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Social networks and wages: It is all about connections!

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Social Networks and Wages: It is all about connections! *

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ABSTRACT

Empirical evidence suggests that networks of personal relations are important in the micro dynamics of labor markets: even in modern capitalistic economies a high share of jobs are filled by social referrals. This paper aims at shedding light on an apparent puzzle concerning the relationship between the use of informal contacts and wages. First, the paper argues that economic perspectives concerning such relationship might benefit from considering important differences in the nature of social ties. Second, a formal model which considers two distinct informal contacts dubbed "family" and "professional" is proposed. 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, a relatively unexploited Italian data set is used to show that distinct ties have different properties and are likely to be used by different individuals. Finally, the paper concentrates on the relation between informal contacts and wages, obtaining results consistent with the foregoing theoretical insights.

JEL Classification: A14, J31, J41, Z13.

Keywords: Labor Markets, Job Search, Social Networks.

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1. Introduction

At least since the influential work of Albert Rees (1966), economists acknowledge that in the labor market demand and supply match in a distinctive mode. In particular, the fact that a high share of jobs are filled through referrals or different kinds of help provided by acquaintances, friends and relatives reveals that information that actors have about one another are largely embedded in their social networks. However, if one tries to go beyond this simple statement sorting out, for instance, 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.¹

Aiming at improving the lack of knowledge concerning the importance of social referrals in the labor market, this paper studies the relationship between the use of social ties and wages. The issue is controversial in both economic and sociology literature (Granovetter 1995; Ioannides and Loury 2005). Social networks are often depicted as effective channels to convey information and, therefore, as an asset in labor matching quality (e.g. Holzer (1988)). On the other hand, there is no clear-cut evidence on the *ceteris paribus* effect of informal contacts use on wage outcomes and distinct works have come to divergent conclusions.

Trying to provide an explanation for the international variation in wage differentials between jobs found through formal and informal channels,² Pellizzari (2004) argues that heterogeneity in firms' recruitment strategies is key in order to make sense of such variation.

¹For discussions and progresses in the above issues see Ports (1993); Osberg (1993); Autor (2001), and the recent survey by Ioannides and Loury (2005).

²The label "informal channels" often encompasses both "social referrals" and "direct application". In this paper we use it as a perfect substitute of "social referrals".

The present work provides a complementary explanation focussing on the multifaceted nature of the social ties between the job seeker and the contact. Two distinct types of contacts are identified, *family* and *professional*, which indicates respectively whether the referral has been made by a relative or a non-relative having the same professional role of the job seeker. It is shown that distinct contacts are likely to be used by different would-be workers and lead to different wage outcomes.

Theoretically, we build on notions familiar to economists: social networks can be employed as screening and search devices in circumstances characterized by asymmetric information and high search costs. To put it in a nutshell, first, employers do not observe productive skills of potential employees before hiring them, but may use social referrals as a screening mechanism. Second, in labor markets undermined by various sorts of frictions, job seekers may exploit their social networks in order to locate vacancies without bearing high search costs. Also motivated by the empirical focus of our study (i.e. individuals in the early stage of their careers), we shall not model explicitly network formation, assuming that actors take social structure as a given.

The empirical analysis focuses on university-to-job transition of Italian graduates and obtains results consistent with the proposed model. The case is interesting for three basic reasons. 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.³ Second, despite the low costs of higher education and the low level of formal barriers in its access, Italian system seems characterized by a low level of intergenerational mobility both in terms of occupational ladder and educational achievements (Checchi et al. 1999).

³Percentages are calculated using the data set built by a Project funded by the European Community under the Targeted Socio-Economic Research (TSER) named "Careers after Higher Education: a European Research Study". See <http://www.uni-kassel.de/wz1/tseregs.htm> for details.

Table 1: **Share of University Graduates Using Social Contacts**

<i>Country</i>	<i>Percentage of Social Contact Use</i>
Italy	31
Spain	28
Czech Republic	20
France	19
Austria	16
United Kingdom	12
Germany	11
Finland	7
Sweden	7
Norway	6

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>.

A possible explanation for this puzzle might be the eventual "conservative" use of social networks. Third, analyzing the effect of the use of social ties on wages of the overall Italian labor force Pistaferri (1999), in contrast with most theoretical predictions, finds a negative impact.

The paper is organized as follows. Section 2 critically reviews the literature on the impact of the use of social contact on wages. Section 3 presents a model that encompasses two distinct types of social networks—professional and family—and predicts that they have a different impact on wages. Section 4 describes the data set. Section 5 presents some evidence concerning common characteristics to individuals who get their job through referrals. Section 6 concentrates on the relationship between distinct social contact use and wage. Section 7 discusses to what extent the correlations found between distinct social network use and wages can be considered as causal. Further evidence concerning the implication of the model is also provided. Section 8 concludes.

2. Networks and wages: a critical review

Several empirical investigations have addressed the efficacy of using social networks as a job-search strategy. For example Holzer (1988) shows that checking with friends and relatives is both the most popular and the most productive search method (conditional upon its use) among unemployed youth.⁴ Subtle and interesting matters concern to which extent this efficiency depends on individual endowments of social contacts and how aggregate welfare is affected if these endowments influence occupational choices (Bentolila et al. 2004).

A complementary issue concerns the effect of the use of social networks on wages. The conventional wisdom in the economic literature acknowledges that, given the inherent information asymmetries and imperfection in the labor market, information flowing through social networks helps employers and job seekers to reach better matches.

