Doctoral School of Sociology
and Communication Science

Thesis summary

Virág Ilyés

Social networks and individual labor market outcomes

Evidence from Hungarian Linked Employer-Employee Panel Data

Supervisors:

Tamás Bartus PhD and László Lőrincz PhD

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Table of Contents

1. Introduction

The role of social networks in labor markets has been widely recognized for decades. Social ties can be essential assets in reducing information and search costs and have proven to be useful intermediaries in matching supply and demand. They can positively affect individual labor market outcomes: they may increase the chance of finding suitable vacancies (Dustmann *et al.*, 2016), enhance the quality of the newly acquired jobs or promote career advancement (Lutter, 2015; Podolny & Baron, 1997). At the same time, they might influence firm-level outcomes as well: informal ties can facilitate knowledge sharing within teams (Tortoriello *et al.*, 2012; Wei *et al.*, 2011), accelerate the creation and diffusion of innovation (Rost, 2011), enhance the productivity within teams (Afridi *et al.*, 2020; Fernandez *et al.*, 2000), or even contribute to firm-level (Boschma *et al.*, 2008) and regional productivity growth (Eriksson & Lengyel, 2019; Lengyel et al., 2021; Lengyel & Eriksson, 2016; Lőrincz, 2021).

The dissertation focuses primarily on the perspective of individuals and aims to give a deeper understanding of how social networks shape the economic and employment opportunities of individuals. It investigates the direct and indirect effects of professional ties on a wide range of labor market outcomes, such as job finding probabilities, the level of wages, job stability and the chances for upward mobility in terms of employment outcomes. Following recent trends in the measurement of network effects, the empirical work takes a relatively novel approach to quantifying the economic benefits of social ties by exploiting the potential of a large Hungarian linked administrative employer-employee panel dataset. Although having some limitations, such as the lack of direct information on social links or hiring methods, the dataset contains precise and reliable information about employment and wages that can be utilized to bypass these shortcomings. As individuals and firms with unique anonymous identifiers are linked, it is possible to identify various segments of networks, such as former co-workers and university peers.

Building on studies using similar data (Dustmann *et al.*, 2016; Eliason *et al.*, 2019), elaborating on the empirical approaches already applied for measuring network-related effects (Glitz & Vejlin, 2021; Kramarz & Skans, 2014; Saygin *et al.*, 2021) and incorporating recent developments in panel data methods (Cardoso *et al.*, 2016; Woodcock, 2008), this dissertation presents three studies on the role of social ties in the labor market. The first study focuses on the wage effects of former co-workers, the second one investigates gender differences in the returns to social ties, while the third one explores the role of university peers on early-career outcomes of master's graduates. In the upcoming pages, I will start by introducing the background, contributions, and research questions of each study separately. Then, I will turn to the overview of the used data sources and methods, and I will present the results of the empirical chapters. Finally, I will close the discussion with some concluding remarks.

2. Background, relevance, and research goals

2.1. Expand our knowledge on the wage effects of co-workers

The group of former co-workers forms an essential part of our social networks. As shown by early survey-based evidence, one's co-worker acquaintances can be good sources of job-related information and they may also play an important role in the job-acquiring process (Corcoran *et al.*, 1980; Granovetter, 2019; Holzer, 1988). Besides this type of studies, which typically exploited self-reported information about the individuals' job search process, in recent years, many promising endeavors appeared in the field of economics which utilized administrative registers to address the labor market effects of co-worker networks. Using various approaches, these studies showed that former co-workers can positively affect a wide range of individual labor market outcomes such as hiring probabilities (Cingano & Rosolia, 2012; Glitz, 2017; Saygin *et al.*, 2021), tenure length and turnover (Glitz & Vejlin, 2021), and quite notably, wages (Glitz & Vejlin, 2021; Hensvik & Skans, 2016). The explanations for the existence of these beneficial effects mostly highlighted the role of two mechanisms: information transmission and employee referral.

