Social Networks and Wages:  
It is all about connections!  
(Job Market Paper) *

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Abstract

Empirical evidence suggests that networks of personal relations are important in the micro dynamics of labor markets: regardless of the country and the occupation considered, a high share of jobs are filled by social referrals. This paper adds theoretical speculation and empirical evidence to this stylized fact shedding light on an apparent puzzle: the effect of informal contacts on wages. First, we argue that economic perspectives on the effect of the use of social networks on wages can benefit from considering differences in the nature of social ties. Second, we propose a formal model which considers two distinct informal contacts called "family" and "professional". The model predicts that while the use of the former type is likely to have a negative impact on wages, the opposite is true for the latter. Third, we use a relatively unexploited Italian data set to show how different ties have different properties and are likely to be used for different purposes. Finally, we concentrate on the relation between informal contacts and wages, obtaining results which are consistent with our theoretical insights.


Keywords: Labor Markets, Job Search, Social Networks.

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1 Introduction

In the past few years labor economics has moved from the periphery to the center of the economic and political discourse. In fact, the institutions that regulate the complex dynamics of labor relations and their influence on workers’ and firms’ behaviors are today considered as one of the most important sources of a nation’s competitive advantages. However, despite the big spurt in interest in job search models and, more generally, in the formal modelling of labor markets microstructures, the actual way in which workers find their jobs and occupations has been to a good extent neglected by economic analysis.

At least since the influential work of Albert Rees (1966), economists acknowledge that in the labor markets demand and supply match in a distinctive mode. In particular, information that actors have about one another and search strategies are largely embedded in their social networks: a high share of employees find their jobs through referrals or different kinds of help provided by acquaintances, friends and relatives. On the other hand, if one tries to go beyond this simple statement, sorting out, for example, how the use of social contacts varies among different demographic groups, how its intensity changes along the business cycle, what is its likely effect on job quality and matching efficiency, how it is affected by new matching technologies (e.g. internet based recruitment), the open questions overshadow the few tentative answers.

Aiming at improving the lack of knowledge in the above domains, this paper studies the impact of the use of social ties on wages, focusing on the Italian labor

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1 See Freeman (1998) for an insightful discussion on this trend.
2 For discussions and progresses in the above issues see Ports (1993); Osberg (1993); Autor (2001); Ioannides and Loury (2004).
markets of young university graduates.

Empirically, the evidence on social networks and wage outcomes is controversial. In fact, even if social networks are often depicted as an effective channel to transmit information and, therefore, an asset in labor matching quality (e.g. Holzer (1988)), there is no clear-cut evidence on the ceteris paribus effect of informal ties use on wages outcomes (see e.g. the afterword in Granovetter (1995) or Ioannides and Loury (2004)). Pellizzari (2004), trying to provide an explanation for the international variation in wage differential between jobs found through formal and informal channels, convincingly argues that heterogeneity in firms’ recruitment strategies has to be considered in order to make sense of this variation.

In this paper we provide another possible explanation. We focus on the nature of social ties between the job seeker and the contact: our main contribution concerns how two distinct types of social contacts are used by heterogeneous would-be workers and how these contacts lead to different wage outcomes. In particular, we shall distinguish between family and professional social ties, which indicates respectively whether the referral is made by relative or a non-relative having the same professional role of the job seeker.

Theoretically, we build on notions familiar to economists: the use of social networks can be envisaged as screening and search devices in circumstances characterized by asymmetric information and high search costs. In a nutshell, first, employers do not know the productive skills of potential employees before hiring them, but they can use employees’ social ties as a screening mechanism. Second, in labor markets undermined by various sorts of frictions and long spell of unemployment, job seekers may employ social networks in order to locate vacancies without bearing high search costs. Given that the focus of this study is on individuals in
Table 1: **Percentages of University Graduates Using Social Contacts**

<table>
<thead>
<tr>
<th>Country</th>
<th>Social Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>31</td>
</tr>
<tr>
<td>Spain</td>
<td>28</td>
</tr>
<tr>
<td>Czech Republic</td>
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<tr>
<td>France</td>
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<tr>
<td>Austria</td>
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<tr>
<td>United Kingdom</td>
<td>12</td>
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<tr>
<td>Germany</td>
<td>11</td>
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<tr>
<td>Finland</td>
<td>7</td>
</tr>
<tr>
<td>Sweden</td>
<td>7</td>
</tr>
<tr>
<td>Norway</td>
<td>6</td>
</tr>
</tbody>
</table>

*Notes:* The relevant question asked in the survey was “Which method was the most important one for getting your first job after graduation?” We label the answer as “social contacts” if the respondent answered “I used personal connections/contacts (e.g. parents, relatives)”.

*Source:* Final report of “Careers after Higher Education: a European Research Study”.

*Details on the project and downloadable material can be found at http://www.uni-kassel.de/wz1/tseregs.htm.*

the early stage of their careers, we shall not model explicitly network formation, assuming that actors take social structure as a given.

As mentioned, our empirical analysis focuses on university-to-job transition of Italian graduates. A few facts make the object of this investigation both relevant and interesting. First, as showed in Table 1, if one compares the shares of college graduates who use personal contacts across a selected sample of European countries, Italy ranks first.

Second, Italian labor market is characterized by the simultaneous presence of high levels of unemployment among qualified workers (especially the young ones) and their relative low share in both the relevant population class and the labor force, as compared to other industrialized countries (see Table 2).

Third, despite the low costs of higher education and the low level of formal barriers in its access, Italian system seems to be characterized by a low level of intergenerational mobility both in terms of occupational ladder and scholastic
Table 2: Educational Attainment of the Population and the Labor Force Aged 25-64 (2001)

<table>
<thead>
<tr>
<th>Country</th>
<th>ISCED 4</th>
<th>ISCED 5/6</th>
<th>ISCED 4</th>
<th>ISCED 5/6</th>
</tr>
</thead>
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<tr>
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<td>10</td>
<td>2</td>
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<tr>
<td>United States</td>
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<td>United Kingdom</td>
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<td>France</td>
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<tr>
<td>Germany</td>
<td>15</td>
<td>13</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

Notes: ISCED 4: tertiary type-B education. ISCED 5/6: tertiary type-A education.
Source: OECD (2002).

achievements (Checchi, 2003; Checchi et al., 1999). A possible explanation for this puzzle can be the eventual “conservative” use of social networks.

Fourth, Pistaferri (1999), analyzing the effect of the use of social ties on wages in the Italian labor market, finds, in contrast with theoretical predictions and the U.S. empirical evidences, that they have a negative impact on earnings.

The paper is organized as follows. Section 2 critically reviews the literature on the impact of the use of social contact on wages. We argue that the economic perspectives on this issue can benefit from considering the huge variation in the circumstances in which people use informal job search and, in particular, we propose that the nature of the social tie between the job seeker and the contact is important. Section 3 presents a model that encompasses two different kinds of social networks—professional and family—and makes some predictions on the effect they have on wages. In section 4, we describe our data set and provide some informative descriptive statistics consistent with our main hypotheses. Lastly, in section 5, we evaluate the properties of different social ties and check if the evidence is consistent with the main implications of the model, controlling for sample
selection and omitted variable biases. Section 6 concludes.

2 Networks and wages: a critical review

Several empirical investigations have been concerned with the individual efficiency of using social networks as a job-search strategy. For example Holzer (1988), exploiting the 1981 US Youth Cohort of the National Longitudinal Survey, finds that checking with friends and relatives is both the most popular and the most productive search method among unemployed youth. Similar results on the efficiency of seeking a job through social contacts can be found in Blau and Robins (1990). Indeed, if employees behave rationally and a high share of job matches occurs through informal channels, then, somewhat tautologically, informal job search strategy is often individually efficient. More subtle and interesting matters concern both to which extent this efficiency depends on individuals’ social contact endowments and how aggregate efficiency is affected if the latter influences occupational choices (Bentolila et al., 2004).

A complementary and more controversial issue is the one addressed by this paper: how good are the jobs reached through informal referrals? And, in particular, which is the ceteris paribus effect of the use of social networks on wages? The conventional wisdom in economic literature acknowledges that, given the inherent uncertainties in the labor market, information flowing in social networks helps employers to reach better matches.

