved shocks that affect the entire neighborhood (for instance, in the case of labor market outcomes, a plant closing that affects employment in the local area), or other unobserved neighborhood-wide institutions that affect the outcome under consideration.

Weinberg et al. (2004) use confidential longitudinal data from the 1979 National Longitudinal Survey of Youth (NLSY) to investigate the presence of social interaction effects at the neighborhood level on labor market activity.[19] They also examine the

[19] The NLSY 79 is a panel study, based on a nationally representative sample of about 12,000 young men and women who were 14–22 years old when they were first surveyed in 1979. The survey participants were re-interviewed annually through 1994 and on a biennial basis thereafter. More documentation can be found at http://www.bls.gov/nls/y79summary.htm

possibility that any correlation in outcomes across neighborhood residents may be explained by the "spatial mismatch" hypothesis: this theory argues that residents of certain urban neighborhoods may incur adverse labor market outcomes because jobs are located far from these neighborhoods. In other words, there is a spatial mismatch between labor demand and supply. Because of commuting costs or other barriers, the larger the distance between jobs and job seekers in a given metro area, the harder it is for job seekers to fill these jobs and thus the higher the unemployment rate in these neighborhoods.[20]

The identification strategy in Weinberg et al. (2004) is to exploit the panel dimension of the data to include individual fixed effects, as well as time-varying individual effects that depend on individual deviations from a typical experience profile. They find evidence that simple OLS estimation over-estimates the impact of neighborhood social interactions on labor market outcomes, and under-estimates the role of spatial mismatch. They study the impact of employment of adult males in the neighborhood on annual hours worked; under their preferred specifications with fixed effects, they find that a one standard deviation increase in neighborhood employment is associated with a 9.5% increase in annual hours worked. In contrast, the effect of a one standard deviation increase in access to jobs (the spatial mismatch hypothesis) on hours is a 3.6% increase. When they introduce controls for individual specific experience effects, the estimated effects on hours of employment in the neighborhood and access to jobs become, respectively, 6.1% and 4.7%.[21]

Topa (2001) analyzes a structural model of transitions into and out of unemployment to estimate the impact of any local social interaction effects on employment outcomes. He posits that individuals may receive useful information about job openings from their employed social contacts (the nearest neighbors) but not from their unemployed ones.[22] The model generates a first-order Markov process over the set of locations, and the positive local feedback implies that the stationary distribution of unemployment in the simulated economy exhibits positive spatial correlations. He estimates the model parameters via indirect inference, comparing the simulated spatial distribution of unemployment with the empirical one, using Census data for the city of Chicago in 1980 and 1990.[23]

[20] See work by Kain (1968), Ellwood (1986), Ihlanfeldt and Sjoquist (1989, 1990), Ross (1998), Holzer et al. (2003), Weinberg (2000, 2004).

[21] Weinberg et al. (2004) also find little evidence of reverse causality (i.e., the possibility that changes in employment status affect individual choice of neighborhood).

[22] This assumption is similar to that in Montgomery (1994), Calvo-Armengol and Jackson (2004), and Kuzubas (2009).

[23] The data are extracted from the Summary Tape Files 3A of the decennial Census, and consist of aggregate measures at the Census tract level. Census tracts represent fairly small areas: there were 863 tracts in the city of Chicago in the period under consideration, the median distance between adjacent tract centroids was about 400 meters, and the median adult population in a tract was roughly 2,000. The data were augmented with the Block and Block dataset for homicides in Chicago.

The identification strategy in this paper relies on the assumption that neighboring census tracts can only affect a given tract's employment outcomes through their employment levels but not through their own attributes, and on the use of ethnic distance[24] and local community boundaries (as identified by residents) to distinguish local social interactions from other types of spatially correlated shocks. The key assumption is that social spillovers generated by information exchanges within networks are significantly weaker across tracts that are physically close but ethnically very different, or that belong to different local communities; on the other hand, other types of spatially correlated shocks may not be affected by such discontinuities across tracts. Indeed, the spatial correlation in crime outcomes across adjacent tracts does not depend on ethnic distance, or on whether the two tracts belong to the same local community. Finally, detailed tract level controls and fixed effects are also used in the estimation.

The results indicate that a one standard deviation increase in neighborhood employment raises expected employment in a given Census tract by between 0.6 and 1.3 percentage points. The estimated spillover effects are stronger in tracts with lower education levels and with higher fractions of minorities: this is consistent with the direct evidence on referral effects presented above.

Further, the analysis points to an interesting asymmetry: if one raises the amount of information (proxied by neighborhood employment) available in a disadvantaged tract and lowers it in a well-off tract by the same amount, the positive effect on expected employment in the former tract is roughly twice as large, in absolute value, as the negative effect in the latter tract. This is due to the different initial conditions in the two tracts in terms of education levels and other attributes, and the fact that the estimated spillovers vary across these attributes. This has potentially interesting implications for public housing policy, for instance with regard to the idea of dispersing public housing instead of concentrating it in a few areas.

