Social Capital, Institutions, and Development

A Matter of Trust: Social Capital and Economic Development

PARTHA DASGUPTA

In recent years a great many scholars have argued that the formation of social capital is the engine of economic progress. Many others have noted, however, that the evidence is mixed. This paper argues that the deep requirement for economic progress is the development of trust among people. Defining social capital in lean terms, namely, as "interpersonal networks," it shows that when suitably directed, social capital can build and sustain trust; if it is misdirected or if it operates in the wrong sphere, it can hamper economic development and even cause economies to regress. Moreover, if the idea of social capital is to serve a useful purpose in economics, it should be interpreted as interpersonal networks whose members develop and maintain trust in one another to keep their promises by the device of "mutual enforcement" of agreements. Trust is the key to cooperation; "social capital," when suitably applied, is only a means to creating trust. A natural place to look for the worth of social capital in macroeconomic statistics is in total factor productivity, but doing so implies that total factor productivity is an amalgam of technology and institutions. The paper concludes (in an appendix) by demonstrating how an increase in trust among people would result in an increase in total factor productivity, which is another way of saying that an increase in trust among people would lead to an increase in the economy's wealth.

The idea of social capital sits awkwardly in contemporary economic thinking. Although it has a powerful, intuitive appeal, social capital has proven hard to track as an economic good. Among other things, it is fiendishly difficult to measure, not because of a recognized paucity of data, but because we do not quite know what

we should be measuring. Comprising different types of relationships and engagements, the components of social capital are many and varied and, in many instances, intangible.

In an early definition, social capital is identified with those "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions" (Putnam 1993, 167). As a characterization this appears beguiling, but it suffers from a weakness: it encourages us to amalgamate strikingly different objects, namely (and in that order), beliefs, behavioral rules, and forms of capital assets such as interpersonal links (or "networks"), without offering reasons why such an inclusive definition would prove useful for our understanding of the social world.[1] Several authors have subsequently defined social capital even more inclusively, where even attitudes toward others make their appearance: "Social capital generally refers to trust, concern for one's associates, a willingness to live by the norms of one's community and to punish those who do not" (Bowles and Gintis 2002, F419). I argue presently against adopting such a narrow view of the concept.

In developing the *economics* of what we today allude to as social capital, some authors have focused on a more primitive concept, namely, trust (Dasgupta 1988, 2000, 2007). Others have studied those components of social organization (for example, rotating savings and credit associations, irrigation management systems, credit arrangements, civic associations, and mutual insurance arrangements) that make social capital a productive asset (Levi 1988; Udry 1990, 1994; Besley and Coate 1995; Ostrom 1996; Dasgupta and Serageldin 2000; Grootaert and van Bastelaer 2002). Case studies of the management of local common property resources in poor countries (for example, fisheries, ponds and tanks, forests, grazing lands, and threshing grounds) have offered further insights into the character of those communitarian institutions that enable mutually beneficial courses of action to be undertaken by interested parties (Jodha 1986; Ostrom 1990; Dasgupta and Mäler 1991; Bromley 1992; Baland and Platteau 1996; Ghate, Jodha, and Mukhopadhyay 2008). Yet others have considered a broader sense of the notion by including extended kinship, lobbying organizations, and hierarchical relationships such as those associated with patronage (for example, the Hindu *jajmani* system, the Sicilian mafia, and street gangs), so that dense networks do not inevitably result in overall economic betterment, at least not in the long run (Gambetta 1993). Moreover, both theory and evidence caution us that communitarian relationships can involve allocations where some of the parties are *worse off* than they would have been if they had not been locked into the relationships, meaning that, even though no overt coercion is visible, such relationships may be exploitative (Dasgupta 2000, 2008). One can even argue that the theory in question makes precise the sense in which a relationship can be exploitative. In all those accounts, the engagements that rely on social capital occur somewhere between the individual and the state: they are conducted within *communities*. Indeed, social capital is frequently identified with the workings of civil society (Putnam 1993, 2000).

For some time now, it has seemed to me that in tracking social capital, the most fruitful first step is not to ask what that object might be, but to ask instead a ques-

tion that is faced by *any* group of people who have agreed on a joint course of action: Under what contexts can they be sanguine that the promises they have made to one another are credible? The question suggests that the fundamental problem facing people who would like to transact with one another is one of *trust*. The question also points to a lean and usable notion of social capital, one that is shorn of the warm glow that surrounds the notion in the contemporary literature. In what follows, social capital is taken to mean interpersonal networks. I argue, however, that if the idea of social capital is to serve a useful purpose in economics, it should be interpreted as *interpersonal networks where members develop and maintain trust in one another to keep their promises by the device of "mutual enforcement" of agreements.*

The advantage of such a lean notion of social capital is that it does not prejudge the asset's quality. Just as a building can remain unused and a wetland can be misused, so can a network remain inactive or be put to use in socially destructive ways. There is nothing good or bad about interpersonal networks: other things being equal, it is the use to which members put a network that determines its quality. But the prior question is one concerning trust.

The Problem of Trust

Trust among people is sometimes taken to be sui generis, arising from motivations that lie somewhere between altruism and self-interest.[2] The Aristotelian conception of trust, which continues to be invoked by political theorists, is hallowed and often shrouded in mystery. In what follows, I use "trust" in the very wide sense of someone entertaining correct expectations regarding someone else's promises (as in "I trust Mary to do what she promised to do"), including cases where the promises are implicit by virtue of the community's customary norms (as in "Prakash will not break our trust in him by eating meat when abroad"). So the idea of trust is not limited to the political sphere; it arises in any sphere that involves human interchange.

Imagine that a group of people have discovered a mutually advantageous course of actions. At the grandest level, it could be that citizens see the benefits of adopting a constitution for their country (ranging from the covenant adopted by the Plymouth brethren to the constitution adopted by the Founding Fathers of the United States). At a more local level, the undertaking could be to share the costs and benefits of maintaining a communal resource (irrigation system, grazing field, coastal fishery), construct a jointly usable asset (drainage channel in a watershed), collaborate in political activity (civic engagement, lobbying), do business when the purchase and delivery of goods cannot be synchronized (credit, insurance, wage labor), enter marriage, create a rotating savings and credit association (as in the institution of *iddir* in Ethiopia), initiate a reciprocal arrangement ("I help you now that you are in need, with the understanding that you will help me when I am in need"), adopt a convention (send one another Christmas cards), create a partnership to produce goods for the market, conduct an instantaneous transaction (purchase something across the counter), and so on. Then there are mutually advantageous courses of action that

involve being civil to one another. They include forms of civic behavior such as not disfiguring public spaces, obeying the law more generally, and respecting the rights of others.

Imagine next that the parties have agreed to share the benefits and costs in a certain way. The agreement could involve some members making side payments to others. Again, at the grandest level the agreement could be a social contract among citizens to observe their constitution. Or it could be a tacit agreement to be civil to one another, such as respecting the rights of others to be heard, to get on with their lives, and so forth. Here we are thinking of agreements over transactions in goods and services. There would be situations where the agreement is based on a take-it-or-leave-it offer that one party makes another (as when a purchaser accepts the terms and conditions in a supermarket). In other contexts, bargaining may be involved (as in a Middle Eastern bazaar). In this paper I do not ask how agreements have been reached, nor look for principles of equity or allocation norms that might have been invoked during negotiation; rather, I ask the question with which we began: Under what circumstances would the parties who have reached agreement trust one another to keep their word?

Because one's word must be credible if it is to be believed, mere promises are not enough (witness that we caution others, and ourselves too, not to trust people "blindly"). If the parties are to trust one another to keep their promise, matters must be so arranged that (1) at every stage of the agreed course of actions, it is in the interest of each party to plan to keep his or her word if all others plan to keep their word, a condition that ensures that the promises are *self-enforcing* and (2) at every stage of the agreed course of actions, each party believes that all others will keep their word. If the two conditions are met, a system of beliefs that the agreement will be kept is *self-confirming*.

Notice that condition 2 on its own is not enough. Beliefs need to be justified. Condition 1 provides the justification. It offers the basis on which everyone could in principle believe that the agreement will be kept. A course of actions, one per party, satisfying condition 1 is a *Nash equilibrium* (formally, a *subgame–perfect equilibrium*).

Notice that condition 1 on its own is not enough either. It may be in each agent's interest to behave opportunistically if everyone believes that everyone else will behave opportunistically. In that case, noncooperation is also a Nash equilibrium, meaning that a set of mutual beliefs that the agreement will not be kept is self-confirming, implying that opportunistic behavior is self-enforcing. Stated formally, a Nash equilibrium is a set of strategies, one per agent, such that no agent has any reason to deviate from his or her course of actions if all other agents pursue their courses of actions. The famous prisoner's dilemma is a game that has a unique Nash equilibrium in which all parties are worse off than they would have been if they had been able to trust one another to cooperate.

Generally speaking, though, societies harbor more than one Nash equilibrium. Some yield desirable outcomes; others do not. In order to probe the question of which Nash equilibrium can be expected to be reached, if a Nash equilibrium is expected to be reached at all, economists have studied human behaviors that are not

Nash equilibriums. The idea is to model the way people form beliefs about the way the world works, the way people behave, and the way they revise their beliefs on the basis of what they observe. The idea is to track the consequences of those patterns of belief formation so as to check whether the model economy moves toward a Nash equilibrium over time or whether it moves about in some fashion or other, but not toward an equilibrium (Evans and Honkapohja 2001).

This research enterprise has yielded a general conclusion. Suppose the economic environment in a certain place harbors more than one Nash equilibrium. Which equilibrium should be expected to be approached, if the economy approaches an equilibrium at all, depends on the beliefs that people held at some point in the past. It also depends on the way people have revised their beliefs on the basis of observations since that past date. This is another way of saying that history matters. Unfortunately, the study of disequilibrium behavior would lengthen this paper greatly. However, a study of equilibrium behavior takes us a long way.

