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Peers at Work – a Brief Overview of the Literature on Peer Effects at the Workplace and the Policy Implications

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Individuals do not exist in isolation but are embedded within networks of relationships, such as families, coworkers, neighbors, friendships or socio-economic groups. While there is a long tradition in sociology and anthropology focusing on the importance of social structure, norms and culture, economists have long ignored social influences on individual behavior. Even though social influences may play an important role in the evaluation of policies, economic evaluations are typically focused on the central question how individuals independently respond to financial incentives. However, economic reforms or the introduction of new policy instruments are likely to affect individuals not only directly by the change in financial incentives, but also indirectly by a change in the behavior of the social environment. At the workplace, one can distinguish four contexts where peer effects may be relevant factors in explaining the observed outcomes; these are (a) job search and employment probabilities; (b) fertility, parental leave and female labor supply; (c) productivity and work place behavior; and (d) retirement and pension plan decisions. Consequently, it is of large importance to understand and predict social interaction effects in these four areas of research and comprehend the implications for economic policy. In the following, I will give an overview of the existing literature in each of the contexts where peer effects at work may evolve, after briefly discussing the challenges associated with the empirical analysis of peer effects.

1. Introduction

The indirect effect of the behavior of a social reference group on individual outcomes is referred to as social interaction or peer effect interchangeably in the following. Social interaction effects can be generated through various channels and can be explained by different sociological, anthropological and economic theories. For example, peer effects can result from a preference for conformity to the behavior and norms of a certain social group. Social norms are unwritten rules about how to behave in a particular social group or culture. Preferences for conformity to peer behavior are not the only explanation for the existence of social interaction effects. Particularly in the labor economic context, the behavior of peers can reveal important information about the reactions to, and consequences of, a certain behavior. Social networks can also function directly as information transmission

channels, for example in the case of job referrals or information about job offers. In general, the literature distinguishes between contextual effects and peer effects (Manski, 1993), where peer effects are the direct effects of the behavior of a social reference group on individual behavior, and contextual effects are the effects of the characteristics of the reference group on individual outcomes. Peer effects are sometimes distinguished further into network effects and social interaction effects. When network effects are discussed, the structure of the social network is usually known to the researcher, while one refers more generally to social interaction effects when the social group is known, but not the structure of social relations within the group. In most cases, data of individual connections within a group are not available.

Social interaction can affect individual behavior through various social groups or networks. While network data is rarely available, existing administrative or census data enable the assignment of individuals to certain social groups, as e.g. families or neighborhoods. While other research typically analyzes geographic neighborhoods (e.g. Weinberg et al. 2004) or family networks (e.g. Del Boca et al. 2000; Dahl, Gordon B. 2014; Neumark & Postlewaite 1998), this Roundup focuses primarily on the workplace as the relevant social network for labor related decisions. This is based on the assumption that peers at the workplace matter for decisions regarding employment behavior. In the context of labor related decisions, coworkers may constitute an influential reference group for individual behavior. The workplace facilitates the formation of social ties and thereby the transmission of social norms and influences. Furthermore, information transmission may play an important role among coworkers. In fact, Keim et al. (2009) show that in the context of fertility decisions, 35% of survey respondents state that coworkers had an important or very important influence on own fertility decisions (compared to e.g. 12% for neighbors).

When social interactions are quantitatively important, policy interventions on single agents might have large effects through so-called social multipliers (Glaeser, Scheinkman, & Sacerdote, 2003). Empirical economic studies frequently attempt to infer individual behavior from observed aggregate outcomes, however, when there is social interaction, aggregate coefficients will be larger than individual coefficients because there is a direct effect of policy changes on individual behavior and an indirect effect through the effects on the social reference group. Economists need to predict individual behavior to know what the likely aggregated outcomes are and plan accordingly. This might be aggravated by social multipliers, which generate or at least exacerbate fluctuations in aggregate behavior. Sometimes social interaction effects and thereby social multipliers are even explicitly desired by policy makers. This is the case for example if policies are aimed at changing social norms of female labor supply and thereby gender roles.