Conley and Topa (2007) extend Topa (2001) in several directions, using data for the Los Angeles metropolitan area. First, the model of local interactions and employment transitions is defined at the level of individual agents rather than Census tracts. This enables the authors to calibrate a subset of employment transition parameters from retrospective Current Population Survey (CPS) data. Further, the network structure is enriched by allowing for a small number of long "bridging" ties connecting artificial agents in the model that are physically distant from each other. This makes the network structure more realistic, since the sociological literature cited above shows that while many network connections are local in a geographic sense, a sizeable fraction of links occurs between locations that are geographically far from each other. Finally, the network structure is endogenized to some extent, by positing that the size of individual agents' networks is larger when unemployed than when employed. This is consistent

[24] See Conley and Topa (2002).

with job search models in which search intensity varies according to employment status.[25]

The richer network structure poses an interesting estimation problem: the existence of long ties implies that cross-sectional data will potentially exhibit strong dependence, with measures such as spatial correlations or mixing coefficients decaying only very slowly as physical distance increases. This is in contrast to models with only nearest-neighbor interactions, which give rise to weak cross-sectional dependence. Therefore, even large cross-sections should be essentially viewed as a single observation from a vector time series process. Conley and Topa (2007) then propose a minimum-distance estimator to obtain point estimates in this context, and a test-statistic inversion method to obtain interval estimates using the minimum distance criterion function as the test statistic.

Thanks to the richer model structure, the parameter estimates can be used to evaluate how well unemployment spell distributions simulated from the model match the empirical ones from the CPS data. Conley and Topa (2007) find that the model generates too many long unemployment spells (at the estimated parameter values) than in the data. The authors further present descriptive methods to illustrate model properties by simulating impulse response functions, in time and in space, to localized unemployment shocks that hit certain neighborhoods in the Los Angeles metropolitan area. They find that, at the stationary distribution, negative employment shocks take a long time to be fully absorbed (more than two years), but travel relatively little in space.

Bayer, Ross and Topa (2008) adopt a different strategy to identify and estimate local referral effects in the labor market. The basic idea in this paper is to look for spatial clustering of individual work locations for a given residential location, as evidence of local referral effects. In order to identify labor market referrals from other spatially correlated effects, the authors estimate the propensity to work together (in a given city block) for pairs of workers who co-reside in the same city block (but distinct from the work location), controlling for the baseline propensity to work together for residents in nearby blocks (within a reference group of blocks).

The crucial identifying assumption here is that workers can choose residential locations down to a group of blocks, but cannot pinpoint an exact block of choice. Therefore, after controlling for reference group level sorting, the assignment of individuals to specific blocks is essentially random and provides a useful source of variation to identify local referral effects. Measures of the extent of sorting on observable attributes at the block level suggest that this assumption is at least plausible. This study also employs individual fixed effects to further control for unobserved heterogeneity and examines alternative specifications to address the possibility of reverse causation (i.e., work colleagues giving referrals about desirable residential locations).

[25] See Burdett and Mortensen (1980); Holzer (1987a) provides supporting empirical evidence. Blau and Robins (1990) find that while employed workers tend to search less than unemployed ones, they are also more likely to generate offers and find new employment.

Bayer et al. (2008) find that, on average, a one standard deviation increase in potential referrals raises expected labor earnings by between 2.0 and 3.7 percentage points, and hours worked per week by between 0.3 and 1.8 hours for men. For women, the effect on labor force participation and expected employment varies between 0.8 and 3.6 percentage points across specifications. Interestingly, they do not find a significant earnings effect for women, which is consistent with the direct evidence on the productivity and wage effects of informal job contacts for women relative to men. Further, the estimated referral effects are stronger for less educated workers, younger workers, and Asians or Hispanics. These results are again consistent with the direct evidence presented above.[26]

Schmutte (2009) uses very detailed matched employer-employee data and the empirical design of Bayer et al. (2008) to estimate a model of on-the-job search. The goal is to study the impact of neighborhood level referral networks on workers' earnings. The model starts from the premise that different employers may offer different compensation packages to the same worker, due to unobserved employer or match specific heterogeneity. Thus, for the same level of human capital stock and other attributes, the same worker can receive different wage premia from different prospective employers. Workers will then engage in search for jobs that offer higher wage premia: the wage offer distribution is a mixture of offers arriving through formal job search methods and offers generated by informal contacts or referrals. The latter offer arrival process is modeled similarly to Conley and Topa (2007) as a contact process: the probability of receiving a job offer with a given wage premium is increasing in the fraction of network contacts holding jobs that yield that premium.

The model is estimated using data on job-to-job transitions from the Longitudinal Employer Household Dynamics (LEHD) Program of the U.S. Census Bureau. These are matched to administrative data on the worker's Census block of residence from the Statistical Administrative Records System (StARS). The data cover 30 large U.S. metropolitan areas. Individual work histories are used to estimate employer specific wage premia. The effect of network quality on wage premia is estimated by exploiting the variation in network quality of workers residing in the same group of Census blocks. The paper finds evidence that individual wage premia are positively affected by the average wage premium in one's network. The estimates imply that about 10% of all job offers are generated through referrals. This is in line with the estimates from direct survey data presented in Holzer (1987a, 1987b) discussed above. The estimated referral effect is almost double for immigrant workers.

[26] The estimated referrals are also stronger for pairs of workers who both have children, and especially of similar ages; and for pairs of workers in which at least one agent is a married male (who tend to be more attached to the labor force and thus better able to provide referrals). Both findings are consistent with the mechanism of referrals transmitted through personal networks.