I began by observing that mutual trust is the basis of cooperation and for people to cooperate, conditions 1 and 2 have to be met. I now look for social environments in which conditions 1 and 2 can be met. To do that, it proves useful to classify the social environments in which the promises people make to one another are credible. Four come to mind (Dasgupta 2000, 2007). In the following section I discuss the first two on my list: mutual affection and pro-social disposition. I discuss the latter two social environments in two separate sections because each relies on a distinct form of social infrastructure, namely, external enforcement (an appeal to the *rule of law*) and mutual enforcement (abiding by *social norms*). Of the latter two means of attaining cooperation, mutual enforcement is the more fundamental, in that societies need mutual enforcement mechanisms if they are to rely on external enforcement. I argue that mutual enforcement is at the heart of social capital.

Affection and Pro-Social Dispositions

I begin with two social environments in which people trust one another to keep their promises.

Mutual Affection

Promises are credible if the parties care about one another sufficiently. Innumerable transactions take place only because the people involved care about one another and rationally believe that they care about one another (that is, each knows that the others know that they care about one another, each knows that the others know that each knows that they care about one another, and so on) and thus trust one another to carry out their obligations. Economists model the situation as one where group members have interdependent utilities. The household best exemplifies institutions based on care and affection. As monitoring costs within the household are low (a group of people who cohabit are able to observe and get to know one another), the institution harbors

fewer problems of moral hazard and adverse selection than many other institutions. However, being few in number, members of a household, as a group, are unable to engage in those enterprises that require large numbers of people of varied talents and locations.

Pro-Social Disposition

Promises are credible if it is common knowledge that those making the promises are trustworthy or that they reciprocate by keeping their promise if others display trust in them. In the political sphere, that trust could be founded, for example, on a shared conception of citizenship. In less lofty spheres of human interchange, trust could develop from a common understanding of *personal integrity*. Thus evolutionary psychologists have argued that because of selection pressures that operated among our hunter-gatherer Pleistocene ancestors, we are adapted to have a general disposition to reciprocate. Others have argued that such a disposition is to a greater or lesser extent formed through communal living, role modeling, education, rewards, and punishments and that the process begins at the earliest stages of our lives.[3]

For the purposes here, it is not necessary to choose between the two theories: either would do. In any event, they are not mutually exclusive. Thus, evolutionary psychologists have argued that our capacity to have feelings such as shame, affection, anger, elation, pride, reciprocity, benevolence, and jealousy has emerged under selection pressure (Ehrlich 2000). No doubt culture helps to shape preferences and expectations (thus behavior), which are known to differ widely across societies. But cultural coordinates enable us to identify the locus of points on which shame, affection, anger, etc., are put to work; they do not displace the centrality of those feelings in the human makeup. The thought I am exploring here is that as adults, we not only have a disposition toward behavior such as paying our dues, helping others at some cost to ourselves, and returning a favor, we also practice norms such as punishing people who have hurt us intentionally, higher-order norms such as shunning people who break agreements, on occasion frowning on those who socialize with people who have broken agreements, and so forth. By internalizing specific norms, a person enables the springs of her actions to include them. She therefore feels shame or guilt in violating the norm, and this prevents her from doing so, or at the very least it puts a brake on her, unless she finds overriding considerations. In short, her upbringing ensures that she has a disposition to obey the norm, be it moral or social or personal. When she does violate it, neither guilt nor shame will typically be absent, but frequently she will have rationalized the act. For such a person, making a promise is a *commitment*, and it is essential for her that others recognize it to be so.

Often enough, the disposition to be honest will be solely toward members of some particular group (clan, neighbors, or ethnic group). This amounts to group loyalty. One may be raised to be suspicious of people from another group and even encouraged to dupe others if and when the occasion arises. Society wastes

resources when people are disposed to be honest only with members of some groups, not others.

The disposition to be trustworthy within both the personal and impersonal spheres exists in varying degrees. When we refrain from breaking the law, it is not always because of a fear of being caught. When an employee in an unorganized sector works overtime, it may simply be a gesture of benevolence, helping out an employer in unexpected need. Recent work in behavioral economics has reaffirmed that benevolence—more generally, pro-social disposition—is not alien to human nature (see, for example, Rabin 1993; Fehr and Fischbacher 2002; Samuelson 2005). The problem is that no society can rely exclusively on such benevolence, for how is one to tell to what extent someone is trustworthy? It is necessary to look elsewhere.

External Enforcement

The promises the parties have made to one another to keep to their agreement would be credible if they could devise an institution, or what one may call a *cooperative infrastructure* (Binmore and Dasgupta 1986), in which keeping promises would be in the interest of each party if everyone else were to keep them. The problem therefore is to devise an institution in which keeping to the agreement satisfies conditions 1 and 2. Societies everywhere have constructed solutions to the credibility problem, but in different ways. What all solutions have in common, however, is that those failing to comply with agreements without cause suffer punishment.

It could be that the agreement is translated into an explicit contract and enforced by an established structure of power and authority; that is, an *external enforcer*. However, for an external enforcer to enforce the agreement, it is necessary for breaches to be *verifiable*. Let us imagine that they *are* verifiable.

By an external enforcer, I imagine, for simplicity of exposition, the state (although it could be the tribal chieftain, a head priest, a warlord, and so forth). The rules governing transactions in the formal marketplace are embodied in the law, meaning that formal markets are supported by a legal structure. The law is enforced by the coercive power of the state. Transactions involve legal contracts backed by an external enforcer, namely, the state.

Why should the parties in question trust the state to carry out its task? After all, the contemporary world has shown that there are states and there are states. The apparatus of the state is controlled by people, so we are faced with an agency problem even there. Simply to invoke an external enforcer for solving the credibility problem will not do; why should the parties trust the state to carry out its tasks in an honest manner? In democracies a possible answer is that the government worries about its reputation. A free and inquisitive press in a democracy helps to sober the government into believing that incompetence or malfeasance will mean an end to its rule come the next election. Knowing that they worry, the parties trust the state to enforce agreements.[4]

This argument involves a system of interlocking beliefs about one another's abilities and intentions. Consider that millions of households in many parts of the world trust their government (more or less!) to enforce contracts, because they know that government leaders know that not to enforce contracts efficiently will mean being thrown out of office. In their turn, each side of a contract trusts the other not to renege (again, more or less!) because each knows that the other knows that the government can be trusted to enforce contracts. And so on. Trust among parties to the agreement is maintained by the threat of punishment (a fine, a jail term, dismissal, or whatever) for anyone who breaks a contract. And the parties are confident that the state will honor its agreement to enforce contracts because citizens have coordinated their voting plans. We are in the realm of equilibrium beliefs, held together by their own bootstraps.

Of course, cooperation is not the only possible outcome. Noncooperation can also be held together by its own bootstrap. Each party believes that the others will not keep to the agreement and finds it in his self-interest to break the agreement. At that particular equilibrium, the parties do not trust one another to keep their promises because the external enforcer cannot be trusted to enforce agreements. To ask whether cooperation or noncooperation will prevail is to ask which system of beliefs is adopted by the parties about one another's intentions. Social systems have multiple equilibriums.

Putnam (1993) offers evidence from Italy to show that if citizens were to invest in social capital (in the sense I am using the term here), they could further their projects and purposes by getting state officials to do their job honestly and efficiently. The underlying mechanism alluded to, however, involves mutual enforcement. I believe that Putnam is right in thinking that social environments involving "mutual enforcement" of agreements are a requirement for those involving "external enforcement." So I turn to the idea of mutual enforcement.

Mutual Enforcement as a Feature of Social Capital

I begin by imagining that the group does not have access to an external enforcer. Suppose, however, that they expect to face similar transaction opportunities in each period over an indefinite future. Assume also that breach of agreement is *observable* by all in the group. In such a situation, the parties could be sanguine that their agreement would be kept if it were to be mutually enforced. The basic idea is this: *a credible threat by members of the group that stiff sanctions will be imposed on anyone who breaks an agreement will deter everyone from breaking it*. The problem is to make the sanctions sufficiently stiff and the threat credible. The solution to the credibility problem in this case is achieved by recourse to social norms of behavior.

Recall that a *strategy* means a set of conditional actions. Strategies take the following form: "Do P if X happens, but Q otherwise," "I will do M if she does Y, but N otherwise," and so forth. A *social norm* means a strategy that is followed by members of a community. So a social norm is a "rule of behavior." However, for a

rule of behavior to *be* a social norm, it must be in the interest of everyone to act in accordance with the rule if all others were to act in accordance with it. Social norms are (Nash) equilibrium rules of behavior.

Notice that a social norm does not insist that everyone must follow the same rule of behavior. In Indian villages, a Brahmin's role differs considerably from that of someone belonging to a schedule caste. The strategy underlying a social norm can be label specific, be the label caste, class, age, or marital status.

I now show how a reliance on social norms can be the basis of mutual trust among people. For a thorough, technical exposition, see Mailath and Samuelson (2006). Here it pays to study a numerical example.

Long-Term Relationships

Imagine that person A has access to some working capital (raw material, say), worth $4,000. To keep things simple, imagine that A is able to borrow the $4,000 from a source that has the means to recover the debt (for example, because there is a credible external enforcer). I want to avoid having to discuss A's incentives to repay any debt incurred to the external source because I want to study A's relationship with B, who has the skills to use the working capital worth $4,000 to produce goods worth $8,000 in the market. A does not have those skills. However, A has access to the market, which B does not. A proposes to advance the capital to her, with the understanding that he will sell the goods once B produces them and will share the proceeds with her. If B was not to work for A, she would use her time to produce goods for her home, worth $2,000 to her. In order to get her to accept his offer, A proposes a sharing rule that is hallowed by their tradition: the $8,000 would be used first to compensate both parties fully ($4,000 for A and $2,000 for B), and the remaining $2,000 would then be divided equally between the two. A would receive a total of $5,000 and B, $3,000. Each would gain $1,000 from the arrangement.

B regards the proposal as fair, but is worried about one thing: Why should she trust A not to renege on the agreement by keeping the entire $8,000 for himself?

