A theory of social capital and trust*

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Abstract: We develop a model in which social capital builds trust, decreases misconduct, and facilitates economic transactions. Social capital refers to the value of social and psychological benefits from performing in accord with contractual promises. It reflects a common component via shared culture and an idiosyncratic component reflecting individual moral values. Opportunistic behavior is disciplined by a decrease in social capital, which manifests as social disapprobation and cognitive dissonance. Social capital works as both a substitute and complement with legal and market forces to discipline opportunistic behavior and build trust.

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A theory of social capital and trust

1. Introduction

The concepts of social capital and trust play prominent roles in economics research. But exactly what do these concepts mean and how do they affect outcomes? Previous research provides little coherence or guidance for this question. For example, Guiso et al. (2004) define social capital as "generalized trust" – an average measure of individuals' willingness to engage with strangers. Lins et al. (2017), in contrast, reference a definition of social capital proposed by Scrivens and Smith (2013) that considers a person's relationships, social network support, civic engagement, and trust and cooperative norms. Karlan et al. (2009) refer to trust based on social collateral and emphasize the importance of a person's social network for fostering trust. Carlin et al. (2009) distinguish between public trust, which arises from the law and culture, and private trust, which arises from repeat contracting. Others refer to such overlapping concepts as social norms, cultural trust, culture, and social interaction (e.g., see Stulz and Williamson (2003), Hong et al. (2004), Pursiainen (2022), and Bottazzi et al. (2016)). As these examples illustrate, researchers seem to agree that social capital and trust are important, but they do not much agree on what these terms mean, how they are related, or how they affect economic outcomes.

This paper seeks to provide structure to these interrelated ideas by developing a theory of social capital that is rooted in microeconomic foundations and shows how social capital can affect trust and economic outcomes. We take advantage of the term "capital" to propose that social capital is an asset with value equal to the present value of the social and psychological surpluses that arise from mutually beneficial exchange and production activities. In our framework, culture is an input in the development of social capital and trust is the main output. Social capital has a common cultural component that is affected by the actions of its group members and an idiosyncratic component in which an individual can invest. Although the common component is shared across members of a cultural group and affected by their actions, social capital operates at the individual level because it builds trust between counterparties in specific transactions. We also show how social capital can act as either a substitute for, or complement of, legal institutions and

repeat purchase incentives in building trust. Viewed broadly, our theory helps to understand how legal, market, and social capital interact to build trust among counterparties, overcome the risk of opportunism, and facilitate cooperative exchange and production activities.

We begin by considering a simple exchange between a buyer and seller that promises gains for both but in which the seller might act opportunistically in a way that imposes a cost on the buyer. Examples include the purchase of an automobile, a contract to build a commercial building, or the provision of a haircut. In each case, the buyer cannot be certain of the quality of the seller's product or service until after committing to the exchange.

The buyer thus enters a lottery when they agree to the transaction – with probability π the seller performs as promised and the buyer earns a surplus, but with probability $(1\text{-}\pi)$ the seller acts opportunistically and the buyer suffers a loss. The probability π, in turn, reflects the likelihood that the seller's benefits from honest dealing exceed their benefits from cheating – benefits the buyer cannot fully anticipate. In many cases a cheated buyer can seek recourse through legal channels, or the seller can be incentivized to perform as promised by the prospect of repeat purchases. We consider legal and market inducements for honest dealing in Section 5 of the paper. Until then, we focus on the social capital channel by assuming third-party and repeat purchase monetary incentives are not available and the seller's only inducement to honest behavior is through the influence of cultural norms and personal ethics, i.e., social capital.[1]

This framework shows how, even in the absence of legal enforcement and repeat purchase incentives, social capital can discipline and deter opportunistic behavior, overcoming information asymmetry and moral hazard problems, and thereby facilitating exchange. Our theory helps explain:

a) How social capital builds trust and contributes to the value of economic activity;

b) Why buyers are willing to trust sellers despite the possibility of opportunistic behavior;

[1] Third-party (e.g., legal) and repeat purchase inducements to honest dealing are examined by La Porta et al. (1997), Klein and Leffler (1981), and many others. Such inducements frequently are unavailable for technical and cost reasons. E.g., it is difficult for a court to adjudicate a claim that a barista served a bad cup of coffee, or for the prospect of repeat sales to discipline cheaters when the gains from cheating are high (e.g., see Karpoff 2022).

c) How individuals can invest in their personal component of social capital and the factors that encourage or discourage such investment; and

d) The conditions in which opportunism and fraud occur despite the presence of social capital.

