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Reviewed work(s):

Source: *The American Economic Review*, Vol. 96, No. 2 (May, 2006), pp. 261-264

Published by: [American Economic Association](#)

Stable URL: <http://www.jstor.org/stable/30034654>

Accessed: 28/12/2012 08:42

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SOCIAL INTERACTIONS: CONSEQUENCES FOR SCHOOLING AND EMPLOYMENT[†]

Why Personal Ties Cannot Be Bought

By ALESSANDRA CASELLA AND NOBUYUKI HANAki*

Personal connections can function as privileged channels of information and trust. When the reliability of information is particularly important—applying for a job, needing capital for a new enterprise, moving to a new country—their role often becomes crucial—hence the ethnic enclaves, both residential and professional, in New York City; the economic weight of the overseas Chinese in their countries of residence; and the success of medieval networks of merchants, organized along ethnic or religious lines.¹ Personal networks are often very successful, but they are by their nature discriminatory and, thus, tend to generate resentment and opposition among those excluded. Economists and sociologists debate whether networks can be replicated artificially. Economists tend to be more optimistic, believing that appropriate market mechanisms, encouraged and supported by policy where necessary, can substitute for the missing personal channels. Sociologists, on the other hand, see the personal, spontaneous link as the essence of the relation,

and thus as something that by its nature cannot be replicated at will.

We address this question in a simple model of labor markets where workers differ in their unobservable productivity. We ask how signaling—the possibility of engaging in a costly action that signals high productivity—compares to recourse to personal connections. Does the availability of the signal weaken the reliance on the network? How informative are the two channels when both coexist?

I. The Model

We borrow James D. Montgomery's (1991) elegant model of networks, adding to it the possibility of signaling. There is a potentially infinite number of identical, infinitely lived firms and, at any period in time, two overlapping generations of workers, each composed of an equally large number of individuals. Each firm employs at most one worker. Workers live two periods, working in the second period of their life. In each generation, half of the workers produce one unit of output when employed (H workers) and half produce no output (L workers). The two types of workers cannot be distinguished ex ante, and wages cannot be made conditional on production.

Each young worker, not yet employed, can establish a connection to an older employed worker at cost λ_N . Employed workers' types are not observable outside the firm but, following sociologists' concept of "in-breeding bias," each young individual has a known probability, $\alpha_N > 1/2$, of establishing a link to an older worker of his own type. The links are otherwise random. Personal connections can be valuable because firms have the option of hiring their new workers through referrals from current employees, whose productivity is known and who,

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¹ See, among many others, Francois Braudel (1982), S. Gordon Redding (1990), Avner Greif (1993), and Joel Kotkin (1993). The classic studies of personal referrals in labor markets are Albert Rees (1966) and Mark S. Granovetter (1974). A large literature focusing on labor markets has emerged since. See Yannis M. Ioannides and Linda Datcher Loury (2004).

through α_N , are likely to have connections to young workers of their own type.

If a firm chooses to hire through referrals, its employee transmits the offer to one of the young workers he is connected to.² If the young worker accepts the offer, the contract is concluded and the worker is hired for the next period. Young workers who either reject the offer or do not receive any must find employment in the anonymous market. Before entering the market, each young worker has the option of engaging in a costly action with the potential of announcing publicly that he is of type H —for example a worker can attempt to be certified through an exam. The action costs λ_S and the probability of success is $\alpha_S > 1/2$ if the individual is of type H , and $(1 - \alpha_S) < 1/2$ if he is of type L , where again α_S is known. We call this option “signaling.” A successful outcome—the certification obtained—is publicly observed. Finally, the markets for certified and noncertified workers open. New firms can enter these markets freely, and expected profits from market hiring are brought down to zero. Once the new workers are hired, the old workers retire, and a new generation of young agents is born, not yet working but ready to network.

Both personal connections and signaling transmit information, but, besides possible differences in parameters, they differ in one crucial dimension: the network transmits information only locally, to the one firm with which connection is established, whereas signaling transmits information globally to the entire market. The main contribution of our analysis lies in stressing this central distinction and identifying its implications.