Imagine that the opportunity for A and B to do business with each other is expected to arise over and over again, say, annually. The time taken for B to produce her output is assumed to be well within a year. Let t denote time ($t = 0,1,2,...$). Although the future benefits from cooperation are important to both A and B, they will typically be less important than present benefits, because, among other things, there is always the chance that one of the parties will not be around in the future to continue the relationship or that circumstances may change in such ways that A does not have access to his capital flow. So we suppose that the two parties discount the future benefits from cooperation at the rate r. (In the present example, B's discount rate does not matter.) It is conventional in economics to interpret r as the opportunity cost of capital. That interpretation does not ring true in the present example. So I want to imagine, as is realistic, that at each date there is a risk that the opportunity to do business will not arise again (for example, because A will lose access to his source of working capital). That risk is r.[5]

Provided r is small, the pair could in principle enter a successful long-term relationship, where each year A advances $4,000 to B, sells the goods B has produced for $8,000, and pays her $3,000.

Consider the following rule of behavior A might adopt: (1) begin by advancing $4,000 to B, (2) sell the goods if she produces them during the year, (3) share the proceeds according to the agreement, and (4) continue doing so every year so long as neither party has broken the agreement, but (5) end the relationship permanently the year following the first defection by either party. Similarly, consider the following rule of behavior B might adopt: so long as neither party has reneged on the agreement, work faithfully for A each year, but refuse ever to work for him the year following the first violation of the agreement by either party.

The two rules embody a common idea: begin by cooperating and continue to cooperate so long as neither party has broken his or her word, but withdraw cooperation permanently following the first defection from the agreement by either party. Withdrawal of cooperation is the sanction. This most unforgiving of rules has been christened the "grim strategy," or simply *grim*. Next I show that grim is capable of supporting the long-term relationship if r is not too large.

First consider B. Suppose A has adopted grim and B believes that he has. He will advance her the capital at the beginning of year 0. B's best course of actions is clear: keep to the agreement. But suppose she reneges on the agreement. She would lose $1,000 (her share of $3,000 minus the $2,000 she would earn producing home goods), but gain nothing in any future year (remember, A has adopted grim). This means that no matter what B's discount rate is, she could not do better than to adopt grim if A has adopted grim.

The harder piece of reasoning is A's. Suppose B has adopted grim and A believes that she has. If he has advanced the working capital to her, she will have worked faithfully for him in year 0. A now wonders what to do. If he reneges on the agreement, he would make a $4,000 profit ($8,000 minus the $4,000 he could have earned with his capital even if he had not entered into the relationship with B). But since he believes B to have adopted grim, he must also believe that B will retaliate by never working for him again. So, set against a single year's gain of $4,000 is a net loss of $1,000 (the forgone profit from the partnership) every year, starting in year 0. That loss, calculated in year 0, is the sum ($1,000 + 1,000/(1+r) + 1,000/(1+r)^2 + 1,000/(1+r)^3 + ... ad infinitum), which adds up to $1,000(1+r)/r. If $1,000(1+r)/r exceeds $4,000, and it is not in A's interest to break the agreement, which means that he cannot do better than to adopt grim himself. But $1,000(1+r)/r exceeds $4,000 if and only if r is less than one-third a year (or approximately 33.3 percent a year). Therefore, if r is less than one-third, it is in each party's interest to adopt grim if the other party adopts grim. But if both adopt grim, neither would be the first to defect, which implies that the agreement would be kept. Grim can serve as a social norm to maintain a long-term relationship between the patron, A, and the client, B.

Economists have found evidence of grim in social interchanges, but it would appear to be in force mostly where people also have access to formal markets. In the poor world, though, grim is not in evidence. Sanctions are graduated, the first

misdemeanor being met by a small punishment, subsequent ones by a stiffer punishment, persistent ones by a punishment that is stiffer still, and so forth (Ostrom 1996). What is the explanation for this?

Where formal markets and long-term relationships coexist, grim could be expected to be in operation. Grim involves permanent sanctions, which are a device for preventing people from engaging in opportunistic behavior when good, short-term opportunities appear nearby from time to time. But if, as in villages in poor countries, there are few alternatives to long-term relationships, communitarian arrangements would be of high value to all. Adopting grim would be overkill in a world where people discount the future benefits from cooperation at a low rate. For that reason, the norms that are adopted involve less draconian sanctions than grim. A single misdemeanor is interpreted as an error on the part of the defector, or as "testing the water" (to check if others are watching). This is why graduated sanctions are frequently observed.

Here then is the general finding: social norms of behavior are able to sustain cooperation if people care sufficiently about the future benefits of cooperation. The precise terms and conditions will vary across time and place. What is common to them all is that cooperation is mutually enforced; it is not based on external enforcement.

There is, however, a piece of bad news: people could end up not cooperating even if they care a lot about the future benefits of cooperation. To see how, imagine that each party believes that all others will renege on the agreement. It would then be in each one's interest to renege at once, meaning that there would be no cooperation. Even if r is less than 33.3 percent a year in our numerical example, behavior amounting to noncooperation is also a Nash equilibrium: A does not advance the $4,000 worth of raw material to B because he knows that B will not work for him; she will refuse because of the fear that A will not keep his promise to share the proceeds, a fear that is justified, given that A intends not to share the $8,000 with her once she has produced those goods, and so on. Failure to cooperate could be due simply to an unfortunate pair of self-confirming beliefs, nothing else. No doubt it is mutual suspicion that ruins their chance to cooperate, but the suspicions are internally self-consistent. In short, even when appropriate institutions are in place to enable people to cooperate, they may not do so. Whether they cooperate depends on mutual beliefs, nothing more. I have known this result for many years, but still find it a surprising and disturbing fact about social life.

Could the pair form a partnership if r exceeds 33.3 percent a year? The answer is no. Because grim is totally unforgiving, no other rule would inflict a heavier sanction for a single misdemeanor. The temptation A faces to defect is less if B adopts grim than if she were to adopt any other rule of behavior, which implies that no rule of behavior could support a partnership if r exceeds 33.3 percent a year. Studying grim is useful because it allows us in many examples, such as the present one, to determine the largest value of r for which cooperation is possible.

This tool is useful to explain how a community can skid from cooperation to noncooperation. Ecological stress—caused, for example, by increasing population and prolonged droughts—often results in people fighting over land and natural resources.

Political instability—in the extreme, civil war—could be a reason why both A and B become concerned that A's source of capital will be destroyed or confiscated. A would now discount the future benefits of cooperation with B at a higher rate. Similarly, if the two are afraid that their government is now more than ever bent on destroying communitarian institutions in order to strengthen its own authority, r would rise. For whatever reason, if r were to rise beyond one-third a year, the relationship would break down. Mathematicians call the points at which those switches occur *bifurcations*. Sociologists call them *tipping points*. Social norms work only when people have reasons to value the future benefits of cooperation.

Contemporary examples illustrate this. Local institutions have been observed to deteriorate in the unsettled regions of Sub-Saharan Africa. Communal management systems that once protected Sahelian forests from unsustainable use were destroyed by governments keen to establish their authority over rural people. But Sahelian officials had no expertise in forestry, nor did they have the resources to observe who took what from the forests. Many were corrupt. Rural communities were unable to switch from communal governance to governance based on the law: the former was destroyed, and the latter did not really get going. The collective vacuum has had a terrible impact on people whose lives had been built round their forests and woodlands.

Ominously, there are subtler pathways by which societies can tip from a state of mutual trust to one of mutual distrust. The model of the partnership between A and B has shown that when r is less than one-third a year, both cooperation and noncooperation are equilibrium outcomes. The example tells us that a society could tip over from cooperation to noncooperation owing merely to a change in beliefs. The tipping may have nothing to do with any discernable change in circumstances; the entire shift in behavior could be triggered in people's minds. The switch could occur quickly and unexpectedly, which is why it would be impossible to predict and why it would cause surprise and dismay. People who woke up in the morning as friends would discover at noon that they are at war with one another. Of course, in practice there are usually cues to be found. False rumors and propaganda create pathways by which people's beliefs can so alter that they tip a society from one where people trust one another to one where they do not.

The reverse can happen too, but it takes a lot longer. Rebuilding a community that was previously wracked by civil strife involves building trust. Noncooperation does not require as much coordination as cooperation does. Not to cooperate usually means to withdraw. To cooperate, people must not only trust one another to do so, they also must coordinate on a social norm that everyone understands. That is why it is a lot easier to destroy a society than to build it.

Tying Long-Term Relationships

Cooperation can be made more robust if the parties *tie* their agreements. To see how, suppose that in the patron-client relationship we have just studied, the discount rate that A (the patron) uses to value the future benefits of cooperation with B (the client) exceeds one-third a year. We know that for want of trust, the pair are

unable to form a partnership. But now imagine that, in addition to the annual flow of $4,000 worth of working capital, A has access to an annual flow of a different type of working capital, worth $3,000 to him. B does not have the skills to work with that capital, but someone named C does. The time C would need to work A's capital into a marketable product is worth $1,000 to her. Like B, C does not have access to the market for products. The product can fetch $6,000 in the market, and A is in a position to procure it. A considers approaching C with a proposal to form a partnership: the $6,000 would be used first to compensate the pair; the surplus would then be divided equally between them. Each would enjoy a profit of $1,000 annually. For what values of r is a partnership between them viable?

Notice that the potential long-term relationship with C is more valuable to A than the relationship he is unable to enter into with B because of a lack of trust. Notice as well that as C's motivations in the potential relationship are similar to B's in the previous example, we need not study them again. But we do need to work through A's reasoning, because the numbers matter. So let us start in year 0. Suppose C has adopted grim. If A advances his capital to her but reneges on the agreement once she has produced the output, he gains $3,000 ($6,000 minus $3,000) that year. Set against it is the $1,000 he would lose every year, starting year 0. That loss, calculated in year 0, is $1,000(1+$r$)/$r$. If $1,000(1+$r$)/$r$ is less than $3,000, A will renege. If, however, $1,000(1+$r$)/$r$ exceeds $3,000, A can do no better than to adopt grim himself. Since $1,000(1+$r$)/$r$ exceeds $3,000 if and only if r is less than a half per year (50 percent a year), the pair are able to form a long-term relationship if A's discount rate is less than 50 percent a year. So suppose r *is* less than 50 percent. Then A is able to form a relationship with C, but not with B (r exceeds one-third).

