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Peer effects

Marie Claire Villeval

Abstract: Peer effects represent the externalities generated by relevant others' behavior and outcomes on an individual's own behavior and outcomes, manifesting across diverse social contexts such as education, work, consumption, health, and criminal behavior. However, identifying and measuring endogenous peer effects are challenging due to the tendency of individuals to associate with similar peers. Peer effects arise from various mechanisms, including a preference for conformity, social comparisons and image concerns, peer pressure, and social learning. Measuring the social multiplier induced by peer effects is crucial for designing more productive workplaces, enhancing educational performance, and developing more impactful prevention policies.

Keywords: Peer Effects; Conformity; Social Learning; Homophily; Social Multiplier; Identification

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Peer effects encapsulate the externalities arising from the behavior and outcomes of relevant others on an individual's own decisions and outcomes. Individuals often arrive at different choices when deciding in isolation versus after observing their peers' academic effort, consumption choices, productivity, fitness habits, or disruptive behavior. Accounting for the spillover effects of individuals' actions is essential for obtaining an accurate assessment of the overall impact of policy interventions. However, identifying social multipliers poses significant challenges.

A challenging identification

Identifying endogenous peer effects using observational data, that is, the direct influence of peers' behavior on an individual's behavior, presents several challenges. Estimating standard linear-in-means models cannot disentangle endogenous peer effects from correlated effects and contextual/exogenous peer effects (Manski, 1993). Correlated effects arise because individuals and their peers may exhibit similar behavior not due to mutual influence but because of exposure to common exogenous shocks. Correlated effects may also stem from an homophilious selection of peers since individuals tend to associate with others who share similar characteristics. Exogenous or contextual peer effects are driven by the inherent characteristics of peers distinct from their behavior.

The "reflection problem" poses a second identification challenge as individuals can simultaneously influence and be influenced by their peers. This creates endogeneity issues and leads to overestimate peer effects. Finally, the estimation can be biased upward due to measurement errors in the characteristics of peers or in defining the individual's reference group.

The identification problems can be overcome by using experimental or quasi-experimental methods that enable random assignment of peers. Alternatively, exploiting time discontinuities between peers' and individuals' decisions can provide insight, as can leveraging the network structure of social interactions.

The heterogeneity of peer effects

Evidence of peer effects has been observed across domains, albeit with significant heterogeneity. Positive effects are commonly identified in labor supply, absenteeism, turnover, and productivity (Falk and Ichino, 2006; Mas and Moretti, 2009; Bandiera *et al.*, 2010). A meta-analysis by Herbst and Mas (2015) estimated that a one-percent increase in the average productivity of peers induces a 0.13 percent increase in worker output, with consistent findings in both field and laboratory settings. Evidence in education and fraud is more contrasted. Sacerdote (2011) showed that in primary and secondary education, for a one-point increase in the peers' average test score, the estimated peer effects vary across studies from a decrease of 0.12 points to an increase of 6.8 points. In higher education, peer effects on extra-school activities such as drinking and drug use is stronger than those related to academic achievements. In the realm of fraud, there is an asymmetric effect of compliant peers versus peers who break the rules, with dishonest peers exerting a stronger influence, but exogenous peer effects dominate endogenous ones (Fortin *et al.*, 2007).

Variations in the magnitude of peer effects depend on individual factors. Gender, age, ability, competitiveness, and sensitiveness to conformity pressure matter. For example, teenagers may be more sensitive to norm pressure than the elder. Females' effort responds to feedback on peers' productivity in certain types of networks but not in others, whereas males are always responsive. While overall test scores suggest positive but modest average peer effects on academic achievements, the direction of these effects differs when considering heterogeneity between high- or low-ability students. Peer effects are not linear: high-ability students benefit from being matched with high-ability peers, whereas low-ability students may be negatively impacted by high-achieving peers (*e.g.*, Feld and Zölitz, 2017).

Social and contextual factors also play a significant role. Peer effects have been documented even in contexts devoid of externalities, with benefits for less productive workers who can observe peers' effort. They are more pronounced in workplaces where individual effort has direct implications on others' earnings, amplifying the marginal return of effort. Organizational and technological externalities, where effort impacts the workload of peers, also contribute: whether the effects are positive and negative depends on the degree of complementarity or substitutability of efforts. Group salience, the facilitation of social interactions, and the fostering of team spirit can further influence the magnitude of peer effects.

Mechanisms

Various channels drive peer effects, although empirical studies are rarely able to disentangle between direct effects and mediating effects. One major channel is a preference for conformity and norm compliance, which motivates individuals to imitate their peers when the distance from them generates disutility. This can be reinforced by the salience of group identity (*e.g.*, conforming to group norms to maintain acceptance by in-groups), although they represent distinct processes. Conformity is about adjusting individual behavior to reduce the distance

with others, while group identity salience is about the prominence of one's identification with a group. Additionally, contagious enthusiasm, social pressure, and rivalry can all contribute to peer effects. Social preferences, such as inequality aversion, also play a role in shaping workers' responses to incentives. Mutual monitoring and observability can lead individuals to internalize externalities under relative incentives, while peer pressure help mitigate self-control problems.

Social learning and knowledge spillovers represent another channel. Through their interactions with higher-achieving peers, individuals can enhance their own abilities and outcomes. The magnitude of such spillovers is influenced by the spatial organization and the structure of social networks.

Peer effects are significant across various domains. It is important for policymakers to consider them, along with resulting social multipliers, to assess policy efficacy and anticipate the impact of new incentive schemes.

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