The equilibria of the model³ depend on the four underlying parameters α_N , α_S , λ_N , and λ_S .

² Choosing randomly if he has several connections.

³ Each worker’s strategy is the probability with which the worker chooses to network and, if not hired through referrals, the probability with which he chooses to signal before entering the market, conditional on the worker’s type. Each firm’s strategy is the probability with which the firm chooses to make a referral offer, and in this case the wage it offers, conditional on the type of the firm’s current employee. We focus on stationary strategies and on symmetrical equilibria. An equilibrium of this model is a vector of strategies, a pair of market clearing wages for certified and uncertified workers, and a set of beliefs about the workers’ types such that no worker and no firm can gain

The model can be solved for arbitrary values of these parameters, but we learn more about the relative performance of the two mechanisms when we impose some restrictions.

II. Results

A. Costless Network

Most analyses of networks view personal links as natural side effects of daily social interactions and, thus, as freely acquired.⁴ How effectively can signaling substitute for the network if $\lambda_N = 0$? The answer is surprisingly clear-cut: personal referrals are the preferred hiring strategy for firms in most of the parameters space, even when, in equilibrium, certification is more informative.⁵ To see why, suppose $\alpha_N = \alpha_S \equiv \alpha$, and consider an equilibrium (which does exist for an appropriate range of λ_S values) where H workers in the market are just indifferent between signaling and not (and, thus, L workers strictly prefer not to signal). All certified workers are of type H , whereas the probability that a young worker recommended by an H employee is an H himself is α —certification is more informative. Nevertheless, firms can make positive profits when hiring through referrals. The lowest referral wage an H worker is willing to accept is the wage in the uncertified market (because, if left in the market, the worker is indifferent between signaling and not). That wage reflects exactly the probability of hiring an H worker in the uncertified market, and because that market includes both workers who failed certification and all those who never tried it, such a probability is necessarily smaller than α . The surplus from referral hiring must then be positive; the reservation wage is lower than the expected productivity from the match. As long as the firm is able to appropriate any of that surplus in the bargain-

from choosing a different strategy, the labor markets clear, and all beliefs are rational.

⁴ The bias toward workers of similar productivity is, then, the result of social segregation. The evidence on the effects of social segregation on labor markets is discussed thoroughly in Ioannides and Datcher Loury (2004).

⁵ This and the next subsection draw on Casella and Hanaki (2004, 2005), where all derivations and proofs can be found.

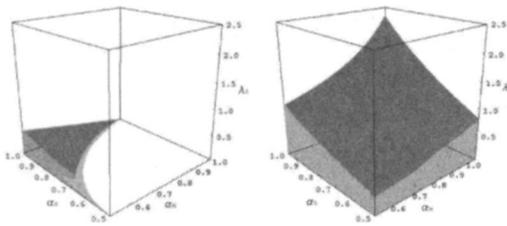


FIGURE 1. EQUILIBRIA

Notes: The space of parameters where equilibria without referrals exist (left) and where equilibria with signaling exist (right) when networking is free, i.e., $\lambda_N = 0$.

ing that accompanies referral hiring, it strictly prefers to hire through referrals.

The equilibrium described is a special one, but the intuition is general. Figure 1 shows, on the left, the fraction of the parameter space where referrals are not used and, on the right, the fraction of the space where signaling occurs for arbitrary α_N , α_S , and λ_S . Equilibria where firms refrain from using personal referrals are rare, even when H workers left in the market perfectly separate themselves.

B. Costly Network

The assumption that personal connections are acquired at no cost in the normal course of social life can be disputed. “Networking” is an accepted term in daily vocabulary. Consultants advise on its best strategies and convention centers host large events explicitly devoted to it. Creating personal connections can be an intentional, costly activity. Here, we want to highlight differences in the two mechanisms that do not originate in exogenous differences in their costs.