We are now able to show that, so long as r is less than 40 percent (or two-fifths) a year, A can form a relationship with B if the three tie the pair of undertakings. Let the proposal be to create both partnerships, but with the understanding that if any party in any year acts opportunistically, *both* relationships will be terminated. In order to formalize this, let the rule of behavior adopted by B (respectively, C) now read as follows: begin by cooperating with A and C (respectively, B) and continue to cooperate so long as *no one* has broken the agreement, but cease cooperating with everyone following the first defection by any one in either relationship. Similarly, let the rule of behavior adopted by A now read as follows: begin by cooperating with B and C and continue to cooperate so long as *no one* has broken the agreement, but cease cooperating with everyone following the first defection by any one in either relationship. Each of the parties has adopted grim once again, but grim here comes with an added sting.

It is easy enough to confirm that B would adopt grim if A and C adopt grim and that C would adopt grim if A and B adopt grim. The interesting exercise is to determine A's incentives to cooperate if B and C adopt grim. As both clients would terminate their relationship with him if he behaves opportunistically with either, A would defect from both relationships if he defects at all. What remains is to calculate A's gains and losses if he defects from both relationships in year 0. If he does, he gains $7,000 now ($4,000 from his partnership with B; $3,000 from his partnership with C). Set

against that is the value of all the future benefits from cooperation he will have to forgo. That loss is $2,000(1+r)/r$. It follows that A cannot do better than to adopt grim himself if $7,000 is less than $2,000(1+r)/r$, which is to say if r is less than 40 percent. As we are supposing that $1/3 < r < 2/5$, we conclude that if relationships are tied, both can be created; whereas if they are kept separate, only the one between A and C can form. The intuition behind the finding is clear. A faces greater temptation to defect from his agreement with B than the one with C, which is why the circumstances under which a relationship could form with B are more restricted than they are for a relationship with C. Tying the two relationships reduces A's temptation to break his relationship with B.

While C does not lose from the move to tie the partnerships, she does not gain either. Only A and B gain. So B has every reason to offer solidarity to C, whom she now regards as a professional comrade. B may even offer a small compensation to C, so as to give her a positive incentive to agree to having the two partnerships tied. In return, C promises to stick by B should A mistreat her. A does not do that, of course, but only because he is smart enough to know that C will break off their relationship if he does.

Further refinements are needed when people who wish to trade with one another are separated by distance. Community responsibility systems in Italy during the twelfth and thirteenth centuries helped people to obtain credit and insurance (Greif 1994). Transgressions by a party were met in a collective way: the group to which the injured party belonged imposed sanctions on the group of which the transgressor was a member. In such arrangements, it is communities, not individuals, who acquire a reputation for honesty. Tying relationships in this manner also creates incentives for members of a peer group to keep an eye on one another. The institution reduces the costs that people incur in keeping an eye on one another.

The drawback of tied relationships among people having different interests is that they require further coordination. If B possesses not only her own skills but those of C as well, and if she has the time to work for A in both ventures, it would be simpler for A to offer both partnerships to B, with the proposal that *they* be tied. The relationship would involve only A and B, requiring less coordination.

Culture as Beliefs

Agreements are kept only because parties expect agreements to be kept. Mutual expectations about "reputation" and "rules of behavior" would seem to require an underlying "thing," something that would permit the coordination of those optimistic beliefs. But what is that thing? Today we use the term *social capital* to signify that thing. In earlier days it used to be *culture*. But pointing to culture as an explanatory device will not do, because culture itself should be explained.

Basics

We have seen that where incentives are required for cooperation, noncooperation is also a possible outcome.[6] Which state of affairs prevails depends upon mutual beliefs. The theory I am using here does not *explain* those beliefs; it does identify those that can be rationally held. Rational beliefs are not belied by the unfolding of evidence. As they are self-confirming, rational beliefs offer an anchor for our analysis. Because rational beliefs are not unique, they offer just the kind of flexible anchor we need in order to make sense of societal differences.

In his famous work on the influence of culture on economic development, Weber (1930) takes a community's culture to be its shared values and dispositions, not just beliefs. Studies as widely cast as Weber's are difficult to summarize, but the causal mechanism Weber himself would seem to have favored in his work on the Protestant ethic and spirit of capitalism leads from religion, through political culture, to institutions and, so, to economic performance.

Using culture to explain economics has not been popular among social scientists in the postwar period. But there has been a recent revival. The most ambitious appeal to culture to understand differences in economic performance since Weber is Landes (1998), who asks why it is that since the middle of the sixteenth century, countries in Northern Europe managed to race ahead of several others seemingly better placed at the time. No doubt technological progress and its rapid diffusion among populations was the key to that success, but the progress itself needs explaining. The one Landes offers is distinctive, because it gives importance to the evolution (or a lack of it) of different types of attitudes and beliefs in various regions of the world. Landes argues that these differences gave rise to institutional differences (with feedback to attitudes and beliefs), which help to explain why some countries became winners, while others enjoyed a brief period of success before losing to the winners, and yet others merely suffered from atrophy.

Landes offers a historical narrative. An alternative strand of enquiry makes use of statistical evidence, when available. The two strands complement each other. Putnam (1993), Knack and Keefer (1997), and La Porta and others (1997) study cross-sectional data and discover positive links between *civic culture* (civic engagements, trust) and economic growth, while Granato, Inglehart, and Leblang (1996) study cross-sectional data and find positive links between *personal motivation* (the desire to advance oneself economically) and economic growth.

The statistical findings should not be given a causal interpretation. The motivation to advance oneself would be expected to depend on one's expectations (that is, beliefs) regarding the chance that hard work pays off. Parents would be expected to instill personal ambition in their children only if they were sanguine that such ambition would not be thwarted by the social order. And women would not rise beyond their station if they (rationally!) feared retaliation against them for their temerity. Thus even an attitude can be a determined rather than a determining factor. When it

is the former, an observed statistical link between culture and economic progress should be interpreted at most as an equilibrium relationship between two endogenous variables. I use "culture" to denote differences in the beliefs that people hold about one another. Culture in this view is a coordinating device.[7] This line of thinking has been used to explain two contemporary phenomena: the presence of cultural stereotypes (Arrow 1973; Starrett 1976; Coate and Loury 1993) and the extent of tax compliance in a society (Levi 1988; Lindbeck, Nyberg, and Weibull 1999).

Culture as a Coordinating Mechanism

Equilibrium beliefs could be the consequence of historical accidents rather than deliberate agreement. Societies that are identical in their innate characteristics (that is, fundamentals) may display very different civic behavior. Similarly, people in one society may harbor cultural stereotypes, even though people in another society possessing the same fundamentals do not harbor them. Culture is not an explanatory variable in either example: it is endogenous in both. Moreover, as my four-way classification of social environments in which people could trust one another to keep their promises suggests, it is not necessary to know someone, even at some steps removed, to form beliefs (even rational beliefs) about his or her intended behavior. Interpersonal networks are certainly necessary if mutually beneficial outcomes are to be identified and the associated agreements reached, but it is not necessary to know each and every fellow citizen to arrive at rational beliefs, at a statistical level, about their intended behavior. Trust is the key to cooperation; what scholars have meant by "social capital" is merely one of the means to creating trust.

Earlier I alluded to disequilibrium beliefs and how social scientists have modeled the way beliefs change over time. We may use those models to explain contemporary cultural differences (differences in rational beliefs) in terms of differences in primitives, such as our material needs, the large-scale ecological landscape, the shared knowledge base, and historical accidents. In such analyses, cultural differences would be correlated with differences in economic performance; they would not be the cause of them.

Different types of variables should be expected to change at different speeds—some slow, some not so slow, yet others fast. Imagine now that certain types of (cultural) beliefs are slow to adapt to changing external circumstances. Since slow variables are to all intents and purposes fixed in the short run, it would not be unreasonable to regard them as parameters for short-run analyses. This is the approximation that social scientists make when they offer cultural explanations for economic performance, for example, the success of Japan in the postwar era (Hayami 1997).

Matters are different in the long run. Individual motivation and beliefs are influenced by values and the practice of norms, and they, in turn, are influenced by the products of society, such as institutions, artifacts, and technologies (Wildavsky 1987). Moreover, any process that ties individual motivations and beliefs to values and norms and thereby to the choices made, and back again, would be expected to be path dependent. There is little evidence, though, that trade and imitation may not lead to convergence in those spheres of culture that have a sizable effect on economic

performance. It is also possible that the effect of a particular component of a people's culture changes over time even when the culture itself is not changing. The various components of culture are in different degrees complementary to other factors of production. So it is possible for a particular component to lie dormant for decades, even centuries, only to become a potent force when external circumstances are "right." By the same token, that same component could become ineffective, even dysfunctional, when external circumstances change again. This is why there is no logical flaw in claims such as that Japan's remarkable economic success in the postwar period has been due in part to some aspects of the nation's culture, even though those same aspects did not have potency in earlier centuries and may in future even prove to be dysfunctional.

Networks

So far I have assumed that interpersonal networks (networks for short) are in place.[8] But networks have to be created. Moreover, searching for others with whom to form networks involves resources (such as time). So it is necessary to study pathways by which networks get formed and the reasons why they get formed.

Creating Ties

One may think of networks (social capital) as systems of communication channels for protecting and promoting interpersonal relationships. Interpersonal relationships are a more complex notion than networks, as they are the outcomes of a system of mutual beliefs. But networks cover a wide terrain. They include a unit as tightly woven as a nuclear family and one as extensive as a voluntary organization. We are born into certain networks and enter new ones. So networks are themselves connected to one another. Network connections can also be expressed in terms of channels, although a decision to establish channels that link networks could be a collective one.