As for wage gains, some additional studies (even focusing on non-co-worker relationships) gave indications that social ties may contribute to the observed gains through multiple channels. Dustmann *et al.* (2016) and Glitz & Vejlin (2021) proposed that monetary gains are primarily attributable to the referral activity of contacts. Hensvik and Skans (2016) showed that homophily in former co-worker networks may lead to the selection of better individuals into firms. Schmutte (2015), on the other hand, by focusing on neighborhood networks established that selection to high-wage firms is also prevalent. Furthermore, Eliason *et al.* (2019) found that referral is more likely to happen when the applicants are of better quality and their social contacts' firm pays higher wages.

Drawing on the above literature, the present study aims to contribute to the literature of co-workers, employee referral, and wage differences in multiple ways. First, by being the first to document the presence of wage gains commonly attributed to the referral activity of former co-workers through the estimation of a two-way fixed effects wage equation on starting wages. Second, by jointly assessing those selection channels that may also contribute to the generation of the overall wage gains and by examining their relative importance. Fourth, by slightly extending upon the decomposition method of Woodcock (2008), and this way, by showing an even more nuanced picture on the actual drivers of given selection channels. Finally, by presenting various endeavors to link differences in the estimated wage components to theories in the referral and co-worker literature. To this end, we will address the following questions:

(1) What is the overall impact of former co-workers on starting wages?

(2) What are the components of this wage premium?

- Apart from the direct effect of referral, what kind of co-worker-induced selections contribute to the generation of wage benefits? What are the relative contributions of these selections to the overall wage premium?

(3) Which mechanisms (information transmission or employee referral) are responsible for the presence of different wage components?

2.2. Investigate the contribution of social networks to gender inequalities

In the last decades, a major change has been observed regarding the role of women in the economy. Female employment has steadily rose, accompanied by closing gender gaps in terms of wages as well. Due to the improvements in human capital accumulation of women, the introduction of antidiscrimination legislation, changing firm policies and hiring practices, entry barriers of women are considerably reduced in high-paying jobs and male-dominated occupations. However, these convergence processes have recently shown signs of a slowdown, even though there are still persistent gaps between men and women in terms of labor market outcomes. Prevailing social norms, gender stereotypes, discrimination, challenges to work-life balance (Cortes & Pan, 2018; Das & Kotikula, 2019) are still key components of women's unequal opportunities and barriers to occupational/wage mobility within and across firms. However, social networks may also have a central role in aggravating labor market inequality (Blommaert *et al.*, 2020, Lindenlaub and Prummer, 2016; Zeltzer, 2020).

The literature offers numerous theories proposing that women should benefit less from their social capital on the labor market. Such theories, on the one hand, emphasize the role of labor market segmentation and less strategic networking, which may result in women having limited access to useful contacts and lower network quality (Blommaert *et al.*, 2020; Trimble O'Connor, 2013). On the other hand, they propose that deep-rooted preferences, biases, and discrimination may reduce the access of women to informal help and result in lower returns from social relationships (Beaman *et al.*, 2018; Lindenlaub & Prummer, 2016; Zeltzer, 2020). These differences can translate into gaps in labor market opportunities between men and women. However, we rarely find endeavors that tried to convincingly quantify the resulting disadvantage of women using large-scale data.

The objective of this chapter is to investigate the contribution of social networks to gender inequalities, by focusing on a specific group of social ties, namely former co-workers. To do so, the study aims to address the differential effects of networks by gender on job finding probabilities and on the chance of promoting upward mobility through job switches.

Similar studies, with respect to data and approach, have already demonstrated that workers are more likely to get their new jobs at firms where their acquaintances are employed (Saygin *et al.*, 2021), and also that co-workers affect wages to a meaningful extent (Boza & Ilyés, 2020; Glitz & Vejlin, 2021). Some of the results even shed light on gender differences: women benefit less from their former co-workers in terms of wages (Boza & Ilyés, 2020) and they receive a lower amount of work-related information from their employed former co-workers (Saygin *et al.*, 2021). However, none of these studies addressed comprehensively gender differences in co-worker effects, nor have they examined systematically all those contact-specific characteristics that may mediate the measured differences. There is limited empirical evidence on the contribution of social ties to gender differences in career advancement, and there is also little known about the segments of the labor market where the gender gap in the returns to social ties is the greatest. To fill the above gaps in the literature, by linking insights on gender inequality and the gendered aspects of social networks, the chapter investigates the following questions:

(1) Can we observe any difference in the labor market role of former co-workers by gender?
   - Do former co-workers affect differently the hiring chances and career improvement of men and women?