In his seminal paper Albert Rees (1966) set the stage arguing that the bulk of the uncertainty in the labor market concerns the so-called intensive margin of search: contrary to standardized commodities markets, in labor markets employers (employees) are typically concerned with detailed information about a single potential applicant (a likely and suitable offer). Accordingly, employers typically either set very restrictive requisites on observables, or exploit information flowing through social contacts concerning non observable characteristics. Relying on employee referrals, a special case of the latter strategy, is believed to perform particularly well: first, employees often 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 may be at stake (Saloner 1985). Third, if people tend to refer others similar to themselves, firms can exploit this information as an effective screening device

⁴Similar results on the effectiveness of seeking a job through social contacts can be found in Blau and Robins (1990), Addison and Portugal (2002), and Sylos Labini (2004).

(Montgomery 1991).

More generally, Simon and Warner (1992) assume that referrals ameliorate the noisy information that firms have about new applicants' true productivity. Building upon a standard matching model *à la* Jovanovic (1979), they show that referred job seekers set higher reservation wages, given that they have less to gamble on provisional firms' misperception of their true productivity. 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).⁵

On the other hand, other authors have found, mainly in European countries, that using social networks yields on average lower salaries (Pistaferri 1999; Addison and Portugal 2002; Bentolila et al. 2004; Pellizzari 2004). A few explanations for this result have been put forward. Pistaferri (1999) argues that the counterintuitive wage discount might stem either from unobserved worker characteristics or from unobserved job ones (e.g. jobs reachable through social networks are available only in small firms which pay lower wages). Granovet-

⁵Incidentally, in Datcher (1983) referrals improves the intensive margin of job seekers rather than employers.

ter (1995) observes that, 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. Loury (2004), using a simple model of job mobility, shows that lower wages can be caused by unobserved heterogeneity stemming from this fact. In addition, the use of social ties can be a negative signal for employers who might respond offering a lower wage. Bentolila et al. (2004) go further suggesting that contacts can induce a mismatch between one’s productive comparative advantage and her occupational choice, given the higher search efficiency of informal search. People using social contacts are thus expected to be on average less productive and therefore earn lower wages. Finally, Pellizzari (2004) argues that employers’ search strategies (i.e. the amount of resources invested in formal recruitment) are key to determine the relative efficiency of social contacts and therefore their effect of on wages. He shows that in industries where firms invest more in formal recruitment, wage premia paid to those who use social networks are indeed lower and eventually negative.

The conflicting arguments and the contrasting evidence reviewed above rise, 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 find their job through referrals is enormous and using social contacts is far from being a homogeneous search method (Granovetter 1995). 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 located⁶ and, (iii) the relation between this network and the information about job opportunities and actors characteristics.

This paper concentrates on the first matter. Social ties differ across several dimensions: first, *employee* social referrals are believed to be mor informative than non-employee ones.

⁶See e.g. Calvó-Armengol and Jackson (2004).

Second, the *intensity* of the relationship between the potential applicant and the contact matters. For instance, both economists and sociologists have been influenced by Granovetter’s hypothesis concerning the ”strength of weak ties”, which predicts that acquaintances are often more informative than close friends and relatives in connecting people and jobs.⁷ Third, Granovetter (1995) in his seminal book also distinguishes among *work* and *family-social* contacts.

Given the peculiarity of young university graduates and the features of our survey data, we use a classification similar to the last one, arguing that *professional* and *family* contact are very different job finding channels for the nature of the information they convey. Consequentially, their impact on labor market outcomes is likely to differ.

3. The Model

This section develops a two period model of a labor market with imperfect information on workers’ productivity and other market frictions. Firms produce in both periods with labor as the sole input; workers live only one period. The model has two basic features: first, a period-1 worker may have a social tie with a period-2 worker and, if this is the case, she automatically refers her connection to her employer. Social contacts, thus, become relevant in disclosing information in period 2 labor market. Second, the social tie connecting period-1

⁷To put it in a nutshell, although friends and relatives (Strong Ties) are probably more committed in helping, acquaintances (Weak Ties) are more likely to convey useful information. They are in fact less likely than close friends to know each other and therefore for *structural* reasons are more likely to have access to useful and unexploited information about jobs openings. Boorman (1975) provides a very interesting economic model, even if, given the structural assumptions he makes, the implications of it are different from Granovetter’s ones. See Bridges and Villemez (1986) for an empirical investigation and Montgomery (1992) for a model which encompasses both economic and sociological insights.

and period-2 workers can be twofold: either professional or family.

3.1. Assumptions and Timing

Workers are heterogeneous in two respect: their skills and the types of social ties they hold. Firms set wages before observing both heterogeneities. The basic structure of the model is similar to the one proposed by Montgomery (1991). The two novel features are: first, the twofold nature of social ties and, second, the presence of search costs which workers have to bear unless they use their family connections.

