The Public Defense

of the Doctoral Thesis in Economics

by

Vladimir Mikhailov

on

Essays on Social Networks and Economic Behavior

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The doctoral thesis is available for inspection

at the CEU Economics Department

Abstract

This thesis consists of 3 unconnected single-authored chapters. Each chapter investigates a particular aspect of social networks' influence on the behavior of economic agents.

In Chapter 1 analyze a model in which criminal networks are viewed as embedded in the social network. Agents in the society are assumed to have social preference for or against illegal activity and, accordingly, can help or harm the criminals without actively partaking in crime. I derive predictions for crime participation as a function of centrality in a given network, as well as the effect of network structure on aggregate crime. The equilibrium number of criminals exhibits an inverse-U pattern with respect to public support for crime. If crime is strongly disliked by the society, it is only committed by the most peripheral agents. If, on the other hand, there is social sympathy for the crime, then it is only the most central individuals who become criminals. In terms of network structure, I find that social antipathy towards crime can mean that denser networks exhibit less crime than sparser ones, which reverses the result of Ballester et al. (2006) that denser networks produce more crime on aggregate. I also find that, depending on the society's attitude, an increase in sanctions might fail to deter or even increase aggregate crime. The results reconcile several apparent conflicts between existing models and empirical evidence.

Chapter 2 is my job market paper. I use a unique data set which maps out the complete social network within a community of Indian student migrants at a large university in central Kazakhstan to identify endogenous peer effects in assimilation among the community's members. Upon arrival, students are randomly assigned into small academic groups, consisting only of fellow Indians. I use the resulting exogenous variation in social ties to implement a quasi-experimental empirical strategy. Positive peer effects are identified in ability to speak the local language and to acquire local friends. At least a part of the effect is explained by complementarity between assimilation efforts of friends, implying that the peer effects `snowball ' into a social multiplier of 1.4. Finally, assimilation is shown to increase overall GPA, conditional on hours of study. The results suggest that taking advantage of the social multiplier within existing migrant clusters might be a viable alternative to policies, such as settlement quotas, designed to prevent clustering.

In chapter 3 I study the problem of a monopolist, who relies on word of mouth in order to diffuse the information about the product through a social network of consumers. The product can be of a certain quality, which is proportional to the probability that the consumer has a positive experience with the good. If the quality is low, the consumer might have a bad experience and choose to give a negative review to friends, discouraging them from purchasing. Discouraged consumers create bottlenecks in the information passage process. I first take quality as exogenously given and show that in highly connected networks, negative WOM makes demand less elastic than the fully-informed case, so the monopolist charges a higher price. Raising the price in this case is a `vaccine' against negative reviews. Later, I endogenize the quality choice and show that if the quality-boosting technology is expensive, then price and quality are substitutes, and the optimal quality goes down with network connectivity, while price goes up.

Chapter 1: Love Thy Criminal Neighbor: Patterns of Crime in Social Networks

Do criminals come from the core or the periphery of the social networks? Does the density of social networks deter or boost criminal activity? Social sciences deliver contradictory answers. In this chapter I develop a model in which criminal networks are embedded in the fabric of society. Members of a criminal network form an illicit underbelly to the social network. Embeddedness

leaves criminals vulnerable to actions by their non-criminal peers. I also allow for society as a whole to feel sympathy or antipathy for the particular type of crime. These features of the model introduce a mechanism by which social sympathy can influence the network location of criminals, as well as the overall level of crime. The possibility of action by non-criminal agents forces better connected people to make different criminal choices than the less connected ones.

There are 3 central contributions of this chapter. The first is to show that socially unpopular crimes are committed by people on the periphery of the social network, while the popular crimes are committed by the central people. The first part arises from the fact that legitimate agents want to hurt the criminals when crime is undesirable. Being on the fringe of society means being least exposed to such wrath of the crowd and being able to hide. The second part of the statement is due to the fact that in cases of social support for the criminal ``cause'' the legitimate agents always help the delinquents. Members of the interconnected central component benefit the most from such help and commit a lot of socially desirable crime. Their actions leave the lesser-supported agents with fewer criminal opportunities.

The second main contribution is to show that denser networks decrease aggregate crime only if the crime is sufficiently disliked by society. If people are close to indifferent or support the crime, then adding extra ties to an existing social network increases the aggregate levels of delinquency. This happens because legitimate agents always help offenders carry out the crime if they consider it socially beneficial. Therefore, an extra link in the network necessarily means an extra bit of help for the criminal, which raises his effort. For cases when crime is socially disliked, on the other hand, an extra link exposes the criminal to an additional bit of harm

The third main contribution is to investigate the effect of an increase in expected punishment on aggregate crime. In my model an increase in punishment also increases the intensity of peer effects in crime, because criminals are assumed to learn their ``craft'' behind bars. People who commit the socially disliked offenses are located on the periphery and do not get to benefit from the boost in peer effects, so their criminal activity drops, creating a deterrence effect. On the other hand, crimes which people support are committed by the tight core of the network. For them increased peer effects win over a rise in the expected cost, bringing the aggregate crime up.