(2) Are the observed differences related to the characteristics of the relationships utilized by men and women?

(3) Which female and male job seekers can make good use of their social contacts, and which job seekers are unable to reap the potential benefits of social ties? If there is a gender difference, for whom do we observe the greatest differences in the opportunities provided by contacts?

2.3. Assess the role of university peers for labor market entrants

The labor market integration of graduates has become increasingly complex in recent decades: the transition from school to work has become longer and de-standardized (Róbert, 2008), and the sharp boundaries between higher education and the labor market have become obscured

(Dianne & Dwyer, 1998; Teichler, 1998). At the same time, early-career patterns of university graduates have become more fragmented, and they no longer necessarily follow a single dominant, linear path (Beck, 1992). Amidst these changes, understanding the components of early labor market success (typically characterized by shorter unemployment periods and higher wages) became increasingly important. Related studies have long emphasized the role of, among others, individual characteristics and decisions (e.g. socio-demographic characteristics, experiences and skills, the chosen study path and career aspirations) and structural factors (e.g. country-specific economic and political situation, labor market conditions, firm recruitment practices) in explaining career success. However, the course of career paths may greatly depend on social resources as well, which could essentially shape the individuals' labor market opportunities (Lin, 2001).

Career tracking surveys from a wide range of countries revealed that social ties might have an essential role in acquiring economic opportunities for university graduates (Bartus, 2001; Franzen, 2006; Kogan, 2011; Kogan, Matković and Gebel, 2013). However, the existing evidence is confined chiefly to investigating hiring outcomes, and detailed information on the role of different network segments is moderate. This study aims to partly fill this gap by focusing on one, professionally relevant subgroup of the graduates' social network, most notably former university fellows.

Due to their similar training profile and professional interest, former university fellows might greatly help each other by providing helpful information on well-matching vacancies. Moreover, their shared training period may also serve as a sound basis for recommendations, as it gives the students time and opportunity to become familiar with each other's skills, attitudes, and performance. Zhu (2019) by linking data on community college student transcripts to matched employer-employee records investigated classroom network effects on job finding and the heterogeneity by gender. The results showed that the presence of college connections at given firms can increase the job seekers' chances of being hired. Using Swedish register data, Eliason *et al.* (2019) also provided some evidence on the essential role of those ties obtained from primary, second and tertiary education on job finding. However, as their paper focuses on the role of social connections in labor market sorting, they neither reflected on the issues related to the causality of network effects nor investigated the heterogeneity of effects for career entrants.

The present study aims to contribute to the literature by i) investigating the role of university connection for career entrants ii) estimating their effect on not only job finding, but on job quality as well, iii) showing the relative importance of different kind of university ties. Thus, in the study we address the following questions:

(1) Do former university peers affect the job finding probabilities of graduates and the quality of their new jobs?

(2) Can we observe any difference in the effects by the type of university contacts (ties from BA and MA)?

3. Data and methodology

3.1. Data and Definitions

The empirical studies are based on two releases of a large Hungarian employer-employee administrative panel dataset from the Databank of the Centre for Economic and Regional Studies. The longitudinal datasets comprise the work histories of two randomly drawn 50 percent of the population on a monthly basis, although their observation periods differ. The first dataset covers only the period between 2003 and 2011, while the second one includes years until 2017 as well.

The two datasets were generated in the same way, so their structure and the set of variables are similar. In both cases, raw data on individual job spells were collected from the Pension Directorate and were combined with additional information gathered from the Tax Office, the Health Insurance Fund, the Office of Education, and the Public Employment Service. The Databank then restructured the data into a monthly panel format based on the employment status of individuals on the 15th day of each month. Both individuals and companies are assigned unique, anonymous identifiers. For each individual-month observation, we have information on a set of personal characteristics (e.g. gender, age, place of residence), but data on health expenditures and social transfers are also available. For each month of employment, the dataset includes monthly earnings, the number of days in employment, the type of employment, occupation, and the employer's balance sheet data. Additionally, the second release of the dataset includes data on primary, secondary, and tertiary education from 2009 at individual level. For higher education, information is available on all university programs started, including active and passive semesters, and the dates of completion of programs. For program characteristics, the name of the university and the program, the type of training (full-time or part-time), the language of instruction and the location of the training are also provided.