5. RANDOMIZED AND NATURAL EXPERIMENTS

I wish to discuss here several studies that analyze the impact of referrals and personal contacts on labor market outcomes by studying various randomized or natural experiments. The majority of these studies exploit housing relocation randomized experiments that allow residents of low-income neighborhoods or of public housing projects to relocate to different neighborhoods. These experiments in principle allow the researcher to measure the effect of changing neighborhood characteristics on outcomes. Other studies exploit refugee resettlement programs in various countries, where the assignment of individuals to cities or neighborhoods is exogenous. A few additional studies do not have a neighborhood or spatial component, but all the same rely on a randomized assignment of potential social contacts to indirectly detect the impact of referrals on outcomes.

A first set of studies uses data from the Gautreaux Program conducted in Chicago in the late 1970's, which gave housing vouchers to eligible black families in public housing as part of a court-imposed public housing de-segregation effort. The Section 8 vouchers allowed recipients to move to private housing elsewhere in Chicago or in nearby suburbs, but the neighborhood of destination was determined in a nonrandom fashion by program administrators as units became available. Popkin et al. (1993) compare individuals who relocated to low-poverty suburban neighborhoods (treatment) to those who relocated to other neighborhoods within the city (control).

The results indicate that suburban movers were 25% more likely to be employed after the move than city movers. The result is even more striking for people who were never employed before a move: for this group, the comparison between suburban and city movers yields a 53% increase in the probability of being employed post-move. These results are robust to the inclusion of detailed controls for human capital, family background, experience, and the number of years since the move. Kaufman and Rosenbaum (1992) also find that moving to low-poverty neighborhoods raises educational attainment and labor market outcomes for the children of movers.[27]

Oreopoulos (2003) studies the effects of administrative assignment to public housing projects in Toronto on long-run labor market outcomes. He uses administrative data on the assignment of families to a wide variety of public housing projects; this assignment is based mainly on household size and the families cannot specify project preferences. The assigned housing projects vary in their size, physical layout (high-rises vs. townhouses), demographic composition, and location within the metropolitan area. The paper then examines the effect of housing project quality on subsequent labor market outcomes for the children that grew up in these projects. He also decomposes this effect into family vs. project influences, by comparing correlation in outcomes for siblings vs. unrelated project neighbors.

[27] See also Rosenbaum (1995) and Rosenbaum et al. (1999). Kling and Votruba (2001), however, show that assignment in the Gautreaux experiment was not random; this might explain the particularly large effects found in these studies.

Oreopoulos (2003) finds that simple OLS estimates for a sample of private housing market residents imply a significant positive neighborhood effect: youths who grew up in wealthier neighborhoods experience 17% higher earnings and are 5% less likely to receive unemployment insurance when adults, even after controlling for family background. However, this neighborhood quality effect essentially disappears when one examines outcomes of children who grew up in different public housing projects. Further, while growing up in very different housing projects does not explain much of the variance in labor market outcomes, family differences can explain up to 30% of this variance.

A large set of papers has looked at the effects of a randomized assignment to low-poverty neighborhoods that occurred in the Moving To Opportunity (MTO) experiment. This demonstration randomly assigned low-income families living in public housing in five U.S. cities to one of three groups: (a) receipt of a Section 8 housing voucher and help to relocate to a low-poverty area; (b) receipt of the housing voucher only, with no constraints on the type of destination neighborhood; (c) no relocation.

Katz et al. (2001) and Ludwig et al. (2001) have used the randomized housing voucher allocation associated with MTO to examine the impact of relocation to neighborhoods with much lower poverty rates on a very wide set of individual behavioral outcomes including health, labor market activity, crime, education, and more. They find positive effects of the relocation on a variety of health outcomes, but no effect on education and labor market outcomes. Kling et al. (2007) discuss the medium term effects of the program, studying a large range of outcomes on average five years after the initial random assignment. They find that for both adults and youth the only statistically significant effects are in the mental health domain. Interestingly, the impact of relocation on mental health and risky behavior is large and positive for female youth, and large and negative for male youth.

It is important to note that there are important limitations in the extent to which the treatment effects identified through relocation are informative about the nature of general forms of neighborhood effects per se. First, individuals studied must be eligible for a relocation program in the first place; this typically implies that the resulting sample is special (i.e., so as to be a resident in public housing) and may not be as sensitive to neighborhood effects as other individuals. More generally, even if the eligible population is representative of the target population, the results of an experiment based on a small sample may not extend to broader populations because of the strong possibility that general equilibrium effects may arise in that case.

Second, the experimental design involves relocation to new neighborhoods that are, by design, very different from baseline neighborhoods; this implies that the identified treatment effect measures the impact of relocating to a neighborhood where individuals initially have few social contacts and where the individuals studied may be very

different than the average resident of the new neighborhood.[28] In this way, the treatment effects identified with this design are necessarily a composite of several factors related to significant changes in neighborhoods that are not easily disentangled.

Beaman (2009) and Edin et al. (2003) both exploit natural experiments, consisting of refugee resettlement programs in the U.S. and Sweden, respectively, to try to disentangle social network referral effects from sorting or correlation in unobservable attributes.[29] Beaman uses data compiled from administrative records of the International Rescue Committee (IRC), a voluntary resettlement agency that works with the U.S. immigration agency to settle incoming refugees into one of 16 regional sites. The placement policy is a function of the presence of previous refugees of a given nationality at given site, of target quotas for each regional office, and of local employment conditions. Family reunification decisions are excluded from the dataset.