Chapter 2: When Sandeep Met Sergey: Peer Effects in Social Assimilation of Foreigners

Countries often want to integrate and assimilate their migrant populations. In particular, social assimilation, defined as knowledge of the language and creation of social ties with locals, is considered an important goal. Yet, economists know little about this kind of assimilation. What are its mechanisms? What are its effects on economic outcomes at the destination country?

In this chapter I hypothesize the peer effects in social assimilation to be an active channel of co-nationals' influence on each other's assimilation outcomes. The paper has three main contributions. The first contribution is to use a unique and uniquely suited data set in order to identify positive endogenous peer effects within a community of foreigners in acquisition of language skills and friendships with locals. The data set covers a community of Indian educational migrants at Karaganda State Medical University in central Kazakhstan. The community is ideal for this investigation due to its homogeneity and complete racial, religious, linguistic and cultural separation from the rest of the city. Upon arrival, students are randomly placed into small academic groups of 7 to 15 fellow Indians for administrative purposes, providing a source of exogenous variation in social ties among them. This variation allows me to devise instrumental variable strategies in order to tackle the endogeneity issues that plague peer effect estimations

The second contribution is to investigate the mechanisms behind the peer effects. There are two competing mechanisms - conformity and complementarity. Complementarity implies that foreigners actively help each other learn the local language, while conformity implies that foreigners simply mimic each other's language skills attainment. Determining the mechanism if of fundamental importance to designing optimal assimilation policies. I show that the peer effects are at least partially driven by complementarities between assimilation efforts of students in my sample. As a result, a social multiplier arises, which can potentially be exploited in order to extract large cumulative gains from targeted assimilation-related interventions.

The paper's third contribution is to use the exogenous variation in social ties to show that assimilation causes the GPA of Indian students to go up, controlling for study hours. Consequently, co-ethnic networks may have a lasting positive effect of helping foreigners be more productive throughout their spell at the destination

Chapter 3: Zero Stars! Price, Quality and Negative Word of Mouth

Negative word of mouth (WOM), the act of telling others one's unpleasant experiences with a good or a service, is ubiquitous and an important determinant of demand. Yet, few formal economic models of NWOM exist. Empirical marketing research on NWOM has shown that it is more powerful than positive WOM and that in the age of social media firms have not quite figured out how to deal with it. In particular, it has been shown that lowering the price of the good is not an effective strategy, as it does not lead to an increase in sales. A natural question, then, arises regarding the firm's optimal pricing strategy in face of NWOM

In this chapter I add negative WOM to the theoretical framework of Campbell (2013). In my model a monopolist wants to diffuse the information about the good to an initially uninformed network of consumers. To do so, the monopolist has to pick the price and the quality that would stimulate WOM communication. Quality is costly. However, if the quality is imperfect, the consumers may share negative reviews with each other, thus reducing demand. There are three sets of results in the chapter. First, I make use of the so-called *cavity method* (Newman and Ferrario (2013)) to calculate the expected the demand for the product in an arbitrary social network of consumers who engage in both positive and negative WOM. I show that for any degree distribution, demand falls in the intensity of negative WOM, but increases in network density.

The second set of results covers monopolist's pricing behavior under negative WOM in several settings. I show that in dense networks negative WOM reduces the price elasticity of demand, allowing the monopolist to charge a higher price compared to the situation where consumers are fully informed. So, the ability to share negative information ends up reducing consumer welfare. The intuition is that raising the price can serve as a `vaccine' by causing a greater reduction in negative WOM than in the positive WOM. I show that whenever the monopolist can reduce the probability of bad reviews directly by selecting higher product quality, price and quality may be either compliments or substitutes, depending on the cost of quality-improving technology. These results have implications for antitrust and regulatory policies.

The third set of model's predictions characterizes the negative WOM's relationship with formal advertising. I show that NWOM may induce a negative relationship between product quality and the level of informative advertising. A negative correlation of this nature is, puzzlingly, sometimes observed in markets where WOM is likely to be strong (Kwotka (1995)). For the targeted advertising, I prove that it is suboptimal to target the individuals with the highest degree, and that the optimal degree increases with the intensity of negative WOM.

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