In his seminal paper Albert Rees (1966) argued that the bulk of the uncertainty in the labor market concerns the intensive margin of search: while in standardized commodities markets buyers (sellers) are interested in acquiring information about
many sellers’ (buyers’ reservation) prices, in labor markets employers (employees) are typically interested in detailed information about a single potential applicant (a likely and suitable offer). Employers, in order to ameliorate their intensive margin of search can either set very restrictive requisites for potential applicants, or exploit information flowing through social contacts. Employee referrals, which are an important subset of the latter, are believed to perform particularly well for a number of reasons: first, employees care about the quality of someone who is likely to become a colleague. Second, they are interested in disclosing accurate information, because their own reputation can be at stake (Saloner, 1985). Moreover, if people tend to refer others similar to themselves (and employers know this), hiring firms can exploit this information as an effective method of screening device (Montgomery, 1991).

Simon and Warner (1992), in a similar vein, do not model referees behavior strategically, but assume that referrals ameliorate the noisy information that firms have about new applicants’ true productivity. With a standard matching model they show that referred job seekers set higher reservation wages, given that they do not gamble on provisional firms misperception of their true ability and therefore do not accept lower initial wages. Accordingly, the model implies that referred workers should earn a higher initial wage, but thereafter should experience a lower wage increase compared to non-referred ones.

Finally, Kugler (2003) suggests that, due to peer pressure in the workplace, employee referrals lower monitoring costs and, therefore, firms hiring through referrals can pay lower efficiency wages. She develops a model in which a dual matching process generates segmentation in the labor market and referred workers get high paying jobs.
Most of the empirical works carried out in the U.S. have supported the above arguments finding a positive association between the use of social contacts and either wages (Granovetter, 1995; Corcoran et al., 1980; Simon and Warner, 1992), or other indicators of job satisfaction (Datcher, 1983).

On the other hand, exploiting mainly European data sets, other authors have found that people who get jobs using social networks earn on average a lower salary (Pistaferri, 1999; Addison and Portugal, 2002; Bentolila et al., 2004; Pellizzari, 2004). In particular, Pistaferri (1999) has argued that this can stem either from unobserved worker characteristics or from job unobserved ones (e.g. jobs reachable through social networks are available only in small firms which pay lower wages). Indeed, especially during recessions, people who rely on contacts are likely to be the ones who are in great need of a job and/or do not have other options (Granovetter, 1995). Therefore, they are likely to accept lower wages. In addition, for the same reason, the use of social contacts can be a negative signal for employers who can respond offering a lower wage. Bentolila et al. (2004) go even further suggesting that social ties can create a mismatch between one’s productive comparative advantage and occupational choice, given the higher search efficiency of informal search. As a result, their model predicts that people using social contacts have on average lower abilities. Finally, finding wide international differences in wage premia, Pellizzari (2004) argues that employers’ search strategies (i.e. the amount of resources invested in formal recruitment) are key to determine the effect of contacts on wages. He shows that in industries where firms invest more in recruitment and in jobs which have higher productivity and require more training,

\footnote{Incidentally, in Datcher (1983) referrals lower uncertainty in the intensive margin of job searchers rather than employers.}
wage premia paid to those who use social networks are indeed lower and eventually negative.

Following Granovetter (1995), we believe that the conflicting arguments and the contrasting evidence reviewed above rises, at least partially, from the oversimplification that is usually made modelling different matching mechanisms and search behaviors: the variation in the circumstances in which people use informal job search is enormous and using social contacts is far from being a homogeneous search method. At least in principle, three issues should be considered in order to improve both theoretical models and empirical analyses: (i) the nature of the informal tie between the job seeker and the contact (ii) the structural characteristics of the network in which this tie is located and (iii) the relation of this network to information about job opportunities and actors characteristics.

This paper concentrates on the first matter: social ties differ across several dimensions. First, as already mentioned, employee referrals are more informative than non-employee ones. Second, the intensity of the relationship matters. For instance, both economists and sociologists have been influenced by Granovetter’s distinction among strong and weak ties and his popular hypothesis on the ”strength of weak ties”, which predicts that acquaintances are often more informative than close friends and relatives in connecting people and jobs\(^4\). Third, Granovetter (1995) in his famous book also distinguished among ”work” and ”family-social” contacts.

\(^4\)In a nutshell, although friend and relatives (Strong Ties) are probably more motivated in helping, acquaintances (Weak Ties) are more likely to convey useful information: being acquaintances less likely than close friend to know each other, they are for structural reasons more likely to have access to useful and unexploited information about jobs openings. Boorman (1975) provides a very interesting economic model. See Bridges and Villemez (1986) for an empirical investigation and Montgomery (1992) for a model which encompasses both economic and sociological insights.
Motivated by both the peculiarity of young university graduates and by the features of our survey data, we use a classification similar to last one, arguing that professional and family ties differ in the nature of the information they convey. Consequentially, their impact on labor market outcomes is likely to be different.

3 The Model

This section develops a two period model of a labor market with imperfect information on workers’ ability and others market frictions. The two essential features are: first, if a period-1 worker has a social tie she automatically refers her period-2 connection to her employers; second, the tie between period-1 and period-2 workers can be twofold: professional and family.

3.1 Assumptions and Timing

The basic structure of the model is similar to the one in Montgomery (1991): workers differ both in their skills or abilities (i.e. productivity level) and in type and the number of connections they have. Firms set wage offers before they observe this heterogeneity. Workers can decide either to exploit their social contacts, if they have one, or to look for a job in the market. The two novel features are: first, the twofold nature of social ties and, second, the presence of search cost which workers have to bear if they are hired in the market.

3.1.1 Workers

The model assumes that in both periods there is a continuum of measure 1 of workers which live only one period. They differ in two respect: first, they have
different productivity. For the sake of simplicity they can be of two type: high ability ones (H) produce an output equal to 1, while low ability (L) produce 0. We further assume that half of them are H and half L. Second, they can have a social tie whose characteristics will be explained below. Workers have a very simple payoff function which equals their wage minus the eventual search cost $c$ they have to bear if they get their job through the market. As stated above, they are observationally equivalent before they are hired.

### 3.1.2 Firms

Each firm employs one worker and its output is exactly equal to its worker productivity\(^5\). Price are identical and, to simplify the analysis, are normalized to 1. Therefore, in each period profit is simply the sole worker’s productivity minus her wage. In each period firms set wages before knowing worker’s productivity and the type of tie she eventually has. In period 1 they hire through a competitive market taking the market wage $w_{m1}$ as given; on the other hand, if in period 1 they have hired a worker with a social tie, in period 2 they have the opportunity to make a referral offer in order to hire their period 1 worker’s connection.

### 3.1.3 Social Structure

We assume a rather simplistic social structure: a period-1 worker can be connected at most with one period-2 worker, either through a professional tie or through a family one\(^6\). We set equal to $p \in [0, 1]$ the share of period-1 workers having a

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\(^5\)This assumption implies firms’ are identical in every respect but the worker type they hire. This implies there is not an assignment problem.

\(^6\)In the network analysis jargon, we have a two-mode network where period-1 workers have at most one tie with period-2 ones.
professional tie and equal to $f \in [0, 1]$ the share of period-1 workers having a family one. It is worthwhile to emphasize the differences in the two mechanisms which govern the social structure:

- **Professional Network**

  For each period-1 worker having a professional tie, the connected period-2 worker is selected through a two stage stochastic process: first, period-2 worker’s type is chosen according to a key parameter: conditional upon holding a professional tie, a period-1 worker is connected to a period-2 worker of her type with probability $\alpha > \frac{1}{2}$. Note that it is possible that a period-2 worker ends up being professionally connected to more than one period-1 worker. Assuming $\alpha > \frac{1}{2}$ is crucial, because it allows firms to use professional ties as a screening device\(^7\). Second, period-2 worker is randomly chosen conditional upon being of this type.

- **Family Network**

  For each period-1 worker holding a family tie, the known period-2 worker is chosen randomly, given she is not connected to any other period-1 worker. This imply that, first, firms do not learn anything about period-2 worker’s ability from her period-1 relative’s ability\(^8\). Second, there is a one-to-one kinship relation between workers in different periods. This last feature may seem odd; in fact, it implies that period-2 workers can have at most one family tie while they can have more professional ones. However it is conceived

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\(^7\)If $\alpha$ were equal to $\frac{1}{2}$ firms would have received no benefits from learning their period-1 worker productivity. See Montgomery (1991) for a detailed discussion on the empirical underpinnings of this assumption.