3.1.1. *Workers*

It is assumed that in both periods there is a continuum of measure 1 of workers who, as already mentioned, live only one period. For the sake of simplicity, they can be of two types: high ability (H) workers produce an output equal to 1, while low ability (L) ones produce 0. We further assume that in each period half of workers are H (and half L) type. Workers have a simple payoff function which equals their wage minus the eventual search cost c they might bear. Period-1 workers search for a job in the market, since in the first stage of the game firms are not able to exploit their connections. Conversely, period-2 workers might either exploit their social contacts (if they receive any referral offer), or seek for a job in the market. Workers who exploit their family connections avoid to bear a search cost. The assumption stems from the fact that relatives' help is usually cheap to mobilize.⁸

3.1.2. *Firms*

Firms are identical but in the productivity of the worker they hire. Each firm employs one worker in each period and its output equals her productivity. Goods and their price

⁸In the final section of the paper we provide some pieces of evidence consistent this hypothesis.

are identical and, to simplify, the latter is normalized to 1. Therefore, in each period firms' profit equals their sole worker's productivity minus the wage offered. In period 1 firms hire through a competitive labor market taking the market wage w_{m1} as given. On the other hand, in period 2, firms have the opportunity to make a referral offer to their potential period-1 worker's connection. In either period firms are free to enter.

3.1.3. Social Structure

We assume an exogenous and stylized social structure. First, a period-1 worker (either through a professional tie or through a family one) may be connected at most with one period-2 worker. Thus, period-1 workers may have three possible states: professionally connected, family connected, not connected. Accordingly, the multinomial distribution regulating the above has two parameters: p , i.e. the probability that a period-1 worker has a professional tie, and f , i.e. the probability that a period-1 worker has a family tie. Then $1 - p - f$ is the probability a period-1 worker has no ties. Second, distinct stochastic processes govern the twofold social structure. For practical purposes, we assume that social ties are assigned sequentially, starting with professional ones:

- *Professional Network*

For each period-1 worker having a professional tie, the connected period-2 worker is selected through a two stages stochastic process. First, a period-2 worker's type is chosen according to a key parameter: $\alpha > \frac{1}{2}$, i.e. the probability for a period-1 worker to be connected to a period-2 worker of her own type, conditional upon holding a professional tie. This assumption is crucial,⁹ because it allows firms to use professional ties as a screening device. Second, a period-2 worker is randomly chosen, conditional upon being of this type. Note that it is possible that a period-2 worker ends up being

⁹See Montgomery (1991) for a discussion on its empirical underpinnings.

professionally connected to more than one period-1 worker.

- *Family Network*

For each period-1 worker holding a family tie, the connected period-2 worker is chosen randomly and sequentially, given that she is not connected (neither professionally nor family) to any other period-1 worker. This has two implications: first, firms do not learn anything about period-2 worker’s productivity out of knowing her period-1 relative’s productivity. Second, given the sequential selection, there is a one-to-one kinship relation between workers in different periods.¹⁰

Social structure is thus exogenously characterized by three parameters: two measures of connectivity (p and f), and a measure of inbreeding among professionally connected workers (α). The basic features of the two types of social ties addressed by the model are straightforward: first, only professional contacts convey information concerning period-2 workers’ productivity. Second, family ties can be used in order to save search costs stemming from various sorts of market frictions. Third, in period 2 firms might *compete* for the hiring of professional connected workers, which are the only ones who may have more than one tie.¹¹

3.1.4. *Timing*

In the first period all workers are hired in the market which clears at w_{m1} . Firms produce and thereafter learn their worker’s productivity. Then, they may set referral offers (family (w_F), professional (w_P), or both (w_F, w_P)) and communicate such offers to their period 1

¹⁰This last feature is key for our model, but may seem odd; in fact, it implies that period-2 workers might have at most one family tie, while they might have several professional connections. However, it is conceived for a reasonable purpose, i.e. to avoid that in period 2 firms compete to hire family connected workers.

¹¹The 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 in empty urns.

employee. Consequently, according to the rules described in subsection 3.1.3, social ties are assigned.¹² At this point, each period-1 worker possessing either kind of tie automatically passes the offer to her period-2 relative or acquaintance. Finally, period-2 workers compare the eventual offers received¹³ and either accept one, or seek for a job in the market earning the period 2 market wage (w_{m2}). Every worker but the ones receiving and accepting a family referral offer incurs into a search cost equal to c .

3.2. Equilibrium

This section proves the existence of a mixed strategy equilibrium with wage dispersion. Let us begin from stating two propositions that will be proven below concerning firms strategies after the productivity of the period-1 worker have been observed.

Proposition 1 *A firm makes a professional referral offer if and only if it has employed a H worker in period 1. Such offer is dispersed over $[w_{m2}, \bar{w}_P]$, whose extremes will be derived below as functions of the model parameters.*

Proposition 2 *All firms, regardless of the period-1 worker type they have hired, make family referral offers. Those offers are set just a small ϵ above $(w_{m2} - c)$.*

We consider now the equilibrium behavior of firms using information flowing through professional networks starting from period 2. Proposition 1 guarantees that professional referral offers always exceed period 2 market wage. On the other hand, the assumption concerning the social structure implies that a professionally connected period-2 worker may have more

¹²It 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.

¹³Indeed, it should be clear at this point that only a few period-2 workers professionally connected might receive more than one offer.

than one professional tie. Therefore, the generic firm i knows that the probability that a period-2 H worker accept a professional referral offer depends on the professional offers made by other j firms.

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

Since it is assumed that each firm sets professional referral offers independently randomizing over the equilibrium wage distribution $F(\cdot)$, following the derivations in Montgomery (1991),¹⁴

$$Pr\{\text{H accepts } w_{P_i}\} = e^{-\alpha p[1-F(w_{P_i})]} \quad .$$

Applying the same procedure, firm i also knows that if a professional referral offer is made to a L worker

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

Note that the reason why a L worker is more likely to accept a given w_{P_i} is that fewer firms make her an offer. This is due to Proposition 1 coupled with the inbreeding assumption $\alpha > \frac{1}{2}$.