In addition to the novel dataset, Beaman's main innovation is to consider a dynamic model of network referrals, which delivers interesting implications. An increase in the size of a given cohort of immigrants of a given nationality has contrasting effects on new arrivals: in the short term, it negatively affects labor market outcomes for new arrivals because of a competition effect as in Calvo-Armengol and Jackson (2004). In the longer term, however, it improves outcomes for cohorts that arrive sufficiently later. Beaman finds that, consistently with the model, a one standard deviation increase in the number of network members in a given year lowers the employment probability of someone arriving one year later by 4.9 percentage points. Conversely, a similar increase in cohort size raises employment probabilities two years later by 4.4 percentage points. More senior cohorts also have a positive wage effect on recent arrivals.

Edin et al. (2003) exploit another natural experiment, whereby refugee immigrants were assigned by the Swedish government to a range of municipalities in the period 1985–91, thus mitigating the possibility that sorting may have played a role in the relationship between ethnic networks and labor market outcomes. In this experiment, immigrant placement was determined mainly by housing availability in each municipality, although education levels and language spoken were also taken into account. The data used in this study come from a panel of immigrants that covers about 20% of the total foreign-born population. Refugees are not identified directly but rather through country of origin. Immigrants who are likely to have joined a family member already in Sweden are excluded.

The main estimation strategy is to use the initial placement decision as an instrumental variable for the share of the immigrant's ethnic group in the municipality of

[28] Kling et al. (2007) report that in follow-up open-ended interviews with program participants, Turney et al. (2006) find that "transportation difficulties and disrupted social networks were additional barriers to employment in the experimental group".

[29] Other papers that find some indirect evidence of referral effects within immigrant networks more generally include Dustmann et al. (2009), Goel and Lang (2009) and Patel and Vella (2007).

residence eight years after the immigrant's arrival. The study finds that sorting is very significant: estimates that do not control for endogenous sorting find a negative and significant effect of network size on wage earnings; using the IV approach, the estimated effect becomes positive and significant for the low-education subset of immigrants. Further, an increase in the "quality" of the ethnic network (as measured by average income and the fraction of self-employed) improves outcomes, especially for the highly educated immigrants.

As I mentioned at the beginning of this section, a handful of papers exploits non-neighborhood natural experiments to assess the impact of informal contacts on labor market outcomes. Lalive (2006) studies the possibility that unemployment outcomes may be affected by social interactions among workers by exploiting a "natural" experiment that extended unemployment benefits for a well-specified subset of workers in Austria. The idea is to see whether this exogenous shock to unemployment of eligible workers spilled over to ineligible workers that were in close contact (in terms of their social distance) with a sizable number of eligible workers.

The author essentially uses a difference-in-difference approach that compares the difference in unemployment outcomes for ineligible workers that had a majority vs. a minority of eligible workers in their peer group, across both treatment and control geographic regions. The paper finds significant social interactions effects in unemployment: when the fraction of program eligible workers in one's peer group goes from zero to 100% the risk of long-term unemployment for an ineligible worker increases by 6.7 percentage points. The results appear to be robust to a wide variety of controls for potential general equilibrium effects, differences in local market interactions and social interactions across regions, and unobserved differences in productivity.[30]

Laschever (2008) exploits the random assignment of young American men to the military during World War I to define exogenously constructed peer groups. He then measures the impact of a group's unemployment rate from the 1930 Census on a veteran's own likelihood of being employed. The magnitude of the effect is quite large: a 1% point increase in his peers' unemployment rate is associated with a half percentage point decrease in one's own expected employment. He further decomposes this effect into the endogenous and the contextual component and finds that the endogenous effect is at least four times as large as the contextual one. This lends some support to the hypothesis that the estimated social effect is due to referrals or informal job contacts.[31]

Marmaros and Sacerdote (2002) exploit the random assignment of dorm roommates at Dartmouth to investigate possible peer effects in post-college labor outcomes. They

[30] The estimated social interactions effect is not necessarily due to a drop in potential referrals or job contacts. Other potential explanations include complementarities in leisure and information about the state of the labor market affecting one's search intensity.

[31] Laschever (2008) further finds that only members of the same military company affect one's outcomes. Belonging to the same battalion or regiment (larger units) has no impact on outcomes.

look at the correlation between one's likelihood of getting a high-paying job and that of their freshman hallmates, and estimate a significantly large peer effect. They also find that help from a fraternity contact was associated with significantly higher starting salary. They conclude that peers influence career choices and/or the ability to find jobs.

6. DIRECTIONS FOR FUTURE RESEARCH

As this Chapter highlights, there exists by now a vast literature that characterizes the nature, extent, and impact of informal job search methods in the labor market. I mention here a few directions for future work that seem potentially interesting and likely to bear fruit in this area.

First, it would be interesting to study whether the use and impact of personal networks and referrals has changed over time, perhaps in response to the advent of the internet with its associated online job search tools (more on this below). Second, in analyzing the use and impact of informal contacts on labor market outcomes, and its variation across socio-economic attributes of respondents and networks, it seems very important to be able to explicitly take into account the possibility of selection across different search modes along various observed or unobserved attributes.

Further, it would be very fruitful to incorporate the use of personal contacts into full-fledged dynamic macro models of job search and matching. As mentioned above, Kuzubas (2009) is an interesting first step in this area. Such an endeavor will yield useful insights into the ways in which an aggregate matching function may change as a function of alternative search methods and intensities. Further, the choice of search method could be made endogenous in the context of a formal search model, to study how the choice between formal and informal methods may vary according to different market conditions, and what implications that has on outcomes.[32] Empirically, it would also be useful to study whether the use of personal contacts varies with the business cycle and in different policy environments.