\(^8\)One can argue that being referred by a family member can be a negative signal to employers. We made the somewhat weaker assumption that it does not convey any information.
for a reasonable purpose, i.e. to avoid firms competing in the hiring of family connected workers.

Social structure is then exogenously given and it is characterized by three parameters: two measures of connectivity ($p$ and $f$), and a measure of inbreeding among professionally connected workers ($\alpha$). The basic features of the two social ties addressed by the model are straightforward: first, only professional contacts convey information on workers’ ability given the parameter $\alpha$, but both kinds of social ties can be used by workers in order to save search costs stemming from market frictions. Second, in period 2 firms compete only for hiring professional connected workers, which are the only ones who can have more than one tie.$^9$

### 3.1.4 Timing

In the first period all workers are hired in the market which clears at a wage $w_{m1}$. Firms produce and thereafter learn their workers’ productivity. Then, they may decide to set referral offers: family ($w_F$), professional ($w_P$), or both ($w_F, w_P$)). Then, according to the rules described in subsection 3.1.3, social ties are assigned.$^{10}$ At this point each period-1 worker possessing either kind of tie passes the offer to her period-2 relative, friend or acquaintance. Finally, period-2 workers compare the offers received$^{11}$ and either accept one, or use the market and seek for a job paying $w_{m2}$ bearing the search cost $c$.

$^9$The allocation of professional ties, like in Montgomery (1991), resembles an occupancy problem in probability theory: professional ties to period-1 workers are the balls randomly dropped in period-2 workers, which are the urns. On the other hand, family ties are like balls which are dropped randomly, but only in empty urns.

$^{10}$It may seem odd that firms make referral offers before knowing if their period-1 worker is connected. However, we can envisage this situation as an employer’s enquiry coupled with an offer.

$^{11}$Indeed, it should be clear at this point that only a few period-2 workers professionally connected could have received more than one offer.
3.2 Equilibrium

The technical details of the statements we make in this section are given in the Appendix I. Moreover, the qualitative nature of the equilibrium is similar to previous work on adverse selection and price dispersion (e.g. Burdett and Judd (1983); Montgomery (1991)). Here we emphasize the novel implications of the model.

Only firms that hired a H period-1 worker find profitable to make a professional referral offer. This is due to the inbreeding bias between professionally connected workers (i.e. \( \alpha > \frac{1}{2} \)) and a not too high value of search cost compared with such bias\(^{12}\). These offers are dispersed over the interval \([w_m - c, \bar{w}_P]\), where \(\bar{w}_P\) is function of \(\alpha, p,\) and \(c\). The density of the referral distribution is positive over the entire range.

On the other hand, all firms hiring a period-1 worker will make a family referral offer irrespectively of the type of period-1 worker they hired. This offer just an \(\epsilon\) higher than \((w_m - c)\). Intuitively, this depends on the search cost assumption: firms set wages just above workers’ outside option which is the market wage minus the search cost.

Given that most of the workers hired through their professional network are high ability ones, both family networks and the market pools are harmed by a form of adverse selection: firms, using Bayes’s rule, set \(w_m\) below \(\frac{1}{2}\) and, due to the free entry hypothesis, equal to the average productivity of the relevant population.

\(^{12}\)In the Appendix we show that the necessary condition which guarantees that firms which hire a L in period-1 do not make professional offers is \((c < 2\alpha - 1)\). The intuition is pretty straightforward: the rent firms can get from higher workers’ search costs should not be too high compared with the negative information convey by being connected to a low ability worker.
3.2.1 Wages

Period-1 workers, given unavoidable information asymmetries, earn the same market wage irrespectively of abilities and the ties they hold. Conversely period-2 workers’ wages and payoffs depend on the number and the type of ties they are endowed with and actually use:

- Workers either with no social ties, or with professional ties to low ability period-1 workers do not get any referral offers, therefore they bear a search cost \( c \) and get \( w_{m2} \). In the appendix we show that \( w_{m2} \) level is affected by social structure’s characteristics, being decreasing both in \( p \) and \( \alpha \). On the other hand, it does not depend the magnitude of search cost\(^{13} \).

- Workers with family ties get \( w_F = w_{m2} - c + \epsilon \). The higher the search costs, the bigger the difference between market wage and the wage of family referred workers.

- Workers professionally well connected (i.e. with at least one tie to high ability period one workers) get offers dispersed over the interval \([w_{m2} - c, \bar{w}_P]\). For small \( c \) their wage is on average higher then \( w_{m2} \).

3.2.2 Profits

In period 1 all firms earn zero profit because of the free entry condition\(^{14} \). In period 2 three groups of firms can be tracked accordingly to their expected profits:

\(^{13}\)In the appendix we \( w_{m2} \) is equal to \( \frac{e^{-ap}}{e^{-ap} + e^{-\alpha p} - (1-\alpha)p} \).

\(^{14}\)Note that in the Appendix \( w_{m1} > \frac{1}{2} \) (the expected productivity of period-1 workers), since expected profits equal the probability of hiring a \( H \) in period 1 plus the expected profit of hiring trough referral in period 2.
• Firms hiring in the market pay wages equal to the expected productivity of period-2 workers that are searching in the market. Again, this is due to free entry condition which dries profits to zero.

• Firms making professional offers get positive expected profits $\bar{\pi}_P = p \cdot (\alpha - \bar{w}_P)$. In the appendix we show this quantity is increasing in $c$.

• Firms making offers to a relative of the worker they hired in period-1, also make positive expected profits increasing in $c$. Intuitively, they are equal to the probability that their period-1 employees are connected to some relatives looking for a job in period 2 multiplied by $(c - \epsilon)$.

Summing up, the original features of the model (i.e. distinguishing among different social ties and assuming workers can save a search cost if they use social ties) imply that family ties can be purposefully used by employers even if they not convey any information on workers' abilities. Their use is profitable because it allows to pay lower wages. It follows that the model makes two predictions which are consistent with the evidence we shall present below:

• workers who find their job through informal professional referrals earn on average higher wages;

• workers who use the referral of their relatives are more likely to get lower wages.

The first is the result of firms’ use of social networks as a screening device; the second is the result of workers’ use of family connection as a way to economize on search costs.
4 The Data

The data used in this study are from a survey run by the Italian National Bureau of Statistics ISTAT (1998) named *Indagine Inserimento Professionale Laureati* (Survey on university-to-job transition, hereafter IIPL). The survey was conducted on a sample of individuals who graduated approximately three years before the survey took place\(^\text{15}\). Our data set is built on the answers to a questionnaire mailed in 1998 to 25,716 individuals. They represent the 25% of the entire Italian university students that completed their degree in 1995. The response rate as been of 64.7 per cent, for a total of 17,326 individuals. Among them only 12,418 considered themselves employed when the survey took place. Since self-employed (4,160 observations) are not technically hired, we exclude them together with the ones who either do not have a regular contract (683 observations) or work only occasionally (394 observations). Finally, we exclude individuals who are enrolled in formal graduate education (e.g. PhD or master)\(^\text{16}\), and 243 observations for missing data. The final sample is therefore composed of 6,136 individuals.

The survey questionnaire is divided into three sections: (i) school and university curricula, (ii) employment (or unemployment) conditions, and (iii) demographics and family backgrounds. The first section asks information about the kind of degree obtained and four indicators of school performance: high school and university final grades, the number of years employed to complete the degree\(^\text{17}\), and a dummy which assumes value one if "laude" (honors) have been obtained. The

\(^{15}\)The stratification process makes the final sample representative for sex, geographical location of the university attended, and the subject of the degree obtained.

\(^{16}\)despite they consider themselves employed, their wage is not informative since it is often coupled with a grant.

\(^{17}\)In the Italian case this measure can be extremely informative, given that over seventy percent of the graduated students are not able to complete on time.
three measures are obviously highly correlated (e.g. individuals who performed better during high school did better at university), but we use all of them since they measure individuals’ performance at different points of time.