Our model also yields insights into several aspects of trust-based relationships and economic activity, including:

e) The characteristics of high trust activities such as brain surgery and bungee jumping, compared to low trust activities such as haircuts and illegal drug purchases;

f) Why buyers might engage in trades that offer negative expected personal benefits and how such trades still have net positive expected societal benefits – except for edge cases in which buyers make perversely self-destructive choices, such as addictive behaviors;

g) The circumstances that lead to a virtuous cycle in which honest behavior, trust, and social capital are self-reinforcing, or a corruption trap in which cheating behavior depreciates the community's social capital and begets more cheating; and

h) How social capital acts as both a substitute and complement to legal institutions and pecuniary market forces (such as repeat purchase incentives) to build trust and facilitate value-increasing exchange and production.

Finally, the model yields a rich set of predictions about the relations between trust, social capital, trade, and economic outcomes. In particular: (i) trade increases with the level of trust among counterparties (Proposition 2); (ii) counterparty trust increases with social capital (Proposition 3); (iii) gains from trade increase with counterparty trust and social capital (Propositions 4 and 5); and (iv) the amount of social capital is determined by the benefits and costs of investing in it, which reflect each counterparty's prospective gain from trade, the efficiency with which investment generates social capital, the endowed level of social capital, the rate at which cheating depreciates social capital, and the counterparty's prospective cost of being cheated (Proposition 6).

This paper proceeds as follows. Section 2 sketches the development of the concept of social capital and its use in the economics and finance literatures. Section 3 builds upon this prior work to develop our

model of trust and trust formation in which a seller's concerns about social and psychological consequences encourages honest dealing and builds trust. Section 4 explores the creation of social capital as the result of both cultural norms and personal investment, and considers whether social capital can have harmful effects. Section 5 extends the model to include legal and market considerations in addition to social capital. Section 6 considers the circumstances that lead to opportunism, negligence, and fraud. Section 7 concludes. In the appendices, we compare our model of social capital and trust formation to other concepts of social capital.

2. Social capital in the literature

Economists have long recognized the importance of social influences on economic outcomes. Adam Smith's (1759) central proposition is of the importance of "moral sentiments" – i.e., human beings' empathy toward others and sense of right and wrong – for social cohesion, production activity, and trade. Banfield (1958) blamed poor economic conditions in Southern Italy on a lack of social capital, meaning the habits, norms, and attitudes that motivate people to consider the common good. Arrow (1972) argued that "virtually every commercial transaction has within itself an element of trust" and that "…much of the economic backwardness in the world can be explained by the lack of mutual confidence."

Putnam (2000) credits Hanifan (1916) for the first use of the term "social capital," although other early uses include Dewey (1899), Jacobs (1961), Coleman (1988), Loury (1997), and Bourdieu (1980).[2] Modern appreciation for the importance of social capital grew significantly with the works of Putnam (1993, 2000) and Fukuyama (1995), entering mainstream economics with the work of Knack and Keefer (1997), La Porta et al. (1997), and Guiso et al. (2004). Subsequent research shows that social capital has meaningful effects on a wide range of economic outcomes, including stock market participation, economic development, corporate fraud, and capital investment.[3]

[2] Even Jane Austen uses the term in *Sense and Sensibility*. When asked about a trip to London, Miss Dashwood says, "Well, it was such a social capital," implying that social capital is a stock of reputation, connection, and prestige. Much of Austen's writing was about the acquisition and use of this type of capital.

[3] See, for examples, Guiso, Sapienza, and Zingales (2004, 2008), Hong, Kubik, and Stein (2004), Lins, Servaes, and Tamayo (2017), Gurun, Stoffman, and Yonker (2018), Hasan, He, and Lu (2022), and Amiraslani, Lins, Servaes, and Tamayo (2023).