An elementary channel connects a pair of individuals directly. However, one can establish indirect links. Person A builds an elementary channel, connecting him to person B, person B builds an elementary channel connecting her to person C, and so forth. A is then connected to C, albeit once removed. Indeed C's motive for consenting to the establishment of an elementary channel with B could be her desire to be linked to A. And so on.

The clause "personal relationships" is central to the notion of networks. There is also the suggestion that engaging in civic cooperation leads to a heightened disposition to cooperate (Seabright 1993). It amounts to forming personal beliefs about others and one's own tastes through sampling experiences. But if social engagement fosters trust and cooperation, there would be positive feedback between civic engagement and a disposition to be so engaged. The synergy would be tempered by the fact that the private cost of additional engagements (time) would rise with increasing engagements.[9]

Network Externalities

Installing channels is a way to create trust by getting to know that person, sharing common interests, and so forth. Plausibly, someone's knowledge of someone else's character declines with the number of elementary channels separating them, as in perhaps knowing very little personally about a friend of a friend of a friend, knowing rather more about a friend of a friend, and knowing even more about a friend.[10] This creates the necessary tension between the benefits and costs of establishing elementary channels.

But it is possible to be misled by this chain-postulate into thinking that weak ties are not valuable. In fact, they can be very valuable. In a famous study based on interviews with professional and technical workers in a town outside of Cambridge, Massachusetts, Granovetter (1973, 1974) reveals that more than half found their job through a personal connection. The surprise was that the majority of personal connections were mere acquaintances.

Granovetter himself notes that the latter finding should have been expected. The reason that weak ties are especially useful in the search for jobs is that they cover a greater range of links than strong ties. Weak ties connect one to a variety of people and to a wide base of information. However, among *rural* populations in poor countries, there are more intense ties than weak ties. This narrows the possibilities. But it creates an avenue for migration. One enterprising member of the community moves to the city, perhaps supported by those with whom he has strong ties at home while he searches for work. He is followed by others in a chain-like fashion, as information about job prospects is sent home. Migrant workers may even recommend village relations to their boss, because employing them would reduce moral hazard and adverse-selection problems for the boss. That would explain the still largely anecdotal evidence that city mills often employ disproportionate numbers of workers from the same village. The emotional costs of adaptation to new surroundings would also be lower for later migrants, with the implication that migration in response to new opportunities in the city would be slow to begin with but would pick up strength as costs decline (Carrington, Detragiache, and Vishwanath 1996). Formal evidence of chain migration, though sparse, does exist. Caldwell (1969) confirms its occurrence in Sub-Saharan Africa, and Banerjee (1983) provides evidence from an Indian sample. Chain migration from village to town is observed among children in Karnataka, India, by Iversen (2002) in his study of peer-group emulation as a determining factor in the supply of child labor.

There can also be negative externalities in the creation of channels, such as those within groups that are hostile to one another. One would expect an oversupply of them (they are often neighborhood "arms" races; Gambetta 1993). Be they positive or negative, externalities give rise to collective inefficiency. Positive externalities point to an argument for public subsidy; negative ones point to an argument for investment in institutions such as those whose presence would lower the externalities ("taxing" the corresponding activities would be another possibility). Local authorities frequently apply this argument when establishing youth centers, social clubs, and the like.

The Strength of Inherited Networks

Wintrobe (1995) asks why social networks frequently operate along ethnic lines and why they are multipurpose and dense, unlike specialized professional networks—that is, why narrow identities are assumed so frequently along ethnic lines. In answer he observes that exit from and entry into ethnic networks are impossible and suggests that the threat of sanctions by the group prevents children from reneging on their tacit agreement to work within the networks.

Additional forces are also at work. It should not be surprising that the social channels that people bequeath their children in traditional societies frequently amount to ethnic networks (who else is there with whom one can form connections?). Posner (1980) observes in the African context that because monitoring one another's activities is not costly within village and kin groups, confining networks to them is a means of reducing moral hazard and adverse selection. But although it is true that exit from one's ethnicity is literally impossible, children may choose not to use the ethnic channels they have inherited. So Wintrobe's thesis needs to be extended if it is to explain why those particular networks are so active: their mere denseness would probably not suffice. The way to extend the account is to observe first that investment in networks is irreversible. One cannot without cost redirect channels once they have been established, because such investments are inevitably specific to the relationships in question. Moreover, if trust among people begets trust (Seabright 1993, 1997), the cost of maintaining a channel would decline with repeated use (witness that we often take our closest friends and relatives for granted). So using a channel gives rise to an externality over time, much as in "learning by doing" in the field of technology use. The benefits from creating new channels are therefore low if one has inherited a rich network of relationships, which is another way of saying that the cost of not using inherited channels is high. Outside opportunities have to be especially good before one severs inherited links. This explains why individuals maintain so many of the channels inherited from their family and kinship and why norms of conduct pass down the generations. Individuals are, so to speak, locked in from birth.

Sundry Features of Social Capital

Three features of social capital (that is, networks whose members enter into engagements under the discipline of mutual enforcement) deserve special attention. I turn to them here.

Narrow Identities

There is a close link between "social capital" and "social identities." Activities in networks create bonds, sometimes even affection, among members. Trust develops on the basis of the first two contexts identified under the headings mutual affection and pro-social disposition. Here a person's social identity is defined by the networks to which she belongs.

How many networks would a person be able to join? It is a truism today that a person's identity is multidimensional and that people share many of the allegiances associated with them. Social psychologists have noted too that aspects of a person's identity are fluid and built on the deliberative choices of the person himself and of others (Tajfel and Turner 1986). Advocates of liberal cosmopolitanism tell us to recognize humanity whenever and wherever it occurs, while assuring us that it is deserving of our first allegiance and respect (Nussbaum 1996; Maalouf 2000; Barry 2001; Appiah 2005; Sen 2006). Sen (2006), in particular, argues that individuals have multiple identities, so that claims for special and narrow identities are not warranted, even delusionary. And yet, all over the world we see individuals and groups defining themselves in narrow, exclusive terms and defending them vigorously. Why?

Population heterogeneity is a reason: some like one network, others feel more at home in a different network, and so on. Religious groupings are a prime example. Then there is the "lock-in effect" of inherited networks, which makes it costly for someone to leave the networks into which he was born.

There is a third reason. The advantages of tied relationships suggest that size is an advantage to networks. This means that if a member of a network were to join another network in order to further some of his purposes, the former network would incur a loss by being less robust. Therefore, an increase in any given network's size inflicts a negative externality on other networks. So networks vie with one another for membership. Dasgupta and Goyal (2009) develop a simple model of individual incentives and network interests to identify circumstances where individuals desire multiple identities but are required by networks to assume narrow identities.[11]

Networks and Human Capital

In his pioneering work, Coleman (1988) sees social capital as an input in the production of human capital. Establishing networks involves time and effort. Much of the effort is pleasurable, but some is not. Even so, just as academics are paid for what they mostly like doing anyway (as a return on investment in their education), networking would be expected to pay dividends even when maintaining networks is a pleasurable activity.

Burt (1992) finds that, among business firms in the United States, controlling for age, education, and experience, employees who occupy a strategic position in networks are more highly compensated than those who do not. His findings confirm that some of the returns from investment in network creation are captured by the investor. However, because of network externalities, not all the returns can be captured by the investor: when A and B establish a channel linking them, the investment improves both A's and B's earnings, but it also improves the earnings of C, who was already linked to B.

Burt's findings suggest that memberships in networks are a component of human capital. If firms pay employees on the basis of what they contribute to profitability, they would look not only at the conventional human capital that employees bring

with them (for example, health, education, experience, and personality), but also at the personal contacts they possess. It would be informative to untangle networks from the rest of human capital. This could reveal the extent to which returns from network investment are captured by the investor. But measurement problems abound. They may be insurmountable because of the pervasive externalities to which they give rise. Moreover, the way that aggregate production functions are specified affects the way that social capital manifests itself in macroeconomic statistics. In the appendix to this paper, for example, I show that even when there are *no* network externalities, growth in trust among members of a group of people will display itself in growth in total factor productivity if the aggregate production function is suitably formulated.

Horizontal versus Vertical Networks

Putnam (1993, 174) observes a critical difference between horizontal and vertical networks:

> A vertical network, no matter how dense and no matter how important to its participants, cannot sustain social trust and cooperation. Vertical flows of information are often less reliable than horizontal flows, in part because the subordinate husbands information as a hedge against exploitation. More importantly, sanctions that support norms of reciprocity against the threat of opportunism are less likely to be imposed upwards and less likely to be acceded to, if imposed. Only a bold or foolhardy subordinate lacking ties of solidarity with peers would seek to punish a superior.

There is a third reason. Imagine a network of people engaged in long-term economic relationships, where relationships are maintained by observing social norms (such as norms of reciprocity). Suppose new economic opportunities arise outside the enclave, say, because markets have developed. Horizontal networks are more likely to consist of members who are similarly placed. If one of the parties discovers better economic opportunities outside the enclave, it is likely that others too will discover better economic opportunities. Both parties would then wish to renegotiate their relationship.

Vertical (or hierarchical) networks are different. Even if the subordinate (for example, the landless laborer) finds a better economic opportunity in the emerging markets, it is possible that the superior (that is, the landlord-creditor) does not; in this case the former would wish to renegotiate, but the latter would not. It is no doubt tempting to invoke the Coase argument that the subordinate would be able to compensate the superior and thus break the traditional arrangement (Coase 1960). But this would require the subordinate to be able to capitalize his future earnings, something typically not possible for people who are subordinates in rural economies in poor countries. The promise to pay in installments is not an appealing avenue open to a subordinate either. He would have to provide collateral. As this could mean leaving his family behind, the worker could understandably find it too costly to move.