Recalling that free entry condition drives expected profits of firms hiring in the market to zero, we can now compute w_{m2} . Therefore, in equilibrium period 2 market wages equals workers' expected productivity: a lower wage will foster further entry, a higher one will cause negative expected profits. Propositions 1 and 2 imply that a period-2 worker searches in the market only if she has not received any professional referral offer (which equals the probability that accept w_{m2}) multiplied by the probability that she has not received a family referral offer (in fact, according to Proposition 2, family offer is an ϵ better than getting the best alternative $w_{m2} - c$). Therefore, we can write the probability of looking for a job in the

¹⁴In Montgomery (1991) it is also proved that the density of the professional referral offer is positive over the entire range $[w_{m2}, \bar{w}_P]$. We give an implicit characterization of $F(\cdot)$ below.

market for a worker with given productivity as

$$\begin{aligned} Pr\{mkt|H\} &= Pr\{H \text{ accepts } (w_{m2})\} \cdot (1 - f) \\ Pr\{mkt|L\} &= Pr\{L \text{ accepts } (w_{m2})\} \cdot (1 - f) \quad . \end{aligned}$$

Following Bayes's rule we have that:

$$w_{m2} = Pr\{H|mkt\} = \frac{e^{-\alpha p}}{e^{-\alpha p} + e^{-(1-\alpha)p}} \quad . \quad (1)$$

Note that, given $\alpha > \frac{1}{2}$ and $p > 0$, period-2 market wages are below average productivity ($w_{m2} < \frac{1}{2}$). Moreover, the denser is professional network ($\uparrow p$) and the higher is the inbreeding bias ($\uparrow \alpha$), the lower will be period 2 market wage ($\downarrow w_{m2}$). On the other hand, neither f nor c have any impact on w_{m2} .

We can now compute firms' payoffs in the case a professional offer w_P is made. Let us first consider a firm who employed a H worker in period-1.

$$\begin{aligned} E\Pi_H(w_P) &= Pr\{H \text{ period-2 is hired}|w_P\} \cdot (1 - w_P) + \\ &+ Pr\{L \text{ period-2 is hired}|w_P\} \cdot (-w_P) \quad . \end{aligned} \quad (2)$$

The probability of hiring a high ability period-2 worker, given a professional referral w_P , is

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

and, similarly

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

Therefore, equation 2 can be written as

$$E\Pi_H(w_P) = \alpha p \cdot e^{-\alpha p[1-F(w_P)]}(1 - w_P) + (1 - \alpha)p \cdot e^{-(1-\alpha)p[1-F(w_P)]}(-w_P) \quad . \quad (3)$$

In order for the above to be an equilibrium in mixed strategies, firms must earn the same expected profit $\bar{\pi}$ for any of the single referral wage offers belonging to the support. Formally:

$$E\Pi_H(w_P) = \bar{\pi} \quad \forall w_P \in [w_{m2}, \bar{w}_P] \quad .$$

It is now possible to express $\bar{\pi}$ as a function of the other parameters of the model. In fact, if we plug w_{m2} in equation 3, holding expected profits constant, we get

$$\begin{aligned} E\Pi_H(w_{m2}) &= \alpha p \cdot e^{-\alpha p}(1 - w_{m2}) \\ &\quad + (1 - \alpha)p \cdot e^{-(1-\alpha)p}(-w_{m2}) = \bar{\pi} \quad . \end{aligned}$$

Plugging in the expression for w_{m2} from equation 1

$$\bar{\pi}(\alpha, p) = \frac{p(2\alpha - 1)}{e^{p(1-\alpha)} + e^{p\alpha}} \quad . \quad (4)$$

This expression shows that, at the beginning of period 2, a firm employing a H worker in period 1 and making a professional referral offer (randomizing over the equilibrium wage distribution $F(\cdot)$) earns positive expected profits. Since a firm hiring in the market earns zero expected profits, Proposition 1 is partly proved: a firms who employed a high ability worker in period 1 makes a professional referral offer.

Combining equation 3 and 4 we characterize $F(\cdot)$ implicitly as

$$\alpha p \cdot e^{-\alpha p[1-F(w_P)]}(1 - w_P) + (1 - \alpha)p \cdot e^{-(1-\alpha)p[1-F(w_P)]}(-w_P) = \frac{p(2\alpha - 1)}{e^{p(1-\alpha)} + e^{p\alpha}} \quad . \quad (5)$$

Moreover, plugging \bar{w}_P for w_P and rearranging yields a solution for the upper bound of the support over which $F(\cdot)$ is defined:

$$\begin{aligned} \bar{w}_P &= \alpha - \left[\frac{2\alpha - 1}{e^{p(1-\alpha)} + e^{p\alpha}} \right] \\ &= \alpha - \frac{\bar{\pi}}{p} \quad , \end{aligned} \quad (6)$$

We now complete the proof of Proposition 1, showing that a firm who employed L worker in period 1 does not make professional referral offers. Its expected profit is in fact

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

By inspection, it is easy to see that

$$\frac{\partial E\Pi_L(w_P)}{\partial w_P} < \frac{\partial E\Pi_H(w_P)}{\partial w_P} \quad .$$

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

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

Since $\alpha > \frac{1}{2}$, the above expression is negative. Given that firms hiring in the market yield zero profit, it is proven that a firm hiring a L worker do not make a professional referral offer.

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.