In our model, networking and signaling are distinct in two essential, in fact defining, dimensions. First, the ranges over which the two mechanisms transmit information differ. The implication is that their distributional effects are also different. Because certification is observable to all, firms’ free entry into the market guarantees that the informational rent associated with it is fully appropriated by the workers. But because networking involves a bilateral relation and, thus, is by definition observable by the counterpart only, referral offers are better described by bargaining. In general, the result is some sharing of the rent between worker and

firm. Networking invests the firm with monopsony power and consistently redistributes surplus in the firm’s favor, relative to market outcomes.

Second, the type of information transmitted differs in the two mechanisms: personal, non-verifiable information in the case of networking, and objective, verifiable information in the case of signaling. To capture this latter point, our model assumes that when workers choose to signal, only success—the achieved certification—is observable, not the effort put toward achieving it. The implication is that signaling, but not networking, can be fully informative because signaling allows H workers to fully separate themselves, while networking does not. If only H workers were to network, all firms would want to hire through referrals, regardless of the productivity of their current employee, ensuring that L workers would also choose to network. With signaling, on the other hand, an equilibrium where only H workers attempt certification can be sustained if either the cost is high or the probability of success is very different for H and L workers.

We can see what these observations imply for the functioning of the two mechanisms in equilibrium. If their cost is equal ($\lambda_N = \lambda_S \equiv \lambda$), workers will be willing to network only if the total size of the informational rent is higher under networking (since their own share is smaller). Networking must transmit information more precisely.⁶ The information transmitted depends both on α_N and α_S , and on equilibrium strategies. If $\alpha_N = \alpha_S \equiv \alpha$, there is indeed an equilibrium where both networking and signaling are used, and the average productivity of the workers hired through referrals is higher than the average productivity of certified workers, but only at low λ , when neither mechanism is very informative. At higher λ , workers separate themselves more effectively through signaling, and networking cannot maintain the informational edge and cannot be sustained. Figure 2 shows this result graphically, for a representative value of $\alpha = 0.75$. Of particular interest is the non-monotonic relation between the productivity of

⁶ The worker’s position is made weaker still by the possibility of crowding; the current employees may have multiple connections to young workers.

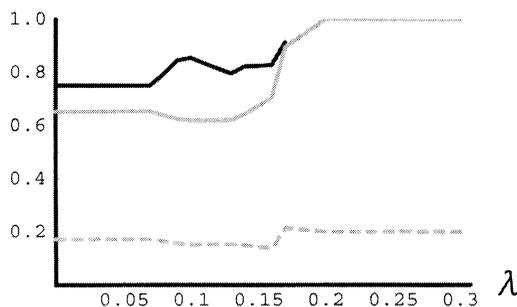


FIGURE 2. AVERAGE PRODUCTIVITY OF WORKERS

Notes: Workers hired via referral (Black), workers with certification (Gray), and workers without certification (dashed Gray). $\alpha = 0.75$.

workers hired through referrals and the cost, λ , the equilibrium result of the interaction between workers' self-selection into networking and firms' response. When λ is low, both H and L workers network, and only firms with current H employees hire through referrals. At higher λ , the network is expensive, and the probability that L workers network falls. But there is a value of λ where the composition of the networking pool cannot improve further and even firms with current L employees, whose contacts are known to be disproportionately L types within the networking pool, find referrals advantageous. When this occurs, L workers reenter the pool, and the productivity of referral hires declines. For different high λ values, the equilibrium summarizes the tension between these two opposite forces.

III. Discussion

The unambiguous message of our model is that networking transmits information effectively only if its cost is low. When networking is free, it is preferred to signaling by both firms and workers, almost without exception. But it is never a very precise mechanism, and if its cost is higher, firms' hiring decisions interact with workers' self-selection, preventing endogenous improvements in precision. At high cost, signaling transmits information more accurately and supplants networking completely. We are somewhat surprised to conclude in qualified support

of the sociologists' position. Networks work best when they are unintentional and, thus, free by-products of people's social life—ethnic, religious, family networks. In this case, they are extremely difficult to substitute with a market mechanism. It is not easy to mimic these spontaneous networks through the intentional and, thus, costly creation of personal ties, because such action distorts, as opposed to favoring, the transmission of information. If ties are costly, market mechanisms are superior.

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