In most of these uses, "social capital" refers to some aspect of societal norms, values, or networks that generally build social cohesion.[4] For example, Putnam (2000, p. 28) defines social capital as "connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them."[5] Beyond such a broad notion, however, there is little agreement on a more specific definition of the term. In fact, Portes (1998, p.2) notes that the term "social capital" is so widely used that "the point is approaching fast in which social capital comes to be applied to so many events and in so many different contexts as to lose any distinct meaning." Knack and Keefer (1997, pp. 1252-1253) make a similar observation: "Trust, cooperative norms, and associations within groups each fall within the elastic definitions that most scholars have applied to the term social capital."

Not only does the conception of these terms differ widely, so do their measurement, as empirical proxies for social capital and trust include religious affiliation, geographical connections, network connections, and personal background or experience characteristics.[6] Such disparate concepts and measures raise basic questions: Is social capital different from trust? Is it different from culture? Is religion or religiosity the same thing as social capital? Is social capital about peoples' values, attitudes, and beliefs, or the outcome of these mental constructs? Does social capital operate at the individual or community level? Who owns social capital, and is it a public good?

Not all definitions of social capital will answer these questions in the same way. To be a functional concept in the economics literature, however, social capital must be defined in some way. We define social capital as an asset with value that derives from the social and psychological benefits from performing in

[4] Social capital is not always cohesive. Putnam (1993), Aldrich (2012), and others distinguish between bridging capital, which fosters trust across groups, and bonding capital, which strengthens in-group relationships. Satyanath et al. (2017) argue that bonding social capital can work to decrease trust between groups and impede beneficial exchange. We discuss the notion of negative social capital in Section 4 below.

[5] Claridge (2025) identifies several conceptions of social capital that are most cited in peer-reviewed articles. In addition to Putnam's (2000) definition, these include: (i) social capital as the resources available through a person's social network (Bourdieu 1986), (ii) social capital as the "… resources embedded in a social structure that are accessed and/or mobilized in purposive actions" (Lin 2001), and (iii) the set of obligations and expectations embedded in social relations (Coleman 1990). Economists have relied primarily on the concepts of Putnam and Coleman. See Appendix A for a brief discussion of alternative conceptions of social capital and trust.

[6] See Servaes and Tamayo (2017) and Dupont and Karpoff (2020) for reviews of empirical proxies for concepts such as culture and social capital in empirical tests.

accord with contractual promises. It reflects a combination of cultural norms and idiosyncratic values that motivate cooperation, honesty, and fair dealing in a person's interactions with others. It has a cultural component that is common to all members of a cultural group and is largely endowed upon each member, although it is affected by each member's behavior. The idiosyncratic component reflects the observation that not all members of a cultural grouping are equally trustworthy. Individuals can and do distinguish themselves by investing in this personal component of their social capital. We discuss such investment in Section 4 below.

In our model, social capital helps to bond contractual performance because non-performance causes a decrease in social capital. This decrease reflects any immediate or long-term cognitive dissonance a person experiences from violating their community's or their personal moral code, which can include feelings of shame, guilt, loss of self-esteem, and emotional distress (e.g., see Charness and Dufwenberg, 2006). A decrease in social capital can also manifest as social disapprobation, as a person who violates cultural norms can face disapproval from their peers and exclusion from valued social groupings (e.g., see Butler et al., 2016).

3. Trust

As Smith (1776, Book One, Chapter II) also observed, human beings are prone to "truck, barter, and exchange", and economics students are taught that mutually preferred trade increases consumption opportunities and individual utility. A problem, however, is that trucking and bartering frequently exposes a person to the risk of fraud, opportunism, or negligence by their counterparties. As an example, a construction firm might hold up its client partway through the project to obtain better contract terms. The client, in turn, might deny and delay payments to the builder. Shipping firms can demand additional payment after a customer's product leaves port. Even simple exchanges are fraught with peril, such as when you buy a meal at a restaurant or pick up a cup of coffee. You could end up paying for a lousy meal or cup of coffee. Worse, a food vendor that skimps on food safety rules could put your health at risk.

The risk of opportunism is present in virtually all exchange and production activities. Buyers and sellers nonetheless do agree to transact, billions of times each day across the world. Somehow, buyers and sellers establish enough trust to overcome the ever-present threat of counterparty risk, at least in many transactions.