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

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

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

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

$$E\Pi_H(w_F) = E\Pi_L(w_F) = f \cdot (c - \epsilon) \quad .$$

Higher search costs on the labor market imply lower wages 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:

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

Period 1 market wage will therefore be increasing in c .

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 family ties) imply that family ties can be purposefully used by employers and workers even if they not convey any information on workers' abilities. Their use is profitable for workers because it reduces search costs. Consequently, knowing their outside options, firms can hiring them offering lower wages. It follows that the model makes two main predictions: first, workers who find their job through informal professional referrals earn on average higher wages; second workers who use the referral of their relatives earn lower wages. The first prediction stems from the role of professional social networks as a screening device; the second is the result of the use of family connection as a way to economize on search costs.

4. The Data

We exploit the 1998 ISTAT (the Italian Bureau of Statistics) survey named *Indagine Inserimento Professionale Laureati* (Survey on university-to-job transition). The survey has

been run on a stratified sample of individuals who graduated approximately three years before the survey took place.¹⁵ During 1998 a questionnaire was mailed to 25,716 individuals, which represent 24.5 per cent of the entire population of 1995 university graduates. The response rate was of 64.7 per cent, for a total of 17,326 respondents. Among them only 12,418 considered themselves employed. Since self-employed (4,160) are not technically hired, we exclude them together with individuals who are enrolled in formal graduate education (692), and individuals who did not answer the questions concerning wage, hours worked, or province of work (1,252). The final sample is therefore composed by 6,314 employed graduates.

The survey questionnaire collects information concerning (i) school and university curricula, (ii) employment (or unemployment) conditions, and (iii) demographics and family backgrounds. Key for our purposes is a subset of questions related to job-finding methods. First, employed individuals are asked: "How did you find your actual job?". Together with direct application, newspaper ads, public exam, state employment service, the respondent may choose "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 identity of the referral. In particular, we know if she is a relative and her professional role. Thus, beyond the aggregate set of people who have used social contacts (*NET*), it is possible to define two not overlapping subsets: the one composed by individuals who have exploited their *family* contacts (*FAM*) and the one grouping individuals who have been referred by non relatives who hold the same *professional* role (*PROF*). We also define a third residual subset, named (*RES*), which groups workers that found employment being referred neither by relatives nor by people having their professional role. The Appendix reproduces the key questions asked in the questionnaire together with a detailed descriptions of the procedure followed.

¹⁵The one stage stratification process takes into consideration sex, geographical location of the university attended, and degree obtained. All the estimates are performed using survey weights.

Table 2: **Sample Characteristics of the Data**

<i>Variables</i>	<i>Mean</i>	<i>Standard Error</i>
<i>NET</i>	0.290	0.006
<i>FAM</i>	0.082	0.003
<i>PROF</i>	0.075	0.003
Monthly Wage	1,994	8.26
Weekly Hours Worked	36.99	0.11
Age	30	0.052
High School Grade	49	0.092
Female	.498	.006
Public Sector	0.298	.006
<i>Number of obs.</i>	<i>6314</i>	

Notes: Wages are expressed in thousands of Italian Lira. High school grades range from 36 to 60.

The subsets *FAM* and *PROF* are the empirical counterparts of the two types of social ties described by our model.

Table 2 depicts weighted means and standard errors of dependent and independent variables of our analysis. Almost 30% per cent of individuals in our sample have found their job through social referrals. Using the 1991 data from Bank of Italy survey, if one focuses on university graduates, one gets a number similar to ours (25%).

5. Who finds job through personal contact

Table 3 depicts the shares of individuals who used different channels (total informal referrals, family and professional) within distinct geographical areas, different university degree and firms with distinct sizes. First, major differences reside in distinct kinds of referrals used rather than in the aggregate percentage. 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 by and large similar

percentages.

Second, different university degrees also show different patterns: engineering graduates rely relatively little on family contacts and are more likely to find a job through direct application.¹⁶ Probably, this is 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 and Economics and Business, who often use their family contacts.

Third, as found in other investigations (Granovetter 1995; Pistaferri 1999; Ioannides and Loury 2005), among the workers employed in smaller firms a higher share relies on informal ties. A plausible explanation is that only big firms have economies of scale in their recruitment processes that allow them to afford formal recruitment departments and practices. In any case, the figure raises some doubts concerning the efficiency for employers of recruiting through informal ties, assumed irrespectively of firms' dimensions.

To further document the characteristics of the individuals who used the three informal networks defined, we estimate with OLS three simple linear probability models in order. The dependent dichotomous variables assume therefore value 1 if the respondent get her job through overall social referrals, family referral, and professional referral respectively. The set of controls includes age, a sex dummy (female=1), high school grade,¹⁷ the educational levels of both parents (ranging from 1, without formal education, to 7, university degree), provincial GDP per capita expressed in millions of Lira, a dummy for public employment

¹⁶The percentage concerning individuals using direct application are available from the author upon request.

¹⁷Other measures of school performance are available: university grade and distinctions. Nevertheless those indicators are less informative (around 25% of Italian graduates get the highest mark) and less exogenous with respect to occupational outcomes.

Table 3: Social Referrals Job Finding Rates: Shares Among Distinct Subgroups.