From the perspective of the research, one of the main shortcomings of the datasets is the lack of direct information on the help of social ties and the list of acquaintances. However, by using alternative strategies, certain types of network segments can be extracted even from administrative records. In the empirical chapters professional ties are identified based on the co-occurrences of individuals at the same institutions or organizations (e.g. firms or universities). Former university fellows are defined as those students who attended the same university program at the same time. While former co-workers are identified as those employees who have worked for the same company and the duration of their employment overlapped. The resulting network segments were then used to generate aggregate measures, such as the proportion of certain types of employed contacts in general or at specific firms. They were also used to define variables that proxy the potential help of social contacts, such as the re-encounter of former co-workers at certain firms. In the first two empirical chapters we will focus on the role of former co-workers, while in third one, we will investigate the labor market role of former university ties.

3.2. Empirical approach

The empirical chapters of this research are structured to analyze the impact of social ties on both job search and labor market outcomes after hiring. In an ideal scenario, the impact of contacts on job search could be estimated using a database containing all job applications made by individuals during their job search period. However, administrative datasets only contain documented employment spells, so only realized employer-employee pairings are known. As a result, the research aims to answer a modified question related to job search, which can be answered using register data. Specifically, it seeks to determine whether job seekers are more likely to find employment at the workplaces of their contacts, compared to other alternatives.

To answer this question, we first identified job seekers and job search periods using identifiable cases of job losses due to closures and months of unemployment. Then, similar to other studies in the literature (Kramarz and Skans, 2014; Saygin, Weber, and Weynandt, 2021), we linked the individuals to a set of target firms that could potentially provide them with employment. Thus, the observations will be individual-target firm pairs. The variable of interest was a dummy indicating, for each pair, whether the job seeker had at least one contact at a given target firm during the job search. Finally, fixed effect regression models were used to assess whether individuals are more likely to be hired by the workplaces of their contacts (former university peers or co-workers) compared to other companies within the defined set of target firms. These regression models controlled for i) observable factors that affect hiring probabilities and ii) frequent labor mobility pathways (either between firms or between education tracks and firms) in the form of fixed effects.

To assess the impact of contacts on labor market outcomes after hiring, we compare individuals who started in firms with at least one contact present and those who started without any. By introducing a set of linear and logistic regressions, we examine whether the employment characteristics of those who started at their contacts' workplaces are characterized by higher wages, higher status, greater prestige, or occupational rank. To capture the contacts' effect on upward mobility, we contrast the firm-related and job-related outcomes of individuals at their new firms to the ones of their previous workplace. In addition to observable characteristics, we control for individual and/or firm fixed effects in the regressions to account for the effect of unobserved and time-invariant characteristics of workers and firms. Finally, for the identifying the various components of co-worker wage gains we augment and apply the decomposition method proposed by Woodcock (2008).

4. Results

4.1. Decomposition of co-worker wage gains

In this chapter, we investigated the composition of wage gains attributable to former co-workers and assessed their magnitude. We started by estimating an OLS regression on the logarithm of starting wages. We found that those who started at the current workplace of any of their former co-workers achieved a 3-5% (overall) wage increase compared to those who started without any acquaintances. Then, by augmenting and using the decomposition method proposed by Woodcock (2008), we assessed the presence and relative importance of those components constituting the overall wage gains. Based on the theoretical and empirical literature on referral and information transmission, we proposed that the overall wage gain attributable to former co-workers consists of four elements: a contact-specific, an individual-specific, a firm-specific and a match-specific component. In addition to their direct effect ("presence" effect), former co-workers may funnel individuals into high-paying firms (firm selection), increase the selection of good workers into firms (individual selection), and may contribute to the creation of better employer–employee pairings (match selection).