Networks and Markets

Networks are personal. Members of networks must have names, personalities, and attributes. Networks are exclusive, not inclusive; otherwise they would not be networks. The terms of trade within a network would be expected to differ from those that prevail across networks. An outsider's word would not be as good as an insider's word: names matter.

Networks give rise to "communitarian" institutions. In contrast, markets (at least in their ideal form) involve "anonymous" exchanges (witness the oft-used phrase "My money is as good as yours"). To be sure, the distinction between named and anonymous exchanges is not sharp, and even in a sophisticated market (modern banking), reputation matters (credit rating of the borrower). But the distinction is real. The key point that follows is that the links between markets and communitarian institutions are riddled with externalities. Transactions in one institution have effects that spill over to the other without being taken into account. Externalities introduce a wedge between private and social costs and between private and social benefits. I observe below that some externalities are of a kind that reflects synergy between the two institutions, while others reflect antagonism between them.

All societies rely on a mix of impersonal markets and communitarian institutions. The mix shifts through changing circumstances, as people find ways to circumvent difficulties in realizing mutually beneficial transactions. It pays to study those features of goods and services that influence the mix in question and the hazards that lie in wait while the mix changes as a consequence of the individual and collective choices that are made.

Complementarities

Networks and markets often complement one another. Production and exchange via networks in one commodity can be of vital importance to the functioning of the market in another. As economists have long noted, for example, exchanges within the firm are based on a different type of relationship than those in the marketplace between firms.

But complementarities between networks and markets can be a good deal more subtle. Powell (1990) and Powell and Brantley (1992) find that researchers in rival firms in a competitive environment such as the one that prevails in the biotechnology industry share certain kinds of information among themselves, even while they maintain secrecy over other matters. The balance between disclosure and secrecy is a delicate one, but in any given state of play a common understanding would seem to prevail on the kinds of information members of a network of scientists are expected to disclose, if asked, and the kinds one is expected not even to seek from others. In such an environment, noncooperation would be costly to the individual scientist: if he refuses to share information, or is discovered to have misled others by giving false information about his own findings, he would be denied access to information that others share. There is also evidence that sharing research

findings among scientists in rival firms is not clandestine practice. Managers not only are aware of the practice; they positively encourage their scientists to join the prevailing network. Well-connected scientists are especially valued. The geographic clustering of firms in research-based industries (for example, the Silicon Valley in California, the Golden Triangle in North Carolina, and Silicon Fen around Cambridge, England) is a consequence of the need for such networks. Networks can even be the means by which markets get established (long-distance trade in earlier times). In some cases, they are necessary if markets are to function at all.[12]

Crowding Out

Where networks and markets are substitutes, they are antagonistic. In an oft-quoted passage, Arrow (1974, 33) expresses the view that organizations are a means of achieving the benefits of collective action in situations where the price system fails. This formulation, if interpreted literally, gets the historical chronology backward, but it has an important contemporary resonance: when markets displace communitarian institutions in the production of goods and services, some people suffer unless countermeasures are undertaken by collective means.

Arrow's observation also has a converse: certain kinds of network can prevent markets from functioning well (Arnott and Stiglitz 1991). Networks can even prevent markets from coming into existence. In such situations networks are a hindrance, not a help, to economic development. They may have served a purpose once, but they are now dysfunctional.

To illustrate, consider the strong kinship ties that are prevalent in traditional societies. Such ties reflect a communal spirit absent from modern urban life and strike an emotional chord among Occidental scholars (Apfell Marglin and Marglin 1990). But there is a functional side to kinship ties: the obligation of members of a kinship to share their good fortune with others in the group offers a way to pool individual risks. The lowlands of Sub-Saharan Africa, for example, are in large measure semi-arid, where people face large climatic risks. In contrast, people in the highlands enjoy more reliable rainfall. Lineage groups are powerful in the lowlands. They are less powerful in the highlands, where even private ownership of land is not uncommon (for example, the Kikuyu in Kenya; Bates 1990).

However, there is a negative side to the coin. Kinship obligations dilute personal incentives to invest for prosperity. Even if the social return on investment in an activity is high, the private return can be low: because of kinship obligations, the investor cannot appropriate the returns.[13] Insurance markets are superior to communitarian insurance systems because the former, covering a wider terrain of people, are able to pool more risks. However, mutual insurance among members of a community (for example, household, kinship, and village) can be expected to be less fraught with problems of moral hazard and adverse selection than markets (Udry 1990, 1994). This means that, if we view kinship obligations over insurance and credit, respectively, as risk-sharing arrangements and intertemporal consumption-smoothing devices, they are to the good, but they are not all to the good, because their presence lowers the private benefits that

people would enjoy from transacting in insurance and credit markets even when the collective benefits remain high.

It is possible to show that the more dissimilar are those engaged in transactions, the greater are the potential gains from the transactions. This means that, to the extent that communitarian institutions are a dense network of engagements, they are like economic enclaves. But if the institutions act as enclaves, they retard economic development. For example, social impediments to the mobility of labor imply that "talents" are not able to find their ideal locations. This can act as a drag on economic development. The same point can be made about credit, if credit is based on kinship. More generally, resources that should ideally flow across enclaves do not do so. Society then suffers from an inefficient allocation of resources.

Micro-Behavior and Macro-Performance

I turn to the issue of how network activities translate into the macro-performance of economies, discovering that they depend on the way aggregate production functions are specified.

Consider a simple formulation of economywide production possibilities. Let individuals be indexed by j ($j = 1,2,...$). For simplicity, I consider a single manufactured physical commodity. Let K denote the economy's stock of physical capital, and L_j denote the labor-hours contributed by person j. I do not specify the prevailing system of property rights to the reproducible capital, nor do I describe labor relations, because to do so would be to beg the questions being discussed here. But it is as well to keep in mind that in a well-developed market economy, K would be dispersed private property, in others K would be in great measure state owned, in yet others much would be in clumps of communally owned property, and so forth. It is also worth remembering that in market economies labor is wage based, that in subsistence economies "family labor" best approximates the character of labor relations, and that labor cooperatives are not unknown in certain parts of the world.

Let h_j be the human capital of person j (years of schooling, health). His effective labor input is then $h_j L_j$. h_j is what one may call "traditional human capital" (for the moment I leave aside the networks to which j belongs). Physical capital is interpreted as "manufactured capital," comprising items such as factories and buildings, roads and bridges, machines and cables, and so on. In short, I ignore natural capital here.

Human capital is embodied in workers. Given the economy's knowledge base and institutions (taken here to be the engagements brought about by interpersonal networks), human capital in conjunction with physical capital produces an all-purpose output, Y.

Scale versus Change

Write $H = \Sigma_j(h_j L_j)$. H is aggregate human capital. Now suppose that output possibilities are given by the relationship,

$$Y = AF(K, H), \ (A > 0), \tag{1}$$

in which F is the economy's aggregate production function. F is non-negative and is assumed to be an increasing function of both K and H.

In equation 1, A is total factor productivity. It is a combined index of institutional capabilities (including the prevailing system of property rights) and publicly shared knowledge. A macroeconomy characterized by the production function F would produce more if, other things being the same, A were larger (that is, if publicly shared knowledge were greater or institutional capabilities were higher). Of course, the economy would produce more also if, other things being the same, K or h_j or L_j were larger. In short, technological possibilities for transforming the services of physical and human capital into output, when embedded in the prevailing institutional structure of the economy, account for equation 1.

Consider now a scenario where civic cooperation increases in the community: the economy moves from a bad equilibrium system of mutual beliefs to a good one. The increase would make possible a more efficient allocation of resources in production. The question arises, would the increase in cooperation appear as a heightened value of A, as an increase in H, or as increases in both?[14]

The answer could seem a priori to depend on the extent to which network externalities are like public goods. It may be thought that if the externalities are confined to small groups (that is, small groups are capable of undertaking cooperative actions on their own, with little effect on others, and do take such actions in the good equilibrium), the improvements in question would be reflected mainly through the h_js of those in the groups engaged in increased cooperation. It may be thought, moreover, that if the externalities are economywide (as in the case of an increase in quasi-voluntary compliance in the economy as a whole owing to an altered set of beliefs, even about members of society one does not personally know), the improvements would be reflected mainly through A. In the appendix to this paper, I show that the matter is ambiguous: the effect of an increase in trust on the aggregate production function depends on the way the production function is specified to begin with!

For my purposes the ambiguity does not matter, because either way, the *directional changes* in macro-performance (though not the magnitude of the changes) would be the same. Other things being equal, an increase in A or in some of the h_js—brought about by whichever of the mechanisms has been considered—would mean an increase in Y; an increase in wages, salaries, and profits; and possibly an increase in investment in both physical and human capital. The latter would result in a faster rate of growth in output and consumption and, if a constant proportion of income were spent on health, a more rapid improvement in health as well.[15]

Interpreting Cross-Sectional Findings

In his analysis of statistics from the 20 administrative regions of Italy, Putnam (1993) finds civic tradition to be a strong predictor of contemporary economic indicators. He shows that indexes of civic engagement in the early years of this century were highly correlated with employment, income, and infant survival in the early 1970s. He also finds that regional differences in civic engagement can be traced back several centuries

and that controlling for civic traditions, indexes of industrialization and public health have no impact on current civic engagement. As he puts it, the causal link appears to be from civics to economics, not the other way around. How do his findings square with the formulation in equation 1?[16]

The same sort of question can be asked of even less aggregated data. For example, Narayan and Pritchett (1999) analyze statistics on household expenditure and social engagements in a sample of some 50 villages in Tanzania, discovering that households in villages where there is greater participation in village-level social organizations on average enjoy greater income per head. The authors also provide statistical reasons for concluding that greater communitarian engagements result in higher household expenditure rather than the other way round.