	Total	Informal	Family	Professional
	<i>University Geographic Location</i>			
North West	.284	.072	.077	
	(.010)	(.006)	(.006)	
North East	.293	.075	.080	
	(.015)	(.009)	(.009)	
Center	.290	.076	.077	
	(.009)	(.005)	(.005)	
South	.296	.115	.064	
	(.013)	(.009)	(.007)	
	<i>University Degree</i>			
Engineering	.277	.057	.084	
	(.012)	(.006)	(.008)	
Science	.318	.072	.106	
	(.013)	(.007)	(.009)	
Economics, Business and Statistics	.288	.099	.065	
	(.011)	(.007)	(.006)	
Low and Political Sciences	.250	.082	.047	
	(.015)	(.010)	(.007)	
Humanities	.291	.098	.065	
	(.013)	(.008)	(.007)	
	<i>Firm size</i>			
Over 100 employees	.268	.071	.073	
	(.006)	(.005)	(.005)	
Below or equal 100 employees	.371	.105	.093	
	(.010)	(.006)	(.006)	

Notes: Standard errors in parenthesis.

Table 4: **Determinants of job finding methods**

	Total Informal		Family		Professional	
Age	.001	(.001)	.002	(.003)	.001	(.001)
Female	.004	(.012)	.007	(.003)	.001	(.007)
High School Grade	-.003***	(.001)	-.002***	(.001)	-.0003	(.001)
Mother Education	.002	(.004)	.005*	(.003)	-.001	(.002)
Father Education	.011**	(.004)	.008***	(.003)	-.001	(.002)
GDP	.001	(.001)	-.001	(.001)	.001*	(.001)
Public Employment	-.146***	(.016)	-.041***	(.010)	-.045***	(.008)
Dummies for province	Yes		Yes		Yes	
Dummies for degree	Yes		Yes		Yes	
Dummies for firm dimension	Yes		Yes		Yes	
R squared	0.085		0.054		0.041	

Notes: 6314 Observations. Weighted OLS estimation of linear probability models with standard errors in parenthesis. Dependent variables assume value 1 if the individual has used one of the specified job finding method. * significant at 10%; ** significant at 5%; ***. significant at 1%.

(public employment=1),¹⁸ 6 dummies for firm size, 103 dummies for province of residence before college enrollment, 58 dummies for university degree.

Results for most controls are reported in Table 4. The probability of finding a job through personal contacts is negatively correlated with school performance and positively with more educated family background. The same pattern holds clearly for jobs found through family contacts (both parents level education is significantly different from zero). On the other hand, the coefficients capturing social background and school performance are not significant for the regression concerning the use of professional tie.

The suggested picture is extremely interesting: uneven access to useful informal networks (i.e. different socio-economic status) is positively correlated with the actual use of social contacts; moreover, more proficient students are less likely to use such networks. Both

¹⁸We add this control, given that most public jobs are filled through public exams.

Table 5: **Averages hourly wages for workers who used different job finding methods**

	Formal means		Total Informal		Family		Professional	
	<i>Mean</i>	<i>St. Error</i>	<i>Mean</i>	<i>St. Error</i>	<i>Mean</i>	<i>St. Error</i>	<i>Mean</i>	<i>St. Dev.</i>
Wage	13.31	.102	12.71	.171	12.64	.382	13.77	.420
<i>Number of obs.</i>	4484		1830		520		473	

Notes: Hourly Wages are expressed in thousands of Italian Lira. Both means and standard errors are weighted.

pieces of evidence do not hold for professional contacts. If high school grade is a good measure for skills or ability, the above result is consistent with one of the implications of our model: individual using professional ties being more skilled than the ones using family ones.

6. Social networks and wages

Table 5 reports descriptive statistics concerning hourly wages earned by workers who have found their job using different channels. In line with the prediction of our model, 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, since it does not control for several dimensions.

The first step of our analysis is to check if wages are correlated with the use of informal referrals. We estimate with OLS technique the following standard wage model

$$\log(w_i) = \beta_0 + \beta_1 NET_i + \mathbf{x}_i' \pi + \varepsilon_i \quad , \tag{7}$$

where w_i is the net hourly wage, NET_i is a dummy variable which equals 1 if the individual i get her present job through a social referral (and 0 otherwise), and \mathbf{x}_i is a set of individual

controls:¹⁹ high school grade, dummies for levels of father and mother education²⁰ and sex, age, pro capita provincial GDP (expressed in millions of Lira), dummies for province of residence before university enrolment,²¹ university degree and public sector employment, and a constant. In the first column of Table 6 we report coefficients of our regression: workers who use social ties earn 2.5 percent lower wages. Our result is qualitatively similar to the one found in Pistaferri (1999).²²

In a second specification (see column 2) we distinguish between Family and Professional ties use adding three different dummies, FAM , $PROF$, RES in place of NET ,

$$\log(w_i) = \beta_0 + \beta_1 FAM_i + \beta_2 PROF_i + \beta_3 RES_i + \mathbf{x}'_1 \pi + \varepsilon_i \quad . \quad (8)$$

It turns out that the coefficients have opposite signs and are both statistically significant. Consistently with the prediction of our model, family contacts are associated with a wage discount of roughly 5.6 per cent and professional ones with a wage premium of 4.4. All the remaining controls have the expected signs.

Given the positive association between parental education and the use of family ties

¹⁹In the first specification regressors which are likely to be *caused* by the use of informal networks (e.g. dummies for size of the employer and occupation) are not included.

²⁰This control is important not only because, as argued by Pistaferri (1999), it can proxy for unobserved ability, but also because it is an indicator for the endowment and quality of social resources which may affect wages through channels different from referrals.

²¹This is the geographical control which is less likely to be endogenous (compared to university and employment location).