Our results demonstrate that there are non-negligible differences in all empirically separable wage elements. We found that for men half of the overall wage gain (precisely 2.1%) originates from match selection or attributable to the presence effect of referrers. Although using the current methodology and data, we have not been able to separate these two elements, the distinction was important for theoretical clarity.

Second, we showed that this gain is accompanied by a 1.7% and 0.9% wage advantage, reflecting individual and firm selection respectively. The presence of such wage elements implies that former co-workers might help individuals getting into high-wage firms, and they also induce the selection of better individuals to firms. By further decomposing these wage components into within and between unit elements we also revealed that they are mostly driven by their respective within components.

The gains associated with firm selection mostly come from the sorting of linked individuals into higher premium firms relative to the wage level of their former firms (which can be considered average). The wage benefits resulting from individual selection on the one hand, stem from the fact that linked individuals are typically hired by firms with better worker pool compared to firms that rely only on formal hiring (resulting in a 0.41% gain). On the other hand, it arises from the fact that the unobserved quality of linked workers is typically better compared to the quality of the firms' other hires. This superiority is responsible for a 1.25% wage advantage.

Considering female workers, the only relevant channels are the selection of better workers into firms (responsible for 2.5% wage gain), and some weak sorting into better firms relative to the working history of these women (accounting for a 1.5% wage increase). Regarding occupational heterogeneity, we showed that individual selection is weaker in higher occupations. Moreover, that the presence of firm selection is more prevalent in skilled occupations with stronger educational requirements. When relying on mass layoffs as exogenous sources of variation, we found similar results.

Third, we presented suggestive evidence in favor of referral and information transmission as the main underlying mechanisms by focusing on scenarios where one or more of the (sub-)mechanisms are expected to have stronger effects on wages according to related theories. Our supplementary specifications showed that wage components attributable to referral are higher if referrers have greater bargaining power with their employer (measured by seniority or better occupation), or when the relationship between the acquaintances is stronger (longer joint working experience, less time between worker reunions). Focusing on situations in which individuals switched jobs without actual acquaintances but having indirect contacts (contacts of the individuals' former co-workers) or similar workers were present (who had experience at the same company but at a different time) at the new firm, we found a lack of referral-related gains.

Finally, in order to separate presence-related gains and benefits related to match selection we examined how the separation of referrers affects the wage-tenure path of the hired workers. In line with literature, we found that the benefits of linked individuals eventually dissolve by time, and we documented a modest (although statistically insignificant) difference in the magnitude of gains by referrer presence suggesting weak evidence in favor of presence-related benefits.

Taken together, the research highlighted the beneficial role of former co-workers for both individuals and firms, and in general the society, by enhancing the creation of better employer-employer matches. The results also shed light on gender differences in the magnitude of wage gains and the importance of specific selection channels. They also revealed that investigating the heterogeneity of network effects by gender is an essential area worth exploring, even beyond wage outcomes.

4.2. Gender differences in co-worker effects

Therefore, as a continuation of the previous study, we assessed the heterogeneity of co-worker effects by gender on job finding chances and career development through inter-firm mobility. Although considerable research has been devoted uncovering the gendered effect of social ties on job finding (Blommaert *et al.*, 2020; Greguletz *et al.*, 2019; Ibarra, 1993; Moore, 1990), the results of this study can still provide interesting and relevant findings.

First, the study reinforced the findings of existing literature that former co-workers have a substantial impact on the individuals' hiring chances. The benefits were more pronounced for male workers, suggesting less network-related help for women. We also showed that the effects are influenced by both the gender of the job seekers and their contacts, although not necessarily directly. In general, we found traces of homophily in network effects: same-gender contacts provide higher benefits for both men and women. Such patterns, however, disappear once we control for typical worker flows between (sending and target) firms, suggesting that the observed homophily is essentially a byproduct of gender segregation. Investigating the heterogeneity of results by the occupational position of contacts, we also demonstrated that while for men essentially all types of contacts increase the hiring chances, for women contacts in managerial or higher occupational positions matter the most. This implies that acquaintances in better occupations (both in absolute and relative terms) can be essential assets for women if they are present, and contrary to the theoretical literature (Lin, 1999), women can exploit such ties in the job search at least as effectively as men.