Section two collects information about individuals’ employment status, occupation, and various job characteristics. Key for our purposes is a subset of questions included in this section which concerns job-search methods. First, employed individuals are asked: “How did you find your actual job?” Among the possible answers, together with direct application, newspaper ads, public exam, State Employment Service, there is ”A relative, a friend, or an acquaintance referred me to my employer”. Second, if the latter method has been used, individuals are asked about the nature of the referral. In particular, we are able to track both her kinship status vis-a-vis the individual interviewed and his or her professional role. We thus can identify both a set of people who have used social contacts (NET), and two not overlapping\(^\text{18}\) subsets of the former: first, the one composed by individuals whose family has played the key role (FAM); second, the one which contains individuals who has been referred by non relatives who have their same professional role (PROF). In Appendix II the key questions are reported together with the detailed procedure we used.

Following the intuitions of the model presented in the previous section, our hypothesis is that the two subsets above have distinct characteristics. In facts, the two kinds of ties employed both convey different information and require different degrees of commitment by the actors involved. If, on the one hand, relatives are more committed in helping, on the other—and partially for the same reason—they

\(^{18}\)Note that the two subsets do not induce a complete partition in Net since some workers were referred neither by relatives nor by people having the same professional role.
Table 3: Sample Characteristics of the Data

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<th>Max</th>
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<td>10,000</td>
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<td>103</td>
<td>6.688</td>
<td>77</td>
<td>110</td>
</tr>
<tr>
<td>Extra years to finish</td>
<td>2.9</td>
<td>3.053</td>
<td>-1</td>
<td>31</td>
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<tr>
<td>Laude</td>
<td>0.214</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.494</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>North West</td>
<td>0.358</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>North East</td>
<td>0.149</td>
<td>0</td>
<td>1</td>
<td></td>
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<tr>
<td>Center</td>
<td>0.326</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>0.166</td>
<td>0</td>
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<td></td>
</tr>
</tbody>
</table>

**Geographical Dummies**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>0.072</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Geology and Biology</td>
<td>0.040</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Science</td>
<td>0.084</td>
<td>0</td>
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<tr>
<td>Engineering</td>
<td>0.265</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Architecture</td>
<td>0.013</td>
<td>0</td>
<td>1</td>
<td></td>
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<tr>
<td>Agronomy</td>
<td>0.022</td>
<td>0</td>
<td>1</td>
<td></td>
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<tr>
<td>Medicine</td>
<td>0.006</td>
<td>0</td>
<td>1</td>
<td></td>
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<tr>
<td>Economics, Business and Statistics</td>
<td>0.228</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sociology and Politics</td>
<td>0.071</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0.065</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Humanities</td>
<td>0.195</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Degree Dummies**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Sector</td>
<td>0.299</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Part Time</td>
<td>0.087</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Temporary contract</td>
<td>0.291</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Started before graduation</td>
<td>0.155</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Firm over 99 empl.</td>
<td>0.489</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Firm from 50 to 99 empl.</td>
<td>0.095</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Firm from 15 to 49 empl.</td>
<td>0.133</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Firm from 6 to 14 empl.</td>
<td>0.078</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Firm less than 6 empl.</td>
<td>0.066</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Job specific Dummies**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Legislator, Sr. Official or Manager</td>
<td>0.015</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>0.286</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Technician or Associate Professional</td>
<td>0.538</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Clerk</td>
<td>0.103</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Service or Shop and Market Sales Worker</td>
<td>0.025</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Craft, Specialized Blue Collar or Agricultural Worker</td>
<td>0.005</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Plast and Machine Operators and Assemblers</td>
<td>0.003</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Low skilled occupation</td>
<td>0.004</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Armed Forces</td>
<td>0.010</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Number of obs.** 6136

Notes: Wages are in thousands of Italian Lira. The eight possible levels for parents’ education are: illiterate/no schooling, primary school (5 years), upper-primary (3 years), vocational high school (2-3 years), high school (4.5 years), short university degree, university degree or PhD. In Italy most of university students do not graduate according to the official length of the degree, so “Extra years to finish” can be consider another indicator of university performance. Laude is a special mention the ones who scored 110 can obtain.
Table 4: Search Methods employed: comparing Italian data-sets

<table>
<thead>
<tr>
<th>Method</th>
<th>Total Informal</th>
<th>Professional</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIPL - 1998</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University Graduates</td>
<td>28.6</td>
<td>8.4</td>
<td>8.1</td>
</tr>
<tr>
<td>SHIW - 1991</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50.35</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>University Graduates</td>
<td>25.32</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Notes: Numbers are percentages using different methods. The Survey of Household Income and Wealth (SHIW) and the Survey on university to job transition (IIPL) are only slightly comparable. Professional and Family do not sum up to Total Network because some workers were not referred neither by relatives nor by people with the same professional role.


are less concerned with referred worker’s characteristics and abilities. Instead, professional colleagues could be somewhat less committed, but their referral is more likely to release private information. In the model presented in the previous section the latter occurs because they often refer colleagues like themselves.

Finally, the third section provides data on demographic characteristics, on geographical residence, and on parental level of education. Along the analysis we consider the latter an indicator of individuals’ socio-economic background.

Table 3 depicts the variables we use in the empirical analysis, together with sample statistics and some further definitional details.

5 Empirical Results

To set the stage, we present some descriptive evidence on the use of informal contacts. Table 4 depicts the methods used by 1995 university graduates who were permanent employees in 1998. Even if results are only slightly comparable, we confront this with the analogous pictures obtained using the 1991 Bank of Italy
Survey on Household Income and Wealth (SHIW). Both figures are consistent with around one third of employees using social ties to find their job. Likewise other countries figure, the use of social network is decreasing with educational level (e.g. Corcoran el al. (1980)).

### 5.1 Who finds job through personal contact

Table 5 reports descriptive statistics for wage, age, and sex within groups of workers who have found their job using different channels. Without controlling for other variables, wages are on average lower among workers who used family social ties and higher for the ones who used professional social ties with respect to the ones who used formal means. Of course, this result is preliminary and potentially misleading, since it does not control for several dimensions. For instance, as we show below, family ties use is more widespread among workers which graduated in degrees which pay less and, conversely, the use of professional ties is concentrated among higher status occupation.

Table 6 depicts the percentages of individuals who used different job-search channels (total informal, family and professional) within distinct geographical areas, having different university degree and occupations, and working in firms of different sizes. The south is at the same time the region where family connections are more pervasive—as the common wisdom suggests—and where professional ties are less used; the remaining areas show similar percentages.

Second, different university degrees show different patterns: engineering grad-
Table 5: Differences among workers who used different methods

<table>
<thead>
<tr>
<th></th>
<th>Formal means</th>
<th>Total Informal</th>
<th>Family</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>St. Dev.</td>
<td>Mean</td>
<td>St. Dev.</td>
</tr>
<tr>
<td>Wage</td>
<td>2,032</td>
<td>626.64</td>
<td>1,974</td>
<td>676.13</td>
</tr>
<tr>
<td>Age</td>
<td>30.48</td>
<td>4.32</td>
<td>30.21</td>
<td>3.67</td>
</tr>
<tr>
<td>Female</td>
<td>0.497</td>
<td>0.485</td>
<td>0.518</td>
<td>0.448</td>
</tr>
<tr>
<td>Number of obs.</td>
<td>4381</td>
<td>1755</td>
<td>498</td>
<td>514</td>
</tr>
</tbody>
</table>

Notes: 6136 observations. Wages are expressed in thousands of Italian Lira. Female is a dummy variable equal 1 if the worker is female and 0 otherwise.

Source: calculation on ISTAT (1998)

uates rely relatively little on family contacts and are more likely to find a job through direct application\textsuperscript{20}. Probably, this is partially due to the more precise skill content of engineers’ occupations and the selectivity of the program: their degree provides more specific skills than other disciplines. The opposite seems to be true for the Humanities where family ties are well above the mean.

There are no clear differences across occupations in terms of the aggregate use of social ties. On the other hand, as anticipated, very few individuals within low skill occupations use professional referrals. Managers, on the other hand, rely relatively more on family ties than other high skilled employees\textsuperscript{21}.

Third, in the matching process demand should be considered. As reported in other investigations, a high share of workers hired by smaller firms relies on informal ties. A plausible explanation is that only big firms can afford formal recruitment practices, given that they have high fixed costs. In any case, the figure raises some doubts about the efficiency of informal ties on the employer

\textsuperscript{20}The percentage concerning individuals using direct application are available from the author upon request.

\textsuperscript{21}This observation should be taken cautiously, since it relies only on 94 observations.
Table 6: Search Methods employed: Percentages among Different Subgroups.