²²According to his study, 1991 wage discount associated with the use of informal networks ranges from 4.5, without firms size controls, to 3 per cent. When occupational and firm size controls are added, our coefficient drops to .022 but are still significantly different from zero. Results can be obtain from the author upon request.

Table 6: **Social networks use and wages**

	(1)	(2)	(3)
NET	-.025*** (.009)
FAM	...	-.056*** (.015)	-.142*** (.045)
PROF044*** (.016)	.044*** (.016)
RES	...	-.045*** (.011)	-.046*** (.011)
FAM*family education020** (.009)
Age	.009*** (.001)	.009*** (.001)	.006*** (.001)
Female	-.071*** (.008)	-.071*** (.008)	-.063*** (.008)
Experience	.050*** (.005)	.050*** (.005)	.050*** (.005)
High School grade	.003*** (.001)	.003*** (.001)	.002*** (.001)
Public Employment	.141*** (.010)	.141*** (.010)	.141*** (.010)
GDP	.003*** (.001)	.003*** (.001)	.003*** (.001)
Dummies for province	Yes	Yes	Yes
Dummies for parents' education	Yes	Yes	Yes
Dummies for degree	Yes	Yes	Yes
Dummies for size and occupation	No	No	No
R-Squared	.155	.160	.161

Notes: 6314 observations. Weighted OLS estimation with standard errors in parenthesis. (1) Only *NET* and no firm size and occupation dummies; (2) *FAM* and *PROF* with without firm size and occupational dummies; (3) An additional regressor added: the interaction of *FAM* with average parents education.

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

(Table 4), we also expect that people with different social background benefit differently from the use family contacts. To test this hypothesis, the third specification of the model allows the wage discount associated with the use of family contact to be different for individuals with distinct social backgrounds: we interact the dummy *FAM* with the parents' average educational level.²³ Results are depicted in column 3. The coefficient has a positive sign and is statistically significantly different from zero, suggesting that the negative association between the use of family network and wages become weaker for individuals having more favorable social background. According to our estimates, wage discounts range from zero to

²³As in the previous section, this variable ranges from 1, no formal education, to 7, university degree.

more than ten percent for individuals with different social backgrounds. This results suggests that even within the group using family ties one wants to distinguish for the quality of the contact.

7. Is the use of social ties the real cause of wage differentials?

Interpreting the coefficients depicted above as causal effects is of course problematic. First, the (positive and negative) associations between distinct social referrals and wages may stem from job specific characteristics which are proxied by the social contact use. For instance, it is well known that smaller firms pay lower wages and, as shown in Table 3, informal methods are more likely to be used by workers employed in those firms.

Second, graduates that use social contacts are likely to differ along important and unobserved aspects: individuals having access to useful connections may have common characteristics beyond the observed ones that affect wages; moreover, the *actual*²⁴ exploitation of them can be correlated with other unobservables like personal motivations or abilities which are not captured by school performance indicator and are likely to have an effect on wages. For instance, if one plausibly assumes that less ambitious and motivated graduates are more likely to exploit their family connections, lower wages may be caused by those personal traits rather than the use of contacts. In this case the *FAM* coefficient reported in the previous section would be upward biased in absolute terms overestimating the negative effect.

We try to mitigate the first problem controlling for job characteristics. Pistaferri (1999), for instance, finds that when firms size is controlled for the negative association between contacts use and wages halves. In the same vein, in a fourth specification of our model we

²⁴See the interesting discussion in Montgomery (1992), who rightly warns on the subtle difference between having a connection and using it to get a job.

Table 7: **Social networks use and wages: robustness checks**

	(1)	(2)
FAM	-.047*** (.031)	...
PROF	.025* (.011)	.044*** (.016)
RES	-.028*** (.006)	-.045*** (.011)
FAM*SOUTH	...	-.100*** (.015)
FAM*CENTRE-NORTH	...	-.040*** (.040)
Age	.006*** (.001)	.009*** (.001)
Female	.006*** (.001)	.071*** (.008)
Experience	.028*** (.005)	.050*** (.005)
High School grade	.0015*** (.0005)	.003*** (.001)
Public Employment	.105*** (.012)	.141*** (.010)
GDP	.003*** (.001)	.003*** (.001)
Dummies for province	Yes	Yes
Dummies for parents' education	Yes	Yes
Dummies for degree	Yes	Yes
Dummies for size and occupation	Yes	No
R-Squared	.271	.161

Notes: 6314 observations. Weighted OLS estimation with standard errors in parenthesis. (1) Firm size and occupational dummies included; (2) *FAM* broken down according to the region of university attended; * significant at 10%; ** significant at 5%; *** significant at 1%.

add a few additional job specific controls: 6 dummies for distinct classes of firms size, 42 for distinct occupations, 1 for temporary contract, 1 for part time jobs, 1 for jobs started before graduation, and 1 for jobs without a registered contract. Although those regressors might bias our estimates (e.g. networks themselves channel individuals into occupations and firms which are more likely to pay lower wages), they control for possible job specific aspects which might be the true cause for lower wages. As depicted in column 1 of Table 7, the coefficients for family and professional contact drop respectively to -0.047 and 0.025, with the latter only marginally statistically different from zero. Nevertheless, their signs still support the implications of our model.

The second problem (i.e. individual unobservables) is more subtle to control for and is

particularly severe for the interpretation of the coefficient concerning family ties: why should identical graduates use their family connections if they cause lower wages? According to our model this stems from the benefit they get from not incurring search costs. We therefore try to check if our empirical results are consistent with other implications of our model. In particular, first, wage discount associated with the use of family connections should increase with market friction and search costs. Second, if we were able to measure search costs, we would find a negative association between them and the use of family ties.