Second, by focusing on job entries to new firms, the results showed that career advancement through job mobility is also affected by the help of informal ties. We captured different aspects of upward mobility by comparing the firm-specific and job-related outcomes of individuals at their new firm to their previous workplace. According to the findings, workers with links are more likely to acquire better positions in the general and within-firm wage distribution, and their chance of getting into higher premium firms is also better. The presence of contacts is also associated with an increased chance for getting into firms with lower within-firm gender wage differences. However, the returns to social ties are of different magnitude for men and women and are unequally distributed within both genders. Men benefit from contacts regardless of their former labor market situation (in terms of wages and firm quality), while women in the best positions are excluded from such gains. By pointing out the relevance of informal ties in compensating for the limited opportunities of women in the bottom segments of the labor market, and maintaining the existing gender differences at the top, the research contributes to the current discussions about gender inequalities and labor market networks.

4.3. The role of university peers in labor market success

Finally, in the last empirical chapter, we investigated the effect of former university peers on job finding and the quality of the new job for master's graduates starting their careers. Our results provided evidence that former university ties can be essential sources of job opportunities and informal help: their presence at given firms significantly increases the hiring chances of individuals at these companies. The results remained robust even after accounting for the fact that individuals from similar study programs typically choose the same firms after graduation. Although we could not present direct evidence on the helping role of peers in getting a job (recommendation or information passing about vacancies), our robustness checks provided suggestive evidence in favor of the existence of such assistance. We also revealed that the measured benefits are primarily attributable to ties from bachelor's studies, while the impact of master's peers is mainly driven by the selection of individuals along existing pathways between university master's programs and given firms. These findings may suggest that too much similarity in the educational and career paths of former university peers, especially early in their careers, may limit the chances of individuals providing help to each other and may even be accompanied by crowding out effects. Also, that dissimilarity, to a given extent, could be associated with increased information on available jobs and better economic opportunities.

In the second part of the analysis, we focused on job entries to firms and compared the employment characteristics of those graduates with and without former university peers present. We demonstrated that those who started their new jobs at their peers' workplaces tend to receive higher entry wages and typically work at positions with more prestige and/or higher status. Additionally, their chance of having longer tenure at their new workplaces is higher, implying that informal ties can contribute to the creation of better person-job matches. However, part of these gains can be attributed primarily to the selection of linked graduates to firms that provide increased benefits to career entrants in general.

The results, taken together, call attention to the importance of university peers as professionally relevant ties and contribute to discussions about school-to-work transitions as well, by emphasizing their role in affecting early career success. The measured benefits, even though they may seem moderate in magnitude, could represent crucial help for labor market entrants.

As early career tracks can influence subsequent labor market outcomes, the initially smaller gains can lead to more significant gaps in economic opportunities in the long run.

5. Closing remarks

Social networks are essential components of the fabric of everyday life. Individual lives are intertwined through social relationships and whether we perceive it or not, social interactions can shape our actions, decisions, opportunities, and constraints. Therefore, if we want to describe economic outcomes, individual decisions, or social processes properly, we can't do so without considering the larger context of our environment, the web of social relations.

The findings of the presented studies, taken together, advance our understanding on the relationship between networks and individual economic opportunities, and provide essential insights for the disciplines of sociology, economics, and social policy as well. One one hand, we draw attention to the importance of professional ties as essential intermediaries facilitating and directing worker mobility. Such mobility is typically associated with desirable benefits for both individuals and firms, and in general, may enhance the overall productivity in the labor market as well. These effects can be considered vital from an economics point of view. On the other hand, the dissertation also provides indications of the downside of networks. The obtainable benefits depend strongly on the available social ties and their characteristics. The lack of good-quality social networks, restricted access to useful social ties can be detrimental for future career prospects of individuals and may even result in gaps in opportunities between different groups of the society. By facilitating discussions about the dual nature of networks as sources of economic benefits and amplifiers of inequalities, hopefully, the dissertation will promote more in-depth research in the area.

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