<table>
<thead>
<tr>
<th>Geographic Location</th>
<th>Total Informal</th>
<th>Family</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>North West</td>
<td>28.55</td>
<td>7.14</td>
<td>8.96</td>
</tr>
<tr>
<td>North East</td>
<td>28.74</td>
<td>7.54</td>
<td>9.18</td>
</tr>
<tr>
<td>Center</td>
<td>28.89</td>
<td>7.85</td>
<td>8.20</td>
</tr>
<tr>
<td>South</td>
<td>27.82</td>
<td>11.26</td>
<td>6.76</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>27.52</td>
<td>5.55</td>
<td>9.20</td>
</tr>
<tr>
<td>Science</td>
<td>30.04</td>
<td>8.33</td>
<td>12.21</td>
</tr>
<tr>
<td>Econ., Bus. and Stat.</td>
<td>28.31</td>
<td>9.79</td>
<td>7.29</td>
</tr>
<tr>
<td>Humanities</td>
<td>28.85</td>
<td>9.72</td>
<td>7.11</td>
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</table>

<table>
<thead>
<tr>
<th>Occupation</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg., Sn. Officials and Managers</td>
<td>28.72</td>
<td>11.70</td>
<td>10.64</td>
</tr>
<tr>
<td>Professional</td>
<td>29.23</td>
<td>6.15</td>
<td>12.02</td>
</tr>
<tr>
<td>Technician or Ass. Prof.</td>
<td>28.26</td>
<td>8.13</td>
<td>7.63</td>
</tr>
<tr>
<td>Clerk</td>
<td>28.03</td>
<td>11.02</td>
<td>3.62</td>
</tr>
<tr>
<td>Low Skilled Occupations</td>
<td>29.78</td>
<td>10.29</td>
<td>3.31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firm size</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 100 employees</td>
<td>26.87</td>
<td>7.23</td>
<td>7.93</td>
</tr>
<tr>
<td>Below 99 employees</td>
<td>36.36</td>
<td>10.26</td>
<td>10.65</td>
</tr>
</tbody>
</table>

Notes: 6136 observations except firm size where, due to missing data, 5294 observations. Low skilled occupations include: service or shop and market sales workers; craft, specialized blue collar or agricultural workers; plant and machine operators and assemblers; and other low skilled occupations.

Source: calculation on ISTAT (1998)
Table 7: Social Ties, School Performance, and Parents’ education

<table>
<thead>
<tr>
<th></th>
<th>Total Informal</th>
<th>Family</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High School Performance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low educated parents</td>
<td>24.9</td>
<td>5.6</td>
<td>7.6</td>
</tr>
<tr>
<td>High educated parents</td>
<td>28.2</td>
<td>8.9</td>
<td>7.9</td>
</tr>
<tr>
<td>t-statistic for difference</td>
<td>-2.09**</td>
<td>-3.50***</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Low School Performance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low educated parents</td>
<td>27.5</td>
<td>6.7</td>
<td>8.8</td>
</tr>
<tr>
<td>High educated parents</td>
<td>34.1</td>
<td>11.4</td>
<td>9.3</td>
</tr>
<tr>
<td>t-statistic for difference</td>
<td>-3.44***</td>
<td>-4.44***</td>
<td>-0.41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low educated parents</td>
<td>26.2</td>
<td>6.1</td>
<td>8.2</td>
</tr>
<tr>
<td>High educated parents</td>
<td>30.9</td>
<td>10.1</td>
<td>8.5</td>
</tr>
<tr>
<td>t-statistic for difference</td>
<td>-4.03***</td>
<td>-5.55***</td>
<td>-0.47</td>
</tr>
</tbody>
</table>

Notes: Both for parental education and high school performance, High and Low have been defined according to medians, in order to have roughly the same number of observation in each class.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ISTAT (1998)

Table 7 helps to disentangle, possibly, one of the most critical issues addressed by this article. First, the share of individuals using social ties is higher within the groups whose individuals are more likely to have useful connections, i.e. the ones whose parents’ educational level is higher. As expected, this holds clearly and strongly for family ties\(^{22}\); conversely, for professional ties the difference among the two groups is not statistically different from zero. Individuals with more educated parents\(^{23}\) use family ties almost twice as much as the ones with less educated parents.

\(^{22}\)It is worthwhile to note that with such descriptive evidence it would be misleading to consider parents’ education as a proxy of unobserved skill when we are interesting in understanding the factors that influence job search behaviors.

\(^{23}\)The two macro classes, both for family education and high school performance, are built using medians as cut points in order to have (roughly) the same number of observation in each class.

side, assumed irrespectively of the firm’s dimensions.
parents. Moreover, if we consider the high school grade as a reliable proxy of cognitive skill or ability, we have lower share of people using social networks within higher performing groups.

The suggested picture is extremely interesting: uneven access to useful informal networks (i.e. different socio-economic status) seems to affect the actual use of social ties; moreover, higher performing students are less likely to use such networks. The evidence presented suggests that the decision to use a given search method could be partially embedded in individual social networks.

To further explore our hypothesis, we estimate three standard probit regressions in order to document the characteristics of the jobs and the related individuals who used the three informal networks defined. The three dependent dichotomous variables assume therefore value 1 if the individual has found her job through overall social network, family network, and professional network respectively. While the set of controls includes four measures of school and university performance, the average number of years of education of both parents, two dummies for big and very big firms, dummies for public sector jobs, jobs started before the graduations, jobs with temporary contract, geographical location, university degree, sex, and occupation.

Results for some of the controls are reported in table 8. Some of the regularities pointed out in the previous section are confirmed: the probability of finding a job through personal contacts is negatively correlated with academic performance and firm size, and positively with better family background. If, on the one hand, this pattern is somewhat clearer for jobs found through family contacts, on the other,

---

24 We use high school instead of university grade because rarely employers use it when they recruit people. Anyway, using university performance we obtained the same qualitative results.

25 A very big firm has 100 or more than 100 employees. A big one has from 50 to 99 employees.
Table 8: Probit estimates for job found through personal contacts

<table>
<thead>
<tr>
<th></th>
<th>Total Informal</th>
<th>Family</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Grade</td>
<td>-.009*** (.003)</td>
<td>-.006 (.004)</td>
<td>-.007* (.004)</td>
</tr>
<tr>
<td>University Grade</td>
<td>-.004 (.003)</td>
<td>-.009* (.004)</td>
<td>-.001 (.004)</td>
</tr>
<tr>
<td>Laude</td>
<td>-.222 (.050)</td>
<td>-.092 (.019)</td>
<td>.092 (.053)</td>
</tr>
<tr>
<td>Mother Education</td>
<td>.011 (.014)</td>
<td>.034* (.018)</td>
<td>.006 (.019)</td>
</tr>
<tr>
<td>Father Education</td>
<td>.029** (.012)</td>
<td>.065*** (.017)</td>
<td>-.008 (.018)</td>
</tr>
<tr>
<td>Firm size over 100</td>
<td>-.149*** (.038)</td>
<td>-.104** (.053)</td>
<td>-.113** (.052)</td>
</tr>
<tr>
<td>Pseudo-R squared</td>
<td>0.040</td>
<td>0.052</td>
<td>0.045</td>
</tr>
</tbody>
</table>

Notes: 6136 Observations. Maximum likelihood estimation of probit models with standard errors in parenthesis. Other controls include number of years over the official limit, age, and sex, geographic, university degree, and occupational dummies. * significant at 10%; ** significant at 5%; *** significant at 1%.


the coefficients capturing social background (i.e. parents’ level education) are not significant for the regression in which the dichotomous dependent variable is the use of professional tie.

5.2 Social networks and wages

We begin our empirical exploration on the impact of the use of social contacts on wages checking if the negative impact found by Pistaferri (1999) for the Italian aggregate working population holds for university graduates. We estimate with OLS technique the following standard wage model

\[
\log(w_i) = \beta_0 + \beta_1 NET_i + x_i'\pi + \epsilon_i, \tag{1}
\]

where \(w_i\) in the neat monthly wage, \(NET_i\) is a dummy variables which assumes value 1 if the individual \(i\) get her actual job through a social referral, and \(x_i\) is a set of controls which includes four indicators of school and university performance, the levels of father and mother education, age, and sex, geographic, university degree,
job characteristic dummies. In the first column of Table 9 we report the most important coefficients and the relative standard errors for the simplest specification which does not include firm size and occupation dummies. According to the results workers who use social ties earn almost 2 percent lower monthly wages. On the other hand, when occupational and firm size controls are added, the coefficient is almost one half lower and loses statistical significance. The same qualitative results were obtained by Pistaferri (1999), even if the wage discount in his figures is slightly higher.