2. Methodological challenges associated with the identification of peer effects

While the importance of peer effects in explaining labor outcomes is important, only few empirical studies succeed in estimating the causal effect of peer behavior because of the problems associated with the empirical identification of social interaction effects (Moffitt, 2001). Social interaction effects are difficult to identify because there are several reasons why one observes similar outcomes for members of the same social group (Manski, 1993). One explanation stems from so-called correlated effects, which means that individuals belonging to the same group tend to behave similarly because they share (un)observed characteristics. The place of work and type of occupation are choice variables and therefore workers may sort into specific peer groups based on observed or unobserved characteristics. For example, workers with a strong preference for leisure may sort into less productive jobs and have similar labor market outcomes independently of each other. Correlated effects

can also be due to common shocks or unobserved external conditions. For example, a change of management may affect a group of coworkers and induce similar behavior despite social interaction. Demand shocks may affect a specific occupation or industry alike and events as changes in child care availability or firm policies may cause similar behavior among coworkers. Another challenge associated with the identification of social interaction effects stems from the simultaneity of interactions within a social group. It is therefore difficult to distinguish whether an individual is affected by its reference group or the other way around. For these reasons, it is crucial to ensure that the perceived peer effect is not simply reflecting a spurious correlation in coworkers' behavior induced by simultaneity, sorting or correlation of unobserved characteristics.

The existing empirical literature often attempts to identify peer effects by exploiting the variation in outcomes over time using panel data, which allows to certain degree to control for endogenous group formation and other unobserved correlated effects (e.g. Cornelissen et al. 2013; Pink & Leopold 2012; Markussen & Røed 2012). Other recent studies propose to look at political reforms to circumvent the identification problems by using exogenous variation of peer outcomes induced by policy changes (Brown, 2013; e.g. Dahl et al., 2014; Rege, Telle, & Votruba, 2012).

Several more technical studies deal with the formulation, identification and estimation of structural microeconomic models with social interaction effects. Blume et al. (2010) address the identification problems of reflection, self-selection into social groups and correlated unobservable group characteristics, and discuss the identification of linear, spatial and discrete choice models with social interaction. Brock and Durlauf (2001), Bramoullé, Djebbari, and Fortin (2009), and Blume et al. (2013) formulate conditions under which structural models with social interactions are identified. Most importantly, the structure of the social network must be known to the researcher and individual data on the behavior of the members of the social network must be available. In most cases, the natural exclusion restriction induced by the structure of a social network enables the identification of the model.

3. Literature overview

In the last two decades a rich theoretical, econometric, and empirical literature in *social economics*, the study of social phenomena with the methods of economics, comprehensively overviewed in Benhabib, Bisin, and Jackson (2010) has emerged. While peer and spillover effects gained attention for instance in research on education (see Epple & Romano, 2011 for a review) or crime (e.g. Glaeser, Scheinkman, & Sacerdote, 1996), there exists little work in on peer effects in the fields of social policy and public economics. In particular, there are only few studies investigating social interaction effects in the context of labor economic research. The existing literature on social interaction can be distinguished into theoretical work, focusing on the formulation, identification and estimation of mainly structural models with social interaction effects, and empirical applications estimating peer effects in various contexts. In the following, the existing empirical literature will be categorized by the different labor related topics where peer effects are expected to play an important role.

a) Job search and employment probabilities

Social networks can help individuals to find jobs and firms to find suitable workers. Unemployed individuals may be able to shorten their unemployment duration and find better jobs through informal referrals and information transmission via personal contacts. Workers may also have a stronger preference for employment, and hence

increase their job search effort when their peers are employed. Direct evidence from surveys suggests that a large fraction of all jobs are found through informal networks. Most research on informal contacts indicates that roughly 50% of jobs are obtained through family, friends, or other acquaintances (Loury, 2006). Based on European and US panel survey data, Pellizzari (2010) also document that personal contacts are among the most important channels that lead people into jobs. On the other hand, employers use referrals from employees in their recruiting. For instance, Marsden (2001) reports that referrals from employees or outside business contacts are used in at least half of all hires, using the 1991 National Organizations Survey (NOS). While there seems to be consensus about the positive effect of the use of informal networks on employment probabilities, the effect on wages remains controversial (Loury, 2006; Pellizzari, 2010).