To analyze these findings in terms of my macroeconomic formulation, consider two autarkic communities, labeled by i (= 1,2). I simplify by assuming that members of a community are identical.[17] Denote the human capital per person in community i by h_i. By h_i I now mean not only the traditional forms of human capital (health and education), but also network capital. I denote by L_i the number of hours worked by someone in community i, by N_i the size of i's population, and by K_i the total stock of the physical asset in i. Aggregate output, Y_i, is

$$Y_i = A_i F(K_i, N_i h_i L_i). \tag{2}$$

I do not specify whether improvements in civic cooperation are reflected in increases in A, or in h, or in both. I leave that specification open here. It follows that if civic cooperation is greater among people in community 1 than in community 2, we would have $A_1 > A_2$, or, $h_1 > h_2$, or both. Imagine now that the two communities have the same population size, possess identical amounts of physical capital, and work the same number of hours. Gross national product (GNP) in community 1 would be greater than GNP in community 2 (that is, $Y_1 > Y_2$). Someone studying the corresponding empirical data would discover that, controlling for differences in K and NhL, there is a positive association between a community's cooperative culture (be it total factor productivity, A_i, or human capital, h_i) and its mean household income (Y_i/N). This is one way to interpret the findings reported in Narayan and Pritchett (1999).

Consider now a different thought experiment. Imagine that in 1900 the two communities had been identical in all respects but for their cooperative culture, of which community 1 had more (that is, in 1900, $A_1 > A_2$, or $h_1 > h_2$, or both). Imagine next that since 1900, both A_i and h_i have remained constant. Suppose next that people in both places have followed a simple saving rule: a constant fraction s_K (> 0) of aggregate output has been invested each year in accumulating physical capital. (For the moment I imagine that net investment in human capital in both communities is nil.)[18] In order to make the comparison between the communities simple, imagine finally that the communities have remained identical in their demographic features. It is then obvious that in 1970, community 1 would be richer than community 2 in terms of output, wages and salaries, profits, consumption, and wealth.

Notice that I have not had to invoke possible increases in total factor productivity (A_i) or human capital (h_i) to explain why a cooperative culture is beneficial. In fact, I have deliberately assumed that neither A_i nor h_i changes. It is the *scale* of total factor productivity and human capital that has done all the work in this analysis of the empirical findings; I have not had to invoke secular improvements in them to explain why a more cooperative society would be expected to perform better economically.[19]

The problem with this interpretation of the empirical findings is that it does not say how an increase in trust translates into changes in the variables that make up macro-economic statistics. I merely assume that an increase in trust translates into an increase in human capital, an increase in total factor productivity, or both. Is it possible to say something sharper? Is it possible to identify types of trust that, when they increase, translate into an increase in human capital and the types of trust that, when they increase, lead to an improvement in total factor productivity? It transpires that this is not possible because the role of trust in productivity depends on the specification of the aggregate production function, which is a matter of choice.

In the appendix, I present a simple capital model (that is, shorn of index number problems) in which an increase in trust translates into an increase in total factor productivity, even though an increase in trust in the model involves *no* externalities whatsoever.

Network Inefficiencies

As the communities in the thought experiment just conducted are both autarkic, there is no flow of physical capital from one to the other. This is an economic distortion for the combined communities: the rates of return on investment in physical capital in the two places remain unequal. The source of the distortion is the enclave nature of the two communities, occasioned in the example by an absence of markets linking them. There would be gains to be enjoyed if physical capital could flow from community 2 to community 1.

Autarky is an extreme assumption, but it is not a misleading one. What the model points to is that, to the extent that social capital is exclusive, it inhibits the flow of resources; in this case it impedes a movement of physical capital from one place to the other.[20] Put another way, if markets do not function well, capital does not move from community 2 to community 1 to the extent that it ideally should. When social networks within each community block the growth of markets, their presence inhibits economic progress.

Micro-Behavior Again: Dark Matters

In this paper social capital has been defined as interpersonal networks where trust is maintained by the mutual enforcement of agreements. There is, however, a dark

side of social capital. Two potential weaknesses of resource allocation mechanisms built on mutual enforcement are easy enough to identify.

Exclusivity

Networks are exclusive, not inclusive. This means that "anonymity," the hallmark of competitive markets, is absent from the operations of networks. When market enthusiasts proclaim that one person's money is as good as any other person's in the marketplace, they invoke the anonymity property of markets. In allocation mechanisms governed by networks, however, "names" matter. Transactions are personalized. This, as noted earlier, implies inefficiencies. Resources do not move to their most productive uses.

Inequalities

The benefits of cooperation are frequently captured by the more powerful within the network. McKean (1992), for example, discovers that the local elite (usually wealthier households) captures a disproportionate share of the benefits of common property resources, such as coastal fisheries and forest products. However, empirical work has, for the most part, only uncovered inequalities in the distribution of the benefits of cooperative behavior. Such findings are, however, compatible with the possibility that all who cooperate benefit. The reason why social capital continues to radiate a warm glow in the literature is that the examples that have motivated thinking on the subject have been coordination games and the prisoner's dilemma.

Of the two, the prisoner's dilemma has received the greatest attention. It remains the favorite workhorse in the literature on social capital. The irony is that the prisoner's dilemma is an uncommon economic game. Dasgupta and Heal (1979, ch. 3) show that when properly formulated, neither the production of public goods nor the management of local common property resources gives rise to the prisoner's dilemma (see also Dasgupta 2008). Even the famous Cournot duopoly game does not conform to the prisoner's dilemma. Below I show that the prisoner's dilemma has kept scholars from exploring the phenomenon of exploitation in communitarian relationships.

Exploitation

I began this paper by considering a group of people who have discovered a *mutually* beneficial course of actions and have agreed to cooperate by following that course. The premise has been that the agreement benefits all members of the network. I now explore the idea that long-term relationships can be *bad* for some members. In other words, I explore circumstances where some members of a network are worse off being part of the long-term relationship than they would have been in its absence.

That there can be exploitation in long-term relationships should not be doubted. In Indian villages, access to local common property resources is often restricted to

the privileged (for example, caste Hindus), who are also among the more prosperous landowners. The outcasts (euphemistically called members of schedule castes) are among the poorest of the poor. Rampant inequities exist too in patron-client relationships in agrarian societies.

Inequity per se is not evidence of exploitation. But inequities in, say, patron-client relationships are known to take forms that make it likely that the "client" is worse off in consequence of the relationship than he would have been in its absence. Among contemporary societies, there are many where women remain socially inferior beings, prevented from inheriting assets, obtaining education, and entering choice occupations, all of which exclude them from credit, savings, and insurance markets. But such people would appear to accept the restrictions in their lives as a matter of course, without visible or audible complaint. Why?

Dasgupta and Heal (1979, ch. 3) find that in the production of public goods and the management of local common property resources, a player's *min-max* value is smaller than the payoff she receives in a noncooperative equilibrium. (In the prisoner's dilemma the two coincide, which is what makes the game so very special.) That gap (between the equilibrium payoff and the min-max value) can be exploited so that *some members of a network are worse off in a long-term relationship than they would have been if the relationship had not been entered into* (Dasgupta 2000, 2008). The basic idea is as follows.

Consider a one-shot game possessing a unique noncooperative equilibrium, but where the min-max value of every member is smaller than his equilibrium payoff. The game is not a prisoner's dilemma. Let us now imagine that the game is to be repeated indefinitely. Let the agreement among the parties read as saying that one of the members is to receive a payoff per period less than her payoff in equilibrium in the one-shot game, but greater than her min-max value.

Call someone a *conformist* if she cooperates with those who are conformists but punishes those who are nonconformists. This sounds circular, but it is not, because the social norm I want to study requires all parties in the network to start the process by keeping their agreement. It would then be possible for anyone in any period to determine who is a conformist and who is not. For example, if someone were to break the original agreement, she would be judged to be a nonconformist, in which case the norm would require all parties to punish the nonconformist by forcing her to her min-max value. Moreover, the norm would require that such a dire punishment be inflicted not only on those in violation of the original agreement (first-order violation), but also on those who fail to punish those in violation of the agreement (second-order violation), on those who fail to punish those who fail to punish those in violation of the agreement (third-order violation), and so on indefinitely. This infinite chain makes the threat of punishment for errant behavior credible, because if all others were to conform to the norm, it would not be worth anyone's while to violate the norm. So long as people do not discount future costs and benefits at too high a rate, keeping one's agreement would then be mutually enforcing.

Conclusions

Writings on social capital have a warm glow about the concept. The observation that relationships matter for a person's well-being is no doubt trite, but people writing on social capital have claimed more. They have claimed that social capital is an economically productive asset, a source of much that is good about economic and political relationships.

The original literature claims less though. Some regard social capital as an input in the production of human capital (Coleman 1988), while others regard it as the sort of civic engagement that helps to discipline public officials (Putnam 1993). The subsequent literature goes far beyond those modest claims. Among development economists, social capital is interpreted as communitarian relationships. In countries where the law does not function well, where officials regard the public sphere to be their private domain, and where impersonal markets are often absent, communitarian relationships are what keep people alive, if not well; hence their attraction for many contemporary development economists. But we need to bear counterfactuals in mind. It could be that communitarian relationships prevent impersonal transactions from taking place. Moreover, personal obligations inherited from the past can prevent public officials from acting dispassionately. What appears as corruption in the North could well be social obligation in the South. Similarly, one man's civic association in the North is another man's special interest group.

In this paper I have suggested that social capital is best seen as interpersonal networks and that, if the concept is to be useful, attention should be paid to engagements within networks that are subject to mutual enforcement. Economists should assess the worth of social capital by studying what networks are engaged in. Some networks would be found to be progressive, others reactionary, yet others violent. That said, the deep underlying feature of an economy that must be present, if the economy is to progress, is not social capital, but rather the extent to which individuals trust one another. In this paper I have also studied how social capital is a means to creating trust. It is a commonplace to say today that an economy's performance depends on its institutions. True enough, but institutions do not grow in a vacuum. Their functioning depends on trust. In any given historical situation, which institutions should be run on external enforcement of agreements and which on mutual enforcement is a problem to which there is still no firm answer. Determining the right interplay between interpersonal networks and impersonal public institutions remains the central problem of the social sciences. Mutual trust is the elusive bird that all societies would like to capture.