A formal search framework may also help disentangle the specific mechanisms through which social networks affect labor market outcomes for individual job seekers. Most of the literature has focused on the idea that network contacts may provide information or referrals. Another channel, however, works directly through preferences: having a larger number or share of unemployed contacts in one's network may affect the disutility of work either through direct imitation or because of changes in one's value of leisure. These different channels may have different implications for reservation wages, search intensity, etc.

With regard to data sources, it seems that much progress can be made by using recent large datasets such as the matched employer-employee data coming from the

[32] Holzer (1988) analyzes the use of alternative search methods (including personal contacts) in the context of a search model to see whether method choices are related to their costs and expected productivities.

Longitudinal Employer Household Dynamics (LEHD) Program at the U.S. Census Bureau. As Schmutte (2009) demonstrates, matching these data with detailed geographic information can enable researchers to implement cleaner identification strategies – exploiting the panel structure and the detailed geography – that can eventually yield more precise and informative estimates of network effects. Similarly, a very promising and as yet largely untapped source of data could be found in social networking websites and online job search engines, such as *Facebook*, *LinkedIn.com*, *Monster.com*, and the like.

Finally, it would be very interesting to incorporate informal job search methods into urban economics models, to see how they affect neighborhood dynamics, as well as equilibrium wage and rent distributions within a city. Zenou (2008) takes a first stab at this research agenda, by analyzing the role of informal contacts and referrals in an explicit urban model in which agents are located at varying distances from jobs, and space affects the extent of social interactions. He finds that an increase in weak tie interactions lowers unemployment but also increases equilibrium rents in the city. Under certain conditions, an increase in weak ties also induces a higher equilibrium wage.

REFERENCES

Addison, J.T., Portugal, P., 2002. Job Search Methods and Outcomes. Oxf. Econ. Pap. 54, 505–533.
Alon, S., Stier, H., 1997. Job Search, Gender, and the Quality of Employment in Israel. Res. Soc. Stratif. Mobil. 15, 133–149.
Bayer, P., Ross, S.L., Topa, G., 2008. Place of Work and Place of Residence: Informal Hiring Networks and Labor Market Outcomes. J. Polit. Econ. 116 (6), 1150–1196.
Beaman, L.A., 2009. Social Networks and the Dynamics of Labor Market Outcomes: Evidence from Refugees Resettled in the U.S. Unpublished manuscript, Northwestern University.
Blau, D.M., Robins, P.K., 1990. Job Search Outcomes for the Employed and Unemployed. J. Polit. Econ. 98 (3), 637–655.
Blau, G., 1990. Exploring the Mediating Mechanisms Affecting the Relationship of Recruitment Source to Employee Performance. J. Vocat. Behav. 37 (3), 303–320.
Bortnick, S.M., Ports, M.H., 1992. Job Search Methods and Results: Tracking the Unemployed, 1991. Mon. Labor Rev. 115, 29–35.
Bradshaw, T., 1973. Jobseeking Methods Used by Unemployed Workers. Mon. Labor Rev. 96, 35–40.
Bridges, W.P., Villemez, W.J., 1986. Informal Hiring and Income in the Labor Market. Am. Sociol Rev. 51 (4), 574–582.
Burdett, K., Mortensen, D.T., 1980. Search, Layoffs, and Labor Market Equilibrium. J. Polit. Econ. 88 (4), 652–672.
Calvo-Armengol, A., Jackson, M.O., 2004. The Effects of Social Networks on Employment and Inequality. Am. Econ. Rev. 94 (3), 425–454.
Calvo-Armengol, Zenou, Y., 2005. Job Matching, Social Network and Word-of-Mouth Communication. J. Urban Econ. 57 (3), 500–522.
Campbell, K.E., 1988. Gender Differences in Job-Related Networks. Work Occup. 15 (2), 179–200.
Campbell, K.E., Rosenfeld, R.A., 1985. Job Search and Job Mobility: Sex and Race Differences. Res. Sociol. Work 3, 147–174.
Campbell, K.E., Marsden, P.V., Hurlbert, J.S., 1986. Social Resources and Socioeconomic Status. Soc. Networks 8 (1), 97–117.