In a third specification (see column 3) we distinguish between Family and Professional ties use adding two different dummies, $FAM$ and $PROF$, in place of $NET$,

$$log(w_i) = \beta_0 + \beta_1 FAM_i + \beta_2 PROF_i + x_i'\pi + \varepsilon_i. \quad (2)$$

It turns out that, consistently with the prediction of our model, the coefficients have opposite signs and are both statistically significant, with family contacts in-
ducing a wage discount of roughly 4 percent and professional ones a wage premium of 2.6. All the other controls have the expected signs with father education being positive in all the versions of the model.

Given the descriptive evidence in Table 7, we further expect people with different social background could benefit differently from the use family contacts. The fourth specification of the model, therefore, allows the effect of father education to be different for individuals who use family contacts: we interact the dummy $FAM$ with the father educational level. Results are depicted in column 4. As expected the coefficient has a positive effect, although not statistically significant, suggesting that the impact of social background has a bigger (positive) effect on wage when individuals use their family contact. Accordingly, in this case the impact of the use of family contact became almost twice as big.

5.3 Sample selection and omitted variable bias

The results obtained suffer two potential econometric problems. First, the sample we use in the analysis is not random. In fact, given that we consider only employed individuals who are not self-employed, we have an incidental truncated sample. Second, the use of social networks, especially the family one, is potentially endogenous: individuals having access to useful informal contacts may have common unobserved characteristics. Moreover, even assuming an even access to social contacts the actual use of them can be correlated to other unobservables (e.g. personal motivations or abilities not captured by school performance indicators) which also affect wages and therefore are left in the error term. Therefore,

---

26Recall that the sample frame was made of all individuals who graduated from Italian universities in 1995.
Table 10: **Sample Characteristics of Instrumental Variables.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of family components</td>
<td>2.504</td>
<td>0.185</td>
<td>2.06</td>
<td>3.04</td>
</tr>
<tr>
<td>Number of Siblings</td>
<td>1.349</td>
<td>1.084</td>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

Number of obs., 6136


OLS estimates depicted in table 9 are potentially biased and inconsistent.

In order to solve the first problem we add an explicit selection equation following the Hekit method after the work of Heckman (1976): first, we define the variable $s$ which assumes value 1 when the individual belongs to our selected sample. Second, using 17,106 observation we estimate a probit model by maximum likelihood of $s$ on all the explanatory variables we use in equation 2 plus a dummy variable which assumes value 1 when the father of the interviewed is (or was) an employee. The latter variable is assumed to be exogenous in our wage equation, while it has a positive effect on the selection in the sample, i.e. individuals whose father is an employee are more likely to be employees. We then compute for each observation the inverse Mills ratio $\hat{\lambda}_i$. Table 11 reports in the first column the coefficients and the standard errors for the relevant dependent variables and for $\hat{\lambda}$: results are almost identical to OLS and, given the small and not significant coefficient on $\hat{\lambda}$, there is no evidence of a sample selection problem.

We try to shed light on the endogeneity issue using two instrumental variables which both affect the probability of using the family contacts and we believe are exogenous in the wage equation. First, we exploit the data of the 14th General Census run by ISTAT in 2001 which reports the average number of family compo-
nents for each Italian province\textsuperscript{27}. We create a variable which assumes this value if the individual is employed in the relevant province. The hypothesis is that individuals living in provinces with bigger families are more likely to use family ties. Second, we instrument for the number of siblings, which also are likely to increases the probability of using family ties. Table 10 reports basic statistics for both variables.

In the second column of table 11 are depicted coefficients and standard errors obtained running standard 2SLS technique, where inverted Mills ratios computed from the Hekit procedure described above were also added. Even if signs and magnitudes of the coefficients are similar to the ones obtained with OLS and Hekit procedure, standard errors are very big and therefore coefficients turn out to be statistically not significant. With some additional assumptions with respect to the standard case\textsuperscript{28}, we can obtain a more efficient IV estimator using in the first stage a binary response model instead of the usual linear probability model. We therefore estimate a probit model by maximum likelihood and use the obtained fitted probabilities in the second stage. Results are reported in the third column of table 11. Coefficients are now significant and have the expected signs, even if the IV estimate of Family effect has big standard errors and it is very large. If, on the one hand, it can be misleading to interpret coefficient magnitude, on the other, the negative sign is confirmed.

Despite the above analysis seems to be pretty accurate, wage discount obtained by individuals who used family connections need some additional remarks. The skeptical reader can in fact be still puzzled: why should people use their family

\textsuperscript{27}Italy has 106 provinces, each of which is organized around larger towns.

\textsuperscript{28}See Wooldridge (2002) (chapter 18) for details.
Table 11: The impact of social networks use on wages II

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAM</td>
<td>-.048*** (.012)</td>
<td>-.038 (.460)</td>
<td>-.601** (.307)</td>
</tr>
<tr>
<td>PROF</td>
<td>.028*** (.012)</td>
<td>.026 (.052)</td>
<td>.029** (.013)</td>
</tr>
<tr>
<td>(\hat{\lambda})</td>
<td>-.005 (.030)</td>
<td>-.062 (.091)</td>
<td>.064 (.091)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.509</td>
<td>.508</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 6136 observations. (1) Heckit method was used; (2) Standard IV estimate; (3) IV estimate with probit first stage. Standard errors in parenthesis
* significant at 10%; ** significant at 5%; *** significant at 1%. Source: calculation on ISTAT (1998).

ties if the jobs they find pay lower wages?

We can try to answer to this objection by going back to the intuition of our model and presenting some insightful evidence. In the equilibrium we singled out, individuals accept lower wages using family ties in order to avoid the search cost they would bear searching in the market. This cost is unobserved, but a good proxy is the time spent searching for the actual job. Unfortunately the survey does not ask questions to employed individuals about the time spent searching. Notwithstanding, for individuals who get their actual jobs after graduation, we have the number of months intercurred from graduation time to employment status\(^{29}\). We adjust such number subtracting 12 if one year further education has been undertaken or if male individuals have served the army after graduation. We call this variable Length.

The model we estimate is

\[
\text{Length}_i = \eta Prof_i + \gamma Fam_i + x'_i \pi + \varepsilon_i. \tag{3}
\]

The controls \(x_i\) include a constant and the other independent variables in

\(^{29}\)The variable assumes value 0 if the job was begun before graduation
equation 1. OLS coefficients depicted in table 12 show that the use of family ties reduces the number of months people stay without a job. Interestingly, this is not true for professional ties. Accordingly to a plausible interpretation, people who have useful family connections are likely to face an option between either waiting for higher wages or experiencing shorter unemployment spells\(^{30}\).

6 Conclusions

This paper has addressed the importance of social networks in labor market outcomes, focussing on the earnings of young Italian workers with tertiary education. First, it has been argued that some of the controversial results obtained in the economic literature so far can stem from a oversimplified idea of informal search methods in the labor market. Second, a formal model which distinguishes among two different social ties has been presented. Third, new empirical evidences largely consistent with such model have been obtained exploiting a 1998 ISTAT data set.

The model, which draws on Montgomery (1991), showed that two distinct social ties can be used to overcome different information imperfections in the labor

\(^{30}\)Incidentally, this result is also consistent with the matching model proposed by Bentolila et al. (2004) in which time is explicitly considered.
market. Employers may use professional ties in order to reduce the uncertainty concerning new workers’ ability. On the other hand, both professional and family contacts lower search costs in markets where frictions undermine the location of job opportunities.

Focussing on Italian graduate students, we have shown how different matching mechanisms correlate with geography, occupational and educational outcomes, school performances, and social backgrounds. First, this evidence suggests that the channel through which individuals find their jobs is affected by educational performance and it is likely to be embedded in social backgrounds. These patterns are somewhat clearer for people who found their jobs through family ties. Second, the hypothesis on the different impact of the two kinds of social networks on wages has been tested. A OLS estimation of a simple wage equation showed that the use of professional networks, *ceteris paribus*, brings a wage premium. The opposite is true for the use of family networks. The results are to a large extent confirmed by both correcting for sample selection and controlling for potential endogeneity of the use of family ties regressor.