3.a. Trust as a participation condition

To capture the role of trust at the transaction level, we consider a potential transaction Ω between a seller A and a buyer B, e.g., the sale of a cup of coffee or provision of a haircut. At date 1, B decides whether to engage in the transaction, in which case $\Omega = 1$, and at date 2, the transaction either is completed as agreed, or A cheats B. If completed as agreed, the transaction generates surpluses g_A for A and g_B for B. The transaction comes at some risk to B because A's performance is not guaranteed and B cannot determine the quality of A's performance until date 2, after committing to the transaction. With probability π, A performs as (explicitly or implicitly) promised and both parties earn their surpluses. With probability $(1-\pi)$, however, A acts opportunistically and earns a total gain of $g_A + b$, $b > 0$, and imposes a cost $c > 0$ on buyer B. π is a continuous variable, $0 \leq \pi \leq 1$, that reflects B's trust that A will perform as promised.[7]

Our designation of A as the "seller" and sole potential cheater is for expositional convenience. In practice, counterparties from either side of a transaction can act opportunistically. We could just as easily consider A's risk of loss if B were to act opportunistically. The relationship between A and B also need not conform narrowly to that of seller and buyer, as they could just as well be partners in a venture. Put differently, any cooperative activity involves the risk of opportunistic behavior by all counterparties. So, although the model focuses on A's potential opportunism and social capital, and B's trust and risk, it applies to the universal experience of vulnerability and risk of harm when people engage in cooperative activities that rely upon other people.

[7] This definition of trust is like that in Guiso et al. (2008), who define (one minus trust) as "the subjective probability individuals attribute to the possibility of being cheated." In Appendix B we compare this definition with other philosophical characterizations of trust.

In effect, B engages in a lottery when she enters a transaction with A – she either receives g_B or pays c. We assume c is sufficiently large to pose a meaningful risk for B (and we define "sufficiently large" below). *B's* expected gain from the transaction is,

$$E(G_B|\Omega=1) = \pi\, g_B - (1-\pi)\, c. \tag{1}$$

Equation (1) defines the minimum required level of trust, π_{min}, for which B's expected gain is non-negative:

$$\pi_{min} = c/(c+g_B). \tag{2}$$

π_{min}, in turn, is increasing in c and decreasing in g_B:

$$\frac{d\pi_{min}}{dc} = \frac{g_B}{(c+g_B)^2} > 0$$

$$\frac{d\pi_{min}}{dg_B} = \frac{-c}{(c+g_B)^2} < 0$$

Note that π_{min} is specific to this particular transaction between A and B. There is no single trust standard that applies to all transactions or people. Rather, the level of trust required to encourage B to engage in this transaction depends on B's transaction-specific benefits and costs. With sufficiently high transaction benefits (g_B) or low costs if the seller cheats (c), π_{min} is low and B is likely to engage in the transaction even with a low level of trust. Transactions for which π_{min} is low can be thought of as low trust transactions. For example, a barber's negligence that results in a bad haircut imposes only a small cost c for most clients, reflecting a low-trust transaction and explaining why barbershop walk-ins are an ordinary occurrence. If, in contrast, the costs from being cheated are high, π_{min} is high and the buyer is not likely to transact unless their trust in A is high. For most people, such high trust transactions include bungee jumping, air travel, and brain surgery – instances in which negligent or opportunistic behavior by A can be very costly for B.

If B is rational and risk-neutral, she will engage in the transaction such that $\Omega = 1$ if and only if $\pi \geq \pi_{min}$. Due to ambiguity aversion, gradual belief updating, and risk perception, however, individuals tend to weigh potential outcomes in a probabilistic manner (Tversky and Kahneman, 1979). Tversky and Kahneman (1992), for example, model decisions using an s-shaped probability weighting function and