Conley, T.G., Topa, G., 2002. Socio-Economic Distance and Spatial Patterns in Unemployment. Journal of Applied Econometrics 17 (4), 303–327.
Conley, T.G., Topa, G., 2007. Estimating Dynamic Local Interactions Models. J. Econom. 140 (1), 282–303.
Corcoran, M., Datcher, L., Duncan, G., 1980. Information and Influence Networks in Labor Markets. In: Duncan, G., Morgan, J. (Eds.), Five Thousand American Families: Patterns of Economic Progress. 7, Institute For Social Research, Ann Arbor, MI, pp. 1–37.
Coverdill, J.E., 1998. Personal Contacts and Post-Hire Job Outcomes: Theoretical and Empirical Notes on the Significance of Matching Methods. Res. Soc. Stratif. Mobil. 16, 247–270.
Datcher, L., 1983. The Impact of Informal Networks on Quit Behavior. Rev. Econ. Stat. 65 (3), 491–495.
Datcher, L.L., 2006. Some Contacts are More Equal than Others: Informal Networks, Job Tenure, and Wages. J. Labor Econ. 24 (2), 299–318.
De Schweinitz, D., 1932. How Workers Find Jobs: A Study of Four Thousand Hosiery Workers in Philadelphia. University of Pennsylvania Press, Philadelphia, PA.
Devine, T.J., Kiefer, N.M., 1991. Empirical Labor Economics: the Search Approach. Oxford University Press, New York.
Durlauf, S., 2004. Neighborhood Effects. In: Henderson, V., Thisse, J.F. (Eds.), The Handbook of Regional and Urban Economics, Volume 4: Cities and Geography. Elsevier Science, North Holland.
Dustmann, C., Glitz, A., Schonberg, U., 2009. Job Search Networks and Ethnic Segregation in the Workplace. Unpublished manuscript, University College, London.
Edin, P.-A., Fredriksson, P., Aslund, O., 2003. Ethnic Enclaves and the Economic Success of Immigrants – Evidence from a Natural Experiment. Q. J. Econ. 118 (1), 329–357.
Elliot, J.R., 1999. Social Isolation and Labor Market Insulation: Network and Neighborhood Effects on Less-Educated Urban Workers. Sociol. Q. 40 (2), 199–216.
Ellwood, D.T., 1986. The Spatial Mismatch Hypothesis: Are There Teenage Jobs issing in the Ghetto? In: Freeman, R.B., Holzer, H.J. (Eds.), The black youth employment crisis. University of Chicago Press, Chicago.
Elsby, M., Hobijn, B., Sahin, A., 2010. Labor Market in the Great Recession. Brookings Pap. Econ. Act..
Falcon, L.M., 1995. Social Networks and Employment for Latinos, Blacks and Whites. N. Engl. J. Public Policy 11, 17–28.
Falcon, L.M., Melendez, E., 1996. The Role of Social Networks in the Labor Market Outcomes of Latinos, Blacks, and Non-Hispanic Whites. In: Russell Sage Foundation Conference on Residential Segregation, Social Capital, and Labor Markets, New York.
Fernandez, R.M., Weinberg, N., 1997. Sifting and Sorting: Personal Contacts and Hiring in a Retail Bank. Am. Sociol. Rev. 62 (6), 883–902.
Fernandez, R.M., Castilla, E.J., Moore, P., 2000. Social Capital at Work: Networks and Employment at a Phone Center. Am. J. Sociol. 105 (5), 1288–1356.
Fernandez, R.M., Castilla, E.J., 2001. How Much Is that Network Worth? Social Capital in Employee Referral Networks. In: Lin, N., Cook, K., Burt, R.S. (Eds.), Social Capital: Theory and Research. Aldine De Gruyter, NJ.
Fischer, C.S., 1982. To Dwell among Friends: Personal Networks in Town and City. University of Chicago Press, Chicago.
Goel, D., Lang, K., 2009. Social Ties and the Job Search of Recent Immigrants. NBER Working Paper 15186.
Gottfredson, G.D., Swatko, M.K., 1979. Employment, Unemployment, and the Job Search in Psychology. Am. Psychol. 34, 1047–1060.
Goyal, S., 2007. Connections. Princeton University Press, Princeton, NJ.
Granovetter, M.S., 1973. The Strength of Weak Ties. AJS 78 (6), 1360–1380.
Granovetter, M.S., 1995. Getting a Job: A Study of Contacts and Careers. Harvard University Press, Cambridge, MA.
Green, P.G., Tigges, L.M., Browne, I., 1995. Social Resources, Job Search, and Poverty in Atlanta. Research in Community Sociology 5, 161–182.