This paper attempts to offer two kinds of contributions to the literature. First, it shows that distinguishing between formal and informal methods in labor market search is not enough. More subtle intuitions stand behind the use of social networks and in particular, the nature of the tie matters. Second, we shed light on the puzzling results found by Pistaferri (1999) on the impact of informal ties in the Italian labor market. In line with the previous point, they can stem from an unsatisfactory characterization of different social ties.

**Appendix I**

33
In this section we offer a formal treatment of the results presented in section 3. First, we state two Propositions that will be proved later, but are useful for our argument.

**Proposition 1** If $c$ is sufficiently small compared to $\alpha^{31}$, a firm makes a professional referral offer if and only if it has employed a high ability worker in period-1. Moreover, professional referral offers are dispersed over $[w_{m2} - c, \bar{w}_P]$ and for small $c$ the expected value of such offers is higher than $w_{m2}$.

**Proposition 2** All firms make a family referral offer regardless of period-1 worker type they have hired; such an offer will be an $\epsilon$ higher than $(w_{m2} - c)$.

We start studying the structure of professional network. Let us consider a period 2 worker with a given ability. Proposition 1 guarantees professional referral offers exceed period-2 market wage minus the search cost. Therefore, a high ability worker (H) will always accept a professional offer from firm $i$ unless another firm $j$ makes a higher professional offers. Formally:

$$Pr\{H \text{ accepts } w_{P_i}\} = Pr\{H \text{ receives no offer } w_{P_j} > w_{P_i}, \forall j \neq i\}.$$  

Since it is assumed that professional referral offers are made independently

$$Pr\{H \text{ accepts } w_{P_i}\} = \prod_{j \neq i} Pr\{H \text{ receives no offer } w_{P_j} > w_{P_i}\} = \prod_{j \neq i} [1 - Pr\{H \text{ receives } w_{P_j} > w_{P_i}\}].$$

---

31 The formal condition required is $e^{-\eta}[2\alpha - 1 - c] > c[(1 - \alpha)e^{-2\alpha p} + \alpha e^{-2(1-\alpha)p}]$. It is derived with further comments below.
The probability that H receives a higher offer from firm $j$ can be written as the sum of two components: firm $j$ makes an offer and this offer is higher than the offer made by $i$.

$$Pr\{H \text{ receives } w_{Pj} > w_{Pi}\} = Pr\{j \text{ makes an offer to } H\} \times Pr\{w_{Pj} > w_{Pi}\}$$

Let us suppose temporary and for practical purposes that in period 1 there were $2N$ workers, free entry implies that $N$ firms employ a high ability worker. If Proposition 6 applies we can write:

$$Pr\{j \text{ makes an offer to } H\} = \left(\frac{p \cdot \alpha}{N}\right)$$

Moreover, if firms make their professional referral offers randomizing over an equilibrium wage distribution $F(\cdot)$, of which we give an implicit characterization below, we can write:

$$Pr\{H \text{ receives } w_{Pj} > w_{Pi}\} = \left(\frac{p \cdot \alpha}{N}\right)[1 - F(w_{Pi})].$$

If we substitute this expression in equation 4, we get

$$Pr\{H \text{ accepts } w_{Pi}\} = \left\{1 - \left(\frac{p \cdot \alpha}{N}\right)[1 - F(w_{Pi})]\right\}^{N-1}.$$  

For $N$ approaching $\infty$

$$Pr\{H \text{ accepts } w_{Pi}\} = e^{-ap[1 - F(w_{Pi})]}.$$
Following the same procedure for a given period-2 low ability worker (L) we obtain

\[ Pr\{L \text{ accepts } w_{Pi}\} = e^{-(1-\alpha)p[1-F(w_{Pi})]} \].

Note that the reason why L is more likely to accept \( w_{Pi} \) is that less firms make her an offer.

We now compute \( w_{m2} \) recalling that free entry condition dries firms’ profits to zero and therefore wages equal workers’ expected productivity. Propositions 1 and 2 imply that a period-2 worker uses the market bearing a search cost \( c \) only if (i) he does not receive any professional offer and (ii) he does not have a family tie. Since we assumed family ties being orthogonal to workers’ ability, we can write

\[ Pr\{mkt|H\} = Pr\{H \text{ accepts } (w_{m2} - c)\} \cdot (1 - f) \]

\[ Pr\{mkt|L\} = Pr\{L \text{ accepts } (w_{m2} - c)\} \cdot (1 - f) \]

Following Bayes’s rule we can write,

\[ w_{m2} = Pr\{H|mkt\} = \frac{e^{-\alpha p}}{e^{-\alpha p} + e^{-(1-\alpha)p}}. \tag{5} \]

Given \( \alpha > \frac{1}{2} \) and \( p > 0 \), period-2 market wages are below average productivity (i.e. \( w_{m2} < \frac{1}{2} \)). Moreover, the more dense is professional network (↑ \( p \)) and the higher is the inbreeding bias (↑ \( \alpha \)), the lower will be market wage. On the other hand, neither \( f \) nor \( c \) have any impact on period-2 market wage.

We can now compute firms’ payoffs in the case they make offers to professional connected workers. Let us consider period-2 expected profit of a firm who employed
an high ability worker in period-1 and makes a professional referral offer \( w_P \):

\[
E\Pi_H(w_P) = Pr\{H \text{ period-2 is hired}|w_P\} \cdot (1 - w_P) + \]
\[
+ Pr\{L \text{ period-2 is hired}|w_P\} \cdot (-w_P) \tag{6}
\]

The probability of hiring a high ability period-2 worker through a professional referral is

\[
Pr\{H \text{ period-2 is hired}|w_P\} = Pr\{\text{offer made to H}\} \times Pr\{\text{H accepts } w_P\}
\]
\[
= \alpha p \cdot e^{-\alpha p [1 - F(w_P)]},
\]

and, similarly, the probability of hiring a low ability period-2 worker:

\[
Pr\{L \text{ period-2 is hired}|w_P\} = Pr\{\text{offer made to L}\} \times Pr\{\text{H accepts } w_P\}
\]
\[
= (1 - \alpha)p \cdot e^{-(1 - \alpha)p [1 - F(w_P)]}.
\]

Therefore the expected profit of a firm who make a professional referral offer having hired a H in period 1 is

\[
E\Pi_H(w_P) = \alpha p \cdot e^{-\alpha p [1 - F(w_P)]}(1 - w_P) + (1 - \alpha)p \cdot e^{-(1 - \alpha)p [1 - F(w_P)]}(-w_P). \tag{7}
\]

In order for the above to be an equilibrium, firms must earn the same expected profit \( \bar{\pi} \) on each referral wage belonging to the support. Formally:

\[
E\Pi_H(w_P) = \bar{\pi} \quad \forall w_P \in [w_m - \epsilon, \bar{w}_P].
\]
Recalling this property helps to express $\bar{\pi}$ as a function of the other parameters of the model. In fact, if we substitute for $w_{m2} - c$ in equation 7 holding expected profits constant, we get:

$$E\Pi_H(w_{m2} - c) = \alpha p \cdot e^{-\alpha p}(1 - w_{m2} + c) + (1 - \alpha)p \cdot e^{-(1-\alpha)p}(-w_{m2} + c) = \bar{\pi}.$$  

Rearranging the above and using equation 5:

$$\bar{\pi}(\alpha, p, c) = \frac{p(2\alpha - 1)}{e^{p(1-\alpha)}} + c \cdot p(\alpha e^{-\alpha p} + (1 - \alpha)e^{-(1-\alpha)p}). \tag{8}$$

This expression shows that at the beginning of period 2 a firms employing high ability workers in period 1 and making a referral offer earn positive expected profits. On the other hand, as already mentioned, if they hire through the market they earn zero profits. A part of Proposition 1 is then proved: a firms who employed a high ability worker in period 1 makes a referral offer.

Market frictions (i.e. the magnitude of $c$) increase firms’ profit stemming from professional hiring. The intuition is that, for given information disclosed about workers ability (i.e. for given $\alpha$), employers can offer lower wages knowing the employees outside options get worse.