Appendix

How does an increase or decrease in trust translate into macroeconomic statistics? The numerical example in the text captures a salient point: an increase in trust raises incomes by permitting a more efficient allocation of resources: A's working capital is put to better use under cooperation, as is B's labor. Consider now two communities

that are identical in all respects, excepting that in one, people have coordinated at an equilibrium where they trust one another, while in the other, people have coordinated at an equilibrium where they do not trust one another. I show below that the difference between the two economies would be reflected in their total factor productivity, which would be higher in the community where people trust one another than in the one where they do not. Enjoying greater income, individuals in the former economy are able to put aside more of their income to accumulate capital assets, other things being equal, so the economy's wealth would grow faster. Mutual trust would be interpreted from the statistics as a driver of economic growth.

Consider a timeless, subsistence economy of N households (i,j = 1,2,...,N). There is a single perishable capital good, which, in combination with labor, can produce a perishable consumption good. The capital being considered is a form of "working capital" (it does not last beyond one period), and output is consumed entirely. Labor is supplied inelastically. If household i works with K_i units of capital, it can produce $F(K_i)$ units of output. This means that households have the same technology of production at their disposal.

I assume that $F(0) = 0$, $F'(K_i) > 0$, and, because labor is also a factor of production, $F''(K_i) < 0$. This means that F is *strictly concave*. Let Y_i be household i's output. Aggregate output would then be

$$Y = \Sigma Y_i. \tag{A.1}$$

Imagine that households do not trust one another at all, meaning that they are *autarkic*. Suppose that i owns K^*_i units of capital. Under autarky, household i's output is $F(K^*_i)$, which means that aggregate output of the economy, Y, is

$$Y = \Sigma Y_i = \Sigma F(K^*_i). \tag{A.2}$$

Let $K^* = \Sigma K^*_i$ be the aggregate capital stock. Suppose that households i and j form a long-term relationship, while all others remain autarkic. We may imagine that each year i and j have access to K^*_i and K^*_j units, respectively, of the capital asset. Suppose that $K^*_i > K^*_j$. Then the two households would maximize their joint output if each were to work with $(K^*_i + K^*_j)/2$ units of capital. (Hint for proof: F is the same for all households and is a strictly concave function.) This would involve i giving $(K^*_i - K^*_j)/2$ units of capital to j, with the understanding that j would, say, repay by sharing j's extra produce in some agreed upon manner (recall the sharing rule investigated in the example of the "putting out" system of cooperation in the main text). Household i's (respectively j's) output would be

$$F(K^*_i - (K^*_i - K^*_j) / 2) = F((K^*_i + K^*_j) / 2),$$

$$\text{respectively, } F[K^*_j + (K^*_i - K^*_j) / 2] = F[(K^*_i + K^*_j) / 2)].$$

By the strict concavity of F, we have

$$2F[(K^*_i + K^*_j) / 2] > F(K^*_i) + F(K^*_j), \tag{A.3}$$

which is why it pays i and j to reach an agreement. The incomes i and j enjoy are larger because of the agreement, but the incomes enjoyed by all other households

remain unaffected. It is tempting to say that the human capital of only i and j has increased. But aggregating household production functions into an economywide production function tells an ambiguous story. Below I show that the aggregate production function can be defined so that social capital shows up as total factor productivity, implying an increase in the marginal productivity of every household's labor input!

If only i and j reach an agreement, the outputs of all other households remain the same, which implies that the agreement between i and j creates no externalities. But because the aggregate output of i and j increases, economywide output increases and so on for all other possible networks that may form. I conclude that all possible networks would gain by sharing their initial endowments of capital equally and splitting the increased output in some agreed upon manner. If the grand coalition of all households were able to form a giant network, each household would work with K^*/N units of capital.

It is simplest to study the effect on aggregate output of network formation by (a) imagining that households are autarkic and (b) varying the distribution of initial endowments. Cooperation within networks of households can then be studied by tracking the effect of the *re*distribution of initial endowments on aggregate output in a world where households are autarkic.

Notice that aggregate output, Y, would be lowest if households were autarkic and the entire capital asset of the economy was owned by one household. By the same token, Y would be at its highest possible level if households were autarkic and each household had inherited K^*/N units of capital. Write $\alpha_i = K^*_i/K^*$. Thus a distribution of initial endowments can be expressed as a vector on the unit simplex of N dimensions—that is,

$$\underline{\alpha} = (\alpha_1,...,\alpha_i,...,\alpha_N), \quad \text{where } \alpha_i \geq 0 \text{ for all } i \text{ and } \Sigma\alpha_i = 1. \quad \text{(A.4)}$$

If $\underline{\alpha}$ is the vector of endowment shares, household i's endowment is $K^*_i = \alpha_i K^*$.

Because F is strictly concave, we know that for all $\underline{\alpha}$ satisfying equation A.4,

$$\Sigma F(K^*/N) \geq \Sigma F(\alpha_i K^*) \geq F(K^*). \quad \text{(A.5)}$$

Define

$$A(\underline{\alpha},K^*) \equiv \Sigma F(K^*_i)/F(K^*) \equiv \Sigma F(\alpha_i K^*)/F(K^*), \text{ where } \alpha \text{ satisfies equation A.4.} \quad \text{(A.6)}$$

Notice that A is a symmetric function. Notice also that A's minimum value is 1 (when $K^*_i = K^*$ for some i) and its maximum value is attained when $K^*_i = K^*/N$ for all i.

So equation A.6 yields the following:

$$Y = \Sigma F(\alpha_i K^*) = A(\underline{\alpha},K^*)F(K^*). \quad \text{(A.7)}$$

It follows from equation A.7 that an increase in social capital, keeping K^* fixed, would be reflected in a larger value of total factor productivity, A. Because all redistributions of initial endowments that increase equality raise aggregate income when households are autarkic, it is possible to conclude that when networks form, total factor productivity (A) increases.

This result came as a surprise. An increase in trust among a group of households in the model has no effect on remaining households. I had expected asset redistributions to be reflected in changes in human capital. The model says otherwise. Thus whether the formation of networks leads to an increase in human capital or to an increase in total factor productivity is ambiguous. Had I begun constructing the aggregate production by modeling trust among households in terms of their human capital, the resulting aggregate production function would have tracked networks to human capital. This means that the specification of aggregate production functions is somewhat arbitrary.

Of course, the ambiguity that arises from that arbitrariness is sharpest if $F(K_i) = K_i^\beta$, where $0 < \beta < 1$; that is, the production function is Cobb-Douglas. In this case, equation A.6 reduces to the form

$$A(\underline{\alpha}) = \Sigma K_i^{*\beta}/K^{*\beta} = \Sigma\alpha_i^\beta, \text{ where } \underline{\alpha} \text{ satisfies equation A.4.} \qquad \text{(A.8)}$$

In the Cobb-Douglas case, it is not possible to tell the difference between an increase in total factor productivity and an increase in the quantity of human capital.

Notes

1. See also Putnam (2000, 19), who writes, "Social capital refers to connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them."

2. I owe this observation to a reviewer of the paper.

3. See Hinde and Groebel (1991), which contains accounts of what is known of the development processes through which people from their infancy acquire pro-social dispositions; for example, by learning to distinguish accidental effects from intentional effects of others' actions. See also Samuelson (2005) for a classification of experiments that were designed to demonstrate the presence of pro-social disposition in a wide variety of cultures.

4. In autocracies the state may fear a rebellion should it misbehave excessively.

5. Formally, r is the hazard rate at each date that A and B will not meet again.

6. There can be many more equilibriums, characterized by partial compliance. For expositional ease I mostly restrict the discussion to two extreme equilibriums, those that are characterized by noncompliance and full compliance, respectively.

7. Greif (1994) pursues this line of enquiry.

8. Goyal (2006) offers an excellent treatise on the structure of a network and its implied connections among the network's members.

9. Putnam (1993, 86–91) discusses this influence. He even suggests (1993, 90), "Taking part in a choral society or a bird-watching club can teach self-discipline and an appreciation for the joys of successful collaboration." Seabright (1997) reports empirical evidence of cooperation begetting further cooperation. Recall the observation by Hirschman (1984) that trust is a moral good (it grows with use and decays if unused).

10. Compare this account with Putnam (1993, 168–69): "Mutual trust is lent. Social networks allow trust to become transitive and spread: I trust you, because I trust her and she assures me that she trusts you."

11. Large networks can experience communication problems, of course. I assume here that those problems become significant only when networks are very large.

12. Even here the role of networks can be expected to diminish as it becomes easier and easier to transmit and access information in the marketplace.

13. Platteau and Hayami (1998) stress this feature of life in the lowlands of Sub-Saharan Africa. They are concerned to account for differences between its economic performance and that of East Asia since the 1960s.

14. As is well known, it would not be possible to separate the two influences if the production function has the Cobb-Douglas form, $AF(K, H) = AK^aH^b$, where a, $b > 0$. In the text I assume that F is not Cobb-Douglas.

15. In the text I assume implicitly that wage rates, salary rates, and profit rates are monotonically increasing functions of the marginal products of L_j, h_j, and K, respectively. In a perfectly competitive world, the former three quantities would equal the latter three, respectively.

16. Putnam stresses the importance of civic engagement for making government accountable and responsible.

17. This is a privilege that theorists are able to enjoy to good advantage. By assuming that potentially different entities are identical, we are able to avoid having to "control for differences" in those same entities. The assumption permits us to better understand statistical correlations within multivariate relationships.

18. It can be argued that the extent to which people save for their future is itself an influence of social capital: people would save more if they trusted their institutions to protect their savings. I abstract from such effects because to include them would merely reinforce the argument I am about to offer in the text.

19. For a different perspective from the one I am advocating here, see Solow (1995), who suggested that if social capital is a potent force in economic development, it should find itself reflected in growth in total factor productivity. In the text I have shown that there need be no growth in the A_is for social capital to influence economic performance.

20. A similar argument can be advanced as regards labor mobility and credit.

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