There exist a growing number of studies which analyze social interaction effects in the context of job search (an overview is given by Topa, 2011). Early theoretical research includes Montgomery (1992), who analyzes the impact of tie strength on equilibrium outcomes in a model of job search in which informal search methods coexist with formal job application processes. Granovetter (M. S. Granovetter, 1973; M. Granovetter, 1995) argues that weak ties within social networks may be more important than strong ties in the transmission of useful information about job opportunities among job seekers. Several more recent theoretical studies attempt to relate personal networks to individual and aggregate labor market outcomes in structural economic models (e.g. Cahuc & Fontaine, 2009; Calvó-Armengol, 2004; Mortensen & Vishwanath, 1994). Most of these studies find that informal networks can lead to inefficiencies in the labor market.

In addition to direct survey evidence and theoretical literature, various studies attempt to estimate causal effects of social interaction on employment outcomes. Among these, a number of studies have found evidence that social networks within urban neighborhoods affect employment and wage outcomes. Examples include Topa (2001), who analyzes a structural model of transitions into and out of unemployment to estimate the impact of any local social interaction effects on employment outcomes. Conley and Topa (2007) extend Topa (2001) using data for the Los Angeles metropolitan area. Bayer, Ross and Topa (2008) examine whether individuals who reside in the same city block have a higher propensity to work together than individuals in nearby but not identical blocks. The authors find significant referral effects that are stronger among individuals with similar socio-demographic characteristics. Schmutte (2010) uses very detailed matched employer-employee data and the empirical design of Bayer, Ross and Topa (2008) to estimate an on-the-job search model with geographical peer effects.

Another strand of literature exploits (quasi-)experiments to estimate the causal effect of social networks on individual job search and match quality outcomes. Many of these studies make use of randomized housing relocation experiments that allow residents of low-income neighborhoods or of public housing projects to relocate to different neighborhoods (e.g. Katz, Kling, & Liebman, 2001; Kling, Liebman, & Katz, 2007). Studies using quasi-experimental data, which are focusing on other than neighborhood effects include Laschever et al. (2009), who use the random assignment of young American men to the military during World War I to define exogenously constructed peer groups; and Marmaros & Sacerdote (2002), who estimate a significantly large peer effect in post-college labor outcomes exploiting the random assignment of dorm roommates at Dartmouth.

While most existing research on peer effects in job search focuses on neighborhood networks, there are only a few recent studies that analyze peer effects among former coworkers. These include Dustmann, Glitz and Schönberg (2011), who develop a model of referral-based job search in which employees provide employers with

information about potential new hires and find evidence that informal networks help to reduce informational deficiencies in the labor market and lead to productivity gains for workers and firms. Another study by Glitz (2013) analyzes how former coworkers affect employment probabilities by exploiting exogenous variation in the strength of social networks that is due to the occurrence of mass-layoffs in the establishments of former coworkers in Germany. The authors find a strong positive effect of a higher employment rate in a worker's network of former coworkers on the individual reemployment probability after displacement. Saygin et al. (2014) study the mechanisms by which social networks have an impact on labor market outcomes of displaced workers in Austria and support the existing evidence that job referrals are an important mechanism.

b) Fertility and parental leave and female labor supply

Fertility, parental leave durations and female labor supply are frequently targeted by family and labor policies that aim to increase both the labor market participation of mothers and fertility. Taking into account possible social interaction effects may improve the explanation of labor supply and parental leave decisions, which is important both to understand the impact of past policies and inform future policies. Furthermore, improving the predictions of labor and fertility outcomes may be relevant for economists to build accurate expectations of future developments of the labor force and demographic changes. In Germany, the existence of social interaction or peer effects would contribute to an explanation of the large increase in the employment rate of mothers with young children that Germany experienced in the past decades. The assumption that labor supply decisions depend on social factors in addition to financial incentives and preferences for leisure versus consumption is supported by Grodner and Kniesner (2006), who show that omitting social interactions from a standard labor supply model may seriously misrepresent the labor supply effects of policy reforms.

However, as mentioned above, the identification of peer effects poses some challenges. Often it cannot be excluded that contextual factors, such as workplace conditions, affect labor supply and fertility decisions of employees in a company alike. The endogeneity of social networks due to sorting into an occupation or firm based on unobservable preferences and firm characteristics poses another challenge for identification. There are several recent studies that successfully solved the identification problems associated with the estimation of peer effects in fertility and labor supply decisions, using different approaches to account for correlated effects. Recent publications make use of family policy reforms (Dahl et al., 2014; e.g. Maurin & Moschion, 2009), while others include peer effects into structural labor supply models (e.g. Neumark & Postlewaite, 1998; Woittiez & Kapteyn, 1998).