Green, P.G., Tigges, L.M., Diaz, D., 1999. Racial and Ethnic Differences in Job-Search Strategies in Atlanta, Boston and Los Angeles. Soc. Sci. Q. 80 (2), 263–278.
Gregg, P., Wadsworth, J., 1996. How Effective Are State Employment Agencies? JobCentre Use and Job Matching in Britain. Oxford Bull. Econ. Stat. 58 (3), 443–467.
Guest, A.M., Lee, B.A., 1983. The Social Organization of Local Areas. Urban Aff. Q. 19, 217–240.
Hilaski, H.J., 1971. How Poverty Area Residents Look for Work. Mon. Labor Rev. 94, 41–45.
Holzer, H.J., 1987a. Job Search by Employed and Unemployed Youth. Ind. Labor Relat. Rev. 40 (4), 601–611.
Holzer, H.J., 1987b. Informal Job Search and Black Youth Unemployment. Am. Econ. Rev. 77 (3), 446–452.
Holzer, H.J., 1987c. Hiring Procedures in the Firm: Their Economic Determinants and Outcomes. In: Kleiner, M.M., Block, R.N., Roomkin, M., Salsburg, S.W. (Eds.), Human Resources and the Performance of the Firm. Industrial Relations Research Association, Madison, WI.
Holzer, H.J., 1988. Search Method Use by Unemployed Youth. J. Labor Econ. 6 (1), 1–20.
Holzer, H.J., Quigley, J.M., Raphael, S., 2003. Public Transit and the Spatial Distribution of Minority Employment: Evidence from a Natural Experiment. J. Policy Anal. Manage. 22 (3), 415–441.
Ihlanfeldt, K.R., Sjoquist, D.L., 1989. The Impact of Job Decentralization on the Economic Welfare of Central City Blacks. J. Urban Econ. 26 (1), 110–130.
Ihlanfeldt, K.R., Sjoquist, D.L., 1990. Job Accessibility and Racial Differences in Youth Employment Rates. Am. Econ. Rev. 80 (1), 267–276.
Ioannides, Y.M., Loury, L.D., 2004. Job Information Networks, Neighborhood Effects, and Inequality. J. Econ. Lit. 42 (4), 1056–1093.
Jencks, C., Mayer, S.E., 1990. The Social Consequences of Growing Up in a Poor Neighborhood. In: Lynn, L., McGeary, M. (Eds.), Inner-City Poverty in the United States. National Academy Press, Washington, DC, pp. 111–186.
Kadushin, C., Jones, D.J., 1992. Social Networks and Urban Neighborhoods in New York City. City and Society 6 (1), 58–75.
Kain, J.F., 1968. Housing segregation, Negro employment, and metropolitan decentralization. Q. J. Econ. 82 (2), 175–197.
Katz, L.F., Kling, J.R., Liebman, J.B., 2001. Moving to Oppoturnity in Boston: Early Results of a Randomized Mobility Experiment. Q. J. Econ. 116 (2), 607–654.
Kaufman, J.E., Rosenbaum, J.E., 1992. The Education and Employment of Low-Income Black Youth in White Suburbs. Educ. Eval. Policy Anal. 14 (3), 229–240.
Kirnan, J.P., Farley, J.A., Geisinger, K.F., 1989. The Relationship Between Recruiting Source, Applicant Quality, and Hire Performance: An Analysis by Sex, Ethnicity and Age. Personnel Psychology 42, 293–308.
Kling, J.R., Liebman, J.B., Katz, L.F., 2007. Experimental Analysis of Neighborhood Effects. Econometrica 75 (1), 83–119.
Kling, J.R., Votruba, M., 2001. Mobility of Families in the Gautreaux Housing Assistance Program. Unpublished manuscript, Princeton University.
Korenman, S., Turner, S.C., 1996. Employment Contacts and Minority-White Wage Differences. Industrial Relations 35 (1), 106–122.
Kuzubas, T.U., 2009. Endogenous Social Networks in the Labor Market. Unpublished manuscript, University of Minnesota.
Lai, G., Lin, N., Leung, S.-Y., 1998. Network Resources, Contact Resources, and Status Attainment. Soc. Networks 20 (2), 159–178.
Lalive, R., 2006. Social Interactions in Unemployment. Unpublished manuscript, University of Zurich.
Laschever, R., 2008. The Doughboys Network: Social Interactions and Labor Market Outcomes of World War I Veterans. Unpublished manuscript, Northwestern University.
Lee, B.A., Campbell, K.E., 1999. Neighbor Networks of Black and White Americans. In: Wellman, B., Boulder, (Eds.), Networks in the Global Village: Life in Contemporary Communities. Westview Press, Colorado, pp. 119–146.

Leicht, K.T., Marx, J., 1997. The Consequences of Informal Job Finding for Men and Women. Acad. Manage. J. 40 (4), 967–987.
Lin, N., Dumin, M., 1986. Access to Occupations through Social Ties. Soc. Networks 8, 365–385.
Lin, N., Ensel, W.M., Vaughn, J.C., 1981. Social Resources and Strength of Ties: Structural Factors in Occupational Status Attainment. Am. Sociol. Rev. 46 (4), 393–405.
Ludwig, J., Duncan, G.J., Hirschfield, P., 2001. Urban Poverty and Juvenile Crime: Evidence from a Randomized Housing-Mobility Experiment. Q. J. Econ. 116 (2), 655–679.
Marmaros, D., Sacerdote, B., 2002. Peer and Social Networks in Job Search. Eur. Econ. Rev. 46 (4/5), 870–879.
Marsden, P.V., 1987. Core Discussion Networks of Americans. Am. Sociol. Rev. 52, 122–131.
Marsden, P.V., 1988. Homogeneity in Confiding Relations. Soc. Networks 10, 57–76.
Marsden, P.V., 2001. Interpersonal Ties, Social Capital, and Employer Staffing Practices. In: Lin, N., Cook, K., Burt, R.S. (Eds.), Social Capital: Theory and Research. Transaction Publishers, New Brunswick, NJ.
Marsden, P.V., Hurlbert, J.S., 1988. Social Resources and Mobility Outcomes: A Replication and Extension. Soc. Forces 66 (4), 1038–1059.
Marsden, P.V., Campbell, K.E., 1990. Recruitment and Selection Processes: The Organizational Side of Job Searches. In: Breiger, R.L. (Ed.), Social Mobility and Social Structure. Cambridge University Press, New York, NY.
Marsden, P.V., Gorman, E.H., 2001. Social Networks, Job Changes and Recruitment. In: Berg, I., Kalleberg, A.L. (Eds.), Sourcebook of labor Markets: Evolving Structures and Processes. Kluwer Academic/Plenum Publishers, New York, NY.
Marx, J., Leicht, K.T., 1992. Formality of Recruitment to 229 Jobs: Variation by Race, Sex and Job Characteristics. Sociol. Soc. Res. 76, 190–196.
McPherson, M., Smith-Lovin, L., Brashears, M.E., 2006. Social Isolation in America: Changes in Core Discussion Networks over Two Decades. Am. Sociol. Rev. 71 (3), 353–375.
Miller, S.R., Rosenbaum, J.E., 1997. Hiring in a Hobbesian World: Social Infrastructure and Employers' Use of Information. Work Occup. 24, 498–523.
Montgomery, J.D., 1991. Social Networks and Labor-Market Outcomes: Toward an Economic Analysis. Am. Econ. Rev. 81 (5), 1408–1418.
Montgomery, J.D., 1992. Job Search and Network Composition: Implications of the Strength-Of-Weak-Ties Hypothesis. Am. Sociol. Rev. 57 (5), 586–596.
Montgomery, J.D., 1994. Weak Ties, Employment, and Inequality: An Equilibrium Analysis. Am. J. Sociol. 99 (5), 1212–1236.
Moore, G., 1990. Structural Determinants of Men's and Women's Personal Networks. Am. Sociol. Rev. 55, 726–735.
Morrison, A.M., von Glinow, M.A., 1990. Women and Minorities in Management. Am. Psychol. 45 (2), 200–208.
Neckerman, K.M., Kirschenman, J., 1991. Hiring Strategies, Racial Bias, and Inner-City Workers. Soc. Probl. 38 (4), 433–447.
Oreopoulos, P., 2003. The Long-Run Consequences of Living in a Poor Neighborhood. Q. J. Econ. 118 (4), 1533–1575.
Ornstein, M.D., 1976. Entry into the American Labor Force. Academic Press, New York, NY.
Otani, S., 1999. Personal Community Networks in Contemporary Japan. In: Wellman, B. (Ed.), Networks in the Global Village: Life in Contemporary Communities. Westview Press, Boulder, Colorado, pp. 279–297.
Patel, K., Vella, F., 2007. Immigrant Networks and Their Implications for Occupational Choice and Wages. IZA Discussion Paper No. 3217.
Pellizzari, M., 2004. Do Friends and Relatives Really Help in Getting a Good Job?. CEP Discussion Paper No. 623, London School of Economics.
Petersen, T., Saporta, I., Seidel, M.-D.L., 2000. Offering a Job: Meritocracy and Social Networks. Am. J. Sociol. 106 (3), 763–816.