We are not able to present an explicit solution for $F(\cdot)$, but combining equation 7 and 8 we can write:

$$\alpha p \cdot e^{-\alpha p[1-F(w_P)]}(1 - w_P) + (1 - \alpha)p \cdot e^{-(1-\alpha)p[1-F(w_P)]}(-w_P) =$$

$$= \frac{p(2\alpha - 1)}{e^{p(1-\alpha)}} + c \cdot p(\alpha e^{-\alpha p} + (1 - \alpha)e^{-(1-\alpha)p}), \tag{9}$$
\[ \forall w_P \in [w_{m2} - c, \bar{w}_P]. \]

Substituting for \( w_P = \bar{w}_P \) yields an expression for the maximum wage offered:

\[
\bar{w}_P = \alpha - \left[ \frac{2\alpha - 1}{e^{p(1-\alpha)} + e^{\alpha p}} \right] - c \cdot (\alpha e^{-\alpha p} + (1 - \alpha)e^{-(1-\alpha)p})
= \alpha - \bar{\pi}_p,
\]

which is decreasing in \( c \). If we compare the case \( c > 0 \) with the limit one \( c = 0 \), which is identical to Montgomery (1991), given that \([\alpha e^{-\alpha p} + (1 - \alpha)e^{-(1-\alpha)p}]\) is less than 1 \( \forall p > 0 \), in the former case the support of equilibrium professional offer is wider.

We now complete the proof of the first part of Proposition 1, showing that \( c < 2\alpha - 1 \) is a necessary condition for holding an equilibrium with firms who employed a low ability worker in period 1 not making professional referral offers. In other words, differently from Montgomery (1991) our equilibrium holds only for specific \( c \) and \( \alpha \).

If a firm hire a L in period 1, expected profits will be equal to

\[
E\Pi_L(w_P) = (1 - \alpha)p \cdot e^{-\alpha p[1-F(w_P)]}(1 - w_P) + \alpha p \cdot e^{-(1-\alpha)p[1-F(w_P)]}(-w_P).
\]

By inspection, it is easy to see that

\[
\frac{\partial E\Pi_L(w_P)}{\partial w_P} < \frac{\partial E\Pi_H(w_P)}{\partial w_P}.
\]

Given that by construction \( \frac{\partial E\Pi_H(w_P)}{\partial w_P} = 0 \) for all \( w_P \in [w_{m2} - c, \bar{w}_P] \), the above implies \( \frac{\partial E\Pi_L(w_P)}{\partial w_P} < 0 \). This implies \( E\Pi_L(w_P) \) is maximized for \( w_P = w_{m2} - c \).

\[ \text{Even if this is not very satisfactory, below we offer the intuition for this.} \]

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Substitution yields:

$$E\Pi_L(w_P) = p \cdot \left[ \frac{e^{-p[1 + c - 2\alpha]} + c[(1 - \alpha)e^{-2\alpha p} + \alpha e^{-2(1-\alpha)p}]}{e^{-p\alpha} + e^{-p(1-\alpha)}} \right].$$

The sign of this expression is ambiguous, but some observation can be made in order to understand what it implies. First, it is increasing in $c$: frictions increase the expected benefits of making professional offers even for firms hiring a L in period-1. Second, it is easy to see that $c < 2\alpha - 1$ is a necessary condition for the above to be negative. The intuition is that if search cost are too big compared to the information disclosed by the professional referral, even firms which employed low skilled workers could benefit from making an offer given the low level of the latter. Third, the condition needed to hold proposition 1 is that the bad signal given by being referred by a L period-1 worker, has to be stronger than the rent assured by frictions:

$$e^{-p}[2\alpha - 1 - c] > c[(1 - \alpha)e^{-2\alpha p} + \alpha e^{-2(1-\alpha)p}]$$

Let us move to the second part of Proposition 1. By construction, professional referral offers are dispersed over the interval $[w_{m2} - c, \bar{w}_P]$. We need to prove that for small $c$

$$E(w_P) = \int w_P F'(w_P)dw_{w_P} > w_{m2}.$$

If we define

$$g(c) = E(w_P^c),$$

it is easy to check that $g(0) = E(w_P^0) > w_{m2}$. If $g$ is continuous, then when $c$ is
small enough $g(c) > w_{m2}$. 

**Lemma 1** $g(c) = \int_{w_{m2} - c}^{\bar{w}_P} w_P F'(w_P) dw_P$ is continuous in $c$.

Let us call by $G(.)$ the function that implicitly define $F(w_P)$ in equation 9. Given that $G \in C^1$ over $(w_{m2} - c, \bar{w}_P)$ with respect to any variable and that $G_F' \neq 0$, the implicit functions theorem implies that $F'(w_P)$ is continuous over $(w_{m2} - c, \bar{w}_P)$. Moreover, it is easy to check that $F'(w_P) = -\frac{G_{w_P}}{G_F}$ does not depend on $c$. Therefore $g$ is continuous in $c$.

We can now move to prove Proposition 2. Given the hypothesis we made about family network structure, firms do not gain any information about period-2 family connected workers ability and therefore the expectations concerning their ability do not differ from the expectation they have on individuals who use the market:

$$Pr\{H|family\} = Pr\{H|mkt\} = w_{m2}.$$ 

Moreover, since period-2 workers family connected have the sole outside option to be hired in the market bearing a search cost, firms’ offers will be rejected if they are lower than $w_{m2} - c$. Therefore, we can write payoffs of firms making an *ex-ante* offer to family connected workers as

$$E\Pi_H(w_F) = E\Pi_L(w_F) = \begin{cases} 
0 & \text{if } w_F \leq w_{m2} - c \\
 f \cdot (w_{m2} - w_F) & \text{if } w_F > w_{m2} - c 
\end{cases}$$

Rational firm will then set their offers just an $\epsilon$ above $w_{m2} - c$ in order to maximize
their expected profits that in turns will be

\[ E\Pi_H(w_F) = E\Pi_L(w_F) = f \cdot (c - \epsilon). \]

Higher search costs on the labor market imply lower wage for family referred workers and higher expected profits for firms making such offers.

Finally, we move back to consider the period 1 market. Free entry condition implies that firms will offer wages that equal their expected profits:

\[ w_{m1} = \frac{1}{2} + \frac{1}{2} \cdot \bar{\pi}(\alpha, p, c) + f \cdot (c - \epsilon). \]

Period 1 market wage will therefore be increasing in \( c \).

**Appendix II**

In this section we simply report the translated key-section of the questionnaire used in the survey end give detailed explanation on how we define the Net, Fam and Prof dummies.

58. **How did you get your job?**

- [ ] Through a referral made to my employer by relatives/friends/acquaintances  
  (*Pass to question 60*)
- [ ] Through direct knowledge of my employer
- [ ] Through a referral made by University, training centers, or Faculties
- [ ] After an internship
- [ ] By a direct call of my employer
- [ ] Through newspaper ads.
- [ ] Sending my CV to my employer

42
☐ Public exam
☐ By starting a job as self employed
☐ Through application to schools or education institutes
☐ Through Public Employment agency
☐ Through private employment agencies

59. Do you believe a single person has been very useful or crucial in helping you?
☐ NO, nobody

YES, somebody who:
☐ Helped me to prepare the exam
☐ Borrowed me money
☐ Gave me tools/machineries
☐ Was the intermediary with my employer
☐ Gave me information which has been crucial to get the job.

60. Was he/she:
☐ A parent
☐ Your brother or sister
☐ Another relative
☐ Someone else

61. Which was his professional role?
☐ Self-employed
☐ Manager
☐ Professor or researcher
□ Technician or qualified employees (data analyst, accountant)
□ Clerical worker

We assign value 1 to the dummy NET if one of the following conditions hold:

- Answer to question 58 is
  "Through a referral made to my employer by relatives/friends/acquaintances”
  or
  "Through direct knowledge of my employer”;

- Answer to question 59 is
  "Yes, someone who was the intermediary with my employer” or
  "Yes, someone who gave me information which has been crucial to get the job”.

In turn, first, if NET = 1 and answer to question 60 is ”A parent”, ”Your brother or sister”, or ”A relative” we assign value one to the dummy FAM; second, if answer to 60 is ”Someone else” and the professional role indicated in question 61 is the same of the respondent one we assign value one to the dummy PROF.

Notice that the two subset are not overlapping and do not induce a complete partition of NET, given that some respondents have been referred by a non relative with different professional role.
References