Asphjell et al. (2014) estimate peer effects in fertility decisions among female coworkers in Sweden, using a dynamic discrete choice model. The identification problems associated with causal inference on peer effects are solved by: (i) focusing on the coworkers past childbearing to mitigate the simultaneity problem; and (ii) including various control variables and specification tests to account for sorting and correlated effects. The findings suggest an estimated effect of the coworker's recent childbearing on individual childbearing follows a distinct dynamic pattern. During the first twelve months following the birth of a coworker's child, the probability of having a child is largely unaffected, only to sharply increase after 13-18 months (9% increase) and then decline. This time pattern is robust across specifications of the econometric model, which speaks against bias due to sorting and correlated unobservable characteristics. In the German context, Pink et al. (2012) find social

interaction effects in fertility decisions among coworkers using administrative linked employer-employee data.

Other studies analyze different kinds of social interaction in the context of female labor supply. Early work includes Neumark and Postlewaite (1998), who introduce relative income concerns into women's utility functions and test whether labor supply decisions depend on the employment and income of sisters and sisters-in-law. They find that relative income concerns can, to some extent, help to explain the observed increases in female labor force participation. Another example is given by Woittiez and Kapteyn (1998), who use survey data of married females in Dutch households to construct reference groups based on age and education. They find that habit formation and preference independence contribute significantly to the explanation of female labor supply in an extended neoclassical model.

Weinberg, Reagan and Yankow (2004) find that social characteristics of a neighborhood are an important determinant of employment status. They account for the selection into neighborhoods by using longitudinal data and controlling for a large number of variables that explain neighborhood heterogeneity. The authors show that specifications that do not control for neighborhood selection on the basis of time-invariant unobserved individual characteristics substantially overstate the social effects of neighborhoods. Maurin and Moschion (2009) also analyze neighborhood effects using the sex composition of neighbors' children as an instrumental variable to account for non-random selection into neighborhoods that might be correlated with labor supply decisions. They show that there are positive and significant neighborhood peer effects using a French data set in which sampling units are not individuals but groups of 20 adjacent households, from which all individuals are interviewed.

While most existing studies focus on family or neighborhood networks, there is only one study analyzing peer effects in parental leave decisions among coworkers. Dahl et al. (2014) estimate peer effects among brothers and coworkers in the context of paternity leave take-up in Norway. The problems of correlated effects, reflection and endogenous group membership are avoided by using a quasi-experiment, exploiting the variation in the costs of paternity leave induced by a family policy reform. They find that coworkers and brothers are substantially more likely to take paternity leave if their peer was induced to take up leave by the reform. An analysis of the channels of social interaction suggests that information transmission about costs and benefits is most likely to drive the peer effects. Furthermore, the authors find that peer effects are likely to generate "snow-ball" effects over time, i.e. the effects on paternity leave take-up are magnified over time due to an increasing share of fathers affected by the reform, who in turn interact with other fathers and so on.

c) Productivity and work place behavior

The performance of a firm, industry or national economy depends on the productivity of its workers. Individual worker productivity in turn depends on several factors, among them ability of the worker and financial incentives. However, individual work effort may also indirectly be affected by peer productivity. If individual productivity is affected by peer productivity, firms may be able to increase total productivity of their workers by designing team composition strategically and motivation of only a few influential or very visible employees.

There are several recent studies that suggest that peer effects at the workplace play an important role in the context of productivity spillovers and workplace behavior. For example, Mas and Moretti (2009) focus on peer effects at the workplace in the context of productivity of checkers for a large grocery chain. They solve the identification problems by using exogenous variation in team composition induced

by within-day changes in personnel and find evidence of positive productivity spillover effects. The results indicate that peer effects come from social pressure and mutual monitoring and suggest that social preferences can play an important role even if economic incentives are limited. Veldhuizen et al. (2014) try to reproduce findings by Mas and Moretti (2009) in a laboratory experiment. The key finding of Mas and Moretti is that worker effort is positively related to the productivity of coworkers who observe them. A laboratory experiments can control for alternative mechanisms that can also generate these empirical results. However, the authors do not find significant peer effects in the particular setting of a laboratory experiment.