Popkin, S.J., Rosenbaum, J.E., Meaden, P.M., 1993. Labor Market Experiences of Low-Income Black Women in Middle-Class Suburbs: Evidence from a Survey of Gautreaux Program Participants. J. Policy Anal. Manage. 12 (3), 556–573.
Ports, M.H., 1993. Trends in Job Search Methods, 1970–92. Mon. Labor Rev. 116, 63–67.
Rees, A., 1966. Information Networks in Labor Markets. Am. Econ. Rev. 56 (1/2), 559–566.
Rees, A., Schultz, G.P., 1970. Workers and Wages in an Urban Labor Market. Univ. of Chicago Press, Chicago.
Rosenbaum, J.E., 1995. Changing the Geography of Opportunity by Expanding Residential Choice: Lessons from the Gautreaux Program. Housing Policy Debate 6 (1), 231–269.
Rosenbaum, J.E., DeLuca, S., Miller, S.R., Roy, K., 1999. Pathways into Work: Short- and Long-Term Effects of Personal and Institutional Ties. Sociol. Educ. 72 (3), 179–196.
Ross, S.L., 1998. Racial Differences in Residential and Job Mobility: Evidence concerning the Spatial Mismatch Hypothesis. J. Urban Econ. 43 (1), 112–135.
Schmutte, I.M., 2009. Job Referral Networks and the Determination of Earnings in Local Labor Markets. Unpublished manuscript, Cornell University.
Simon, C.J., Warner, J.T., 1992. Matchmaker, Matchmaker: The Effect of Old Boy Networks on Job Match Quality, Earnings and Tenure. J. Labor Econ. 10 (3), 306–330.
Topa, G., 2001. Social Interactions, Local Spillovers and Unemployment. Rev. Econ. Stud. 68 (2), 261–295.
Turney, K., Clampet-Lundquist, S., Edin, K., Kling, J.R., Duncan, G.J., Ludwig, J., et al., 2006. Neighborhood Effects on Barriers to Employment: Results from a Randomized Housing Mobility Experiment in Baltimore [with Comments]. Brookings-Wharton Papers on Urban Affairs 137–187.
Wahba, J., Zenou, Y., 2005. Density, Social Networks and Job Search Methods: Theory and Application to Egypt. J. Dev. Econ. 78 (2), 443–473.
Wegener, B., 1991. Job Mobility and Social Ties: Social Resources, Prior Job, and Status Attainment. Am. Sociol. Rev. 56 (1), 60–71.
Weinberg, B., 2000. Black Residential Centralization and the Spatial Mismatch Hypothesis. J. Urban Econ. 48 (1), 110–134.
Weinberg, B., 2004. Testing the Spatial Mismatch Hypothesis Using Inter-city Variations in Industrial Composition. Reg. Sci. Urban Econ. 34 (5), 505–532.
Weinberg, B.A., Raegan, P.B., Yankow, J.J., 2004. Do Neighborhoods Affect Hours Worked: Evidence from Longitudinal Data. J. Labor Econ. 22 (4), 891–924.
Wellman, B., 1996. Are Personal Communities Local? A Dumptarian Reconsideration. Soc. Networks 18, 347–354.
Yakubovich, V., 2005. Weak Ties, Information, and Influence: How Workers Find Jobs in a Local Russian Labor Market. Am. Sociol. Rev. 70 (3), 408–421.
Zenou, Y., 2008. Social Interactions and Labor Market Outcomes in Cities. IZA Discussion Paper No. 3283.