Barberis, Huang, and Santos (2001) argue that a smooth probability assessment best reflects observed behavior such as gradual changes in asset allocation. We adopt a similar approach and define *B*'s decision to engage in the transaction as a probability, $0 \leq y \leq 1$, defined by the logistic rule:

$$y = \Pr\{\Omega = 1) = \frac{1}{1+ e^{-k(\pi-\pi_{min})}} \quad (3)$$

This characterization of the buyer's decision allows for the possibility of risk aversion in which the buyer does not engage in some transactions that have positive expected value, i.e., when $\pi > \pi_{min}$, or cognitive errors in which the buyer engages in some transactions even when they have negative expected value, i.e., when $\pi < \pi_{min}$. However, we assume the buyer avoids transactions that have extremely negative expected values. That is, our model accommodates the kind of behavioral biases normally contemplated in the literature (e.g., see Hirshleifer 2015). But we rule out self-destructive choices that would impose large costs on the buyer.[8]

The likelihood of a cognitive error is determined by the steepness parameter *k*. A larger *k* makes the probability flip more abruptly from $y \approx 0$ to $y \approx 1$ as π is close to π_{min}, and as $k \to \infty$ equation (3) reduces to a binary model in which $\Omega = 1$ if and only if $\pi > \pi_{min}$. That is, the model can accommodate a rational risk neutral buyer who never makes a cognitive error by assuming $k = \infty$. More generally, we can say that $y \approx 1$ when *B*'s trust in the seller is high relative to π_{min}, and $y \approx 0$ when *B*'s trust is low relative to π_{min}.

3.b. "Cheating" refers to fraud, opportunism, or negligence

In legal settings, the distinctions between fraud, opportunism, and negligence can be significant. For example, charges of fraud imply intent or *scienter* and can prompt larger penalties than findings of mere negligence. Throughout most of this paper we do not make such distinctions. Regardless of the seller's intent or circumstances, the important concern is that, with probability $(1–\pi)$ the buyer receives a cost *c*

[8] Appendix B provides a precise definition of "self-destructive choices" in the context of our model. These are transactions in which *c* is very large compared to g_B and π. An opiate addict, for example, might purchase fentanyl from a supplier with poor quality control, thus transacting even though trust (π) is low and the potential cost of cheating (*c*) is large.

instead of the anticipated benefit g_B. The seller might intend to defraud the buyer, or might merely act with negligence or indolence resulting in a loss to the buyer. For example, an airline's managers do not intend to impose costs on their customers, yet a customer who loses a bag, sits for hours in a plane waiting for takeoff, or suffers from a safety issue still suffers a loss compared to their contractual expectations. A seller might intentionally sell the buyer a poor quality apple, e.g., one that was bruised or stale from sitting on the shelf too long. Or the seller might just be negligent in handling the apple. Either way, what matters to the buyer is whether the apple meets expectations. To reflect this concern, we will refer to instances in which *A* does not perform as promised or expected as "cheating" and for the most part will avoid distinctions between fraud, opportunism, and negligence.

B's expectations, in turn, can be established via an explicit contract, as is typical in the construction industry or many transportation services. But many expectations are based on implicit agreements and expectations. A builder's promises to meet specific goals by certain dates may be stated explicitly, but how the builder is expected to respond to unexpected weather events might be left to an implicit agreement, e.g., to "do their best under the circumstances." The price of a coffee espresso is explicit, but how the barista pulls the shot is not. In many situations, the costs of identifying and specifying the full range of contingencies are prohibitively high. It also is prohibitively expensive to appeal to third parties to adjudicate many qualities of the good or service that is delivered, e.g., the quality of an espresso, or of a restaurant meal or haircut. As a result, many transactions require implicit agreements between the seller and buyer that are not enforced using third parties such as the law.

Of course, implicit agreements also are prone to miscommunication, misjudgment, and ex post disagreement. For now, we assume both seller and buyer agree on the contractual arrangement whether the agreement is explicit or implicit. In Section 6 we explore the effects of differences in the seller's and buyer's ex ante beliefs about the contract.[9]

[9] In short, the prospect of such differences increases the probability that the buyer will – from their perspective – be cheated, thus increasing the minimum level of trust, π_{min}, required by the buyer to participate in the transaction, decreasing the number of completed transactions, and (in most cases) increasing the return to the seller *A* of investing in social capital. The prospect of costly differences in ex ante beliefs also increases the benefit of explicit contracts.

3.c. The seller's problem

The potential cheating gain, b, is what tempts A to cheat. b could represent the value of the