It is a well known fact that Italian labor market works very differently in distinct regions. In particular, unemployment in the south is much higher and this is likely to imply higher search costs. If our explanation is correct, one should therefore observe higher wage discount stemming from family connections for university graduates of southern regions. In column 2 of Table 7 we report the results the same model estimated in the previous section substituting *NET* with two distinct dummies: *FAM*SOUTH* for individuals who had attended university in the south and have used family contacts and *FAM*CENTRE-NORTH*. Wage discount associated with family contacts use is, in fact, more than twice bigger for southern graduates.

Unfortunately actual search costs afforded by graduates are difficult to observe. Nevertheless, our data set provides a reasonably good proxy: the monthly time lag between graduation date and the beginning of the actual job (*Length*).²⁵ However, individuals are not asked about the channels used to find their first job, but only their actual one; therefore we refine our sample considering only those 2,451 workers who are in their first occupation and did not start their job before the end of university.²⁶ For those individuals the following

²⁵Unfortunately the survey does not ask if individuals have actively searched for a job during such period.

²⁶Our estimates might be biased if selection into our sub-sample were systematically correlated with unobservables that affect *Length*. We also estimate the same model for the entire sample assuming that

model is estimated:

$$Length_i = \eta FAM_i + \gamma PROF_i + \sigma RES_i + \mathbf{x}_i' \pi + \varepsilon_i \quad . \quad (9)$$

The controls \mathbf{x}_i include high school grade, dummies for levels of father and mother education and sex, age, pro capita provincial GDP, dummies for province of residence before university enrolment and kind of degree, a dummy for having done the military service after graduation²⁷ and for public employment, and a constant. According to OLS estimates, as depicted in Table 8, the use of family ties is associated with around 1.7 months shorter jobless status after graduation. The negative association with other informal job finding method is smaller and not significant. This piece of evidence is consistent with our model: people exploiting family connections are likely to tradeoff higher wages for less costly search.²⁸

To conclude, we show with some rough calculations that, according to the above, the decision of exploiting one’s family connection is not so irrational as it might seem. In fact, to simplify, if one takes 5% as a realistic measure of the wage discount stemming from the use of family contacts and one considers an approximate monthly wage of 2 millions of lira, the monthly loss from using one’s family contact would be of 100 thousands lira. On the other hand, if one takes for good the above estimates of extra 1.7 months of jobless status, a graduate who decides not to use her family ties incurs in a monetary loss of 3.4 millions (without considering additional job search costs). Therefore, it takes about 35.7 months to earn the same amount of money of someone who had decided to exploit her family connections for someone who has decided not to do so. In such period of time wages are likely to adjust

individuals who are not in their first job have used the same method to find their first occupation. We obtain the same qualitative results, which are available from the author upon request.

²⁷Military service lasted about 12 months and was compulsory for Italian males.

²⁸Incidentally, this result is also consistent with the matching model proposed by Bentolila et al. (2004) in which time is explicitly considered.

Table 8: **Determinants of employment transition duration.**

FAM	-1.69** (.765)
PROF	-0.87 (.774)
RES	-0.27 (.604)
GDP	-0.29 (.041)
Age	0.29*** (.030)
Female	2.37*** (.482)
High School Grade	-0.02 (.031)
Military Service	10.11*** (.522)
Dummies for province	Yes
Dummies for parents' education	Yes
Dummies for degree	Yes
R-Squared	.146

Notes: 2451 observations. The dependent variable is expressed in number of months. Weighted OLS estimation with standard errors in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%.

towards one's productivity and exploiting one's family connection may be profitable.

8. Conclusions

The present paper addressed the importance of distinct social networks in the labor market, focussing on the case of young Italian workers with tertiary education. First, we argued that some of the so far controversial results obtained in the economic literature can stem from an oversimplified idea of informal search methods in the labor market. Second, a formal model which distinguishes among two different social ties was presented. Third, new empirical evidence largely consistent with such model was obtained exploiting a relatively unexploited data set.

The model, which draws on Montgomery (1991), shown that two distinct social ties can be used to overcome different information imperfections in the labor market. Employers use professional ties in order to reduce the uncertainty concerning new workers' ability. On

the other hand, family contacts lower search costs in markets where frictions undermine the location of job opportunities.

Focussing on Italian graduate students, we found that different matching mechanisms correlate with geography, school performances, and social backgrounds. Moreover, the channels through which graduates find their jobs are affected by educational performance and are likely to be embedded in social backgrounds. Most importantly, the implications of our concerning the wage differentials associated with the two kinds of social networks use were also tested. A standard wage regression model shown that the use of professional networks is associated with a wage premium, while the opposite is true for the use of family networks. The results are to a large extent confirmed controlling for job specific characteristics. We also found, consistently with the insights of the model, that graduates using family contacts are likely to experience shorter jobless status.

This paper has offered two kinds of contributions to the literature. First, we argued that distinguishing between formal and informal job finding methods is not enough. More subtle mechanisms stand behind the use of distinct social networks and in particular, the nature of the tie matters. Second, we shed light on the puzzling results found in the literature concerning the impact of the use of social referrals on wages.

Appendix

In this section we simply report the translated key-section of the questionnaire used in the survey and 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
- 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
- Lend 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.

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