Most existing evidence on productivity peer effects relies on quasi-experimental data to circumvent the identification issues. For example, Kato and Shu (2009) find evidence for productivity peer effects in Chinese textile manufacturing firms. The study takes advantage of the social divide between urban resident workers and rural migrant workers in China. A worker is found to increase work effort in response to the arrival of the new high-ability worker to the team when the newcomer belongs to the other social network, but not if the newcomer belongs to the same social group. The authors explain this by rivalry between the social groups. Another study by Bandiera, Barankay and Rasul (2009) shows that social connections in the workplace might also matter across hierarchies. They analyze the effect of social connections between workers and managers on productivity in the workplace using panel data and a quasi-experimental change in managerial incentives from fixed wages to bonuses. The authors find that when managers are paid fixed wages, they favor those workers to whom they are socially connected. However, they do not find favoritism in the case of performance based payments.

Not only productivity is affected by peer behavior. Hesselius et al. (2009) show that peer effects exist also in the context of absence from work. The authors utilize a large-scale randomized social experiment and administrative data and find significant peer effects. However, they cannot draw conclusions about the nature of the underlying causes of the observed social interaction effects.

While most existing evidence is based on (quasi-)experiments, Cornelissen et al. (2013) use linked employer-employee data in order to analyze peer effects in wages. The authors estimate the effect of the long-term quality of a worker's peers (measured by the average wage fixed effect of coworkers in the same firm and occupation) on the worker's wage. They argue that the problem of correlated effects is solved by looking at effects on the firm and occupation level, which is enabled by the panel structure of the data using various fixed effects. Based on this method, the authors find relatively small peer effects in wages.

d) Retirement and pension plans

In many European countries, among them Germany, the demographic change combined with low employment rates of older workers poses an increasing imbalance to public finances. It is therefore of high policy relevance to increase employment among older workers. This can be achieved by making early retirement more costly. However, financial incentives are not the only driving force of individual retirement decisions, which may depend on the retirement decisions of peers through social norms and culture or leisure complementarities among coworkers, spouses, or other social groups.

However, there has been little research on peer effects in the context of retirement decisions. Examples include a paper by Brown (2013) who analyzes the retirement decisions of teachers. Using a reform in the retirement age that has been introduced for teachers of schools in the Los Angeles area, peer effects among teachers of the

same schools are identified by exploiting arguably random variation in the age composition of teachers between schools in the LA area.

Another recent study by Rege et al. (2012) analyze disability pension participation using neighbors' exposure to plant downsizing events as an instrument for the disability entry rate among one's previously employed neighbors. The intuition behind this approach is straightforward: if social interaction effects exist, then workers in neighborhoods disproportionately exposed to plant downsizing events should exhibit a relative increase in subsequent disability entry rates, independent of one's own exposure to plant downsizing. According to the authors, social interaction could operate through social norms, information and leisure complementarities.

Duflo and Saez (2003) look at a randomized experiment to provide evidence for social interaction in retirement plan decisions. They argue that because how much and how to save for retirement is a difficult decision, it is likely that individuals' decisions are affected by the decisions of others in their peer group. The randomized experiment is given by the random sample of individuals within a random sample of departments, who are encouraged to go to an information fair about Tax Deferred Account (TDA). The authors find that those who were encouraged and their coworkers were much more likely to attend the fair. Furthermore, the effect on TDA enrollment is almost as large for individuals in treated departments, who did not receive the encouragement, as for those who did.

4. Conclusion

Economic reforms or the introduction of new policy instruments are likely to affect individuals not only directly by the change in financial incentives, but also indirectly by a change in the behavior of the social environment. Previous research has shown that peer effects influence individual behavior and thereby aggregate outcomes at all stages of the career from job search to retirement. Social networks can influence employment probabilities of unemployed individuals through several channels. Taking into account possible social interaction effects can also improve the explanation of labor supply and parental leave decisions, which is important both to understand the impact of past policies and inform future policies. Furthermore, individual work effort of individuals may be affected by peer productivity. At the end of the career, retirement decisions may depend on the retirement decisions of peers through social norms and culture or leisure complementarities among coworkers, spouses, or other social groups. Despite the acknowledged importance, social interaction effects were, with a few exceptions, neglected by economic evaluations. In particular, there have been only a few studies that empirically analyze peer effects in work related decisions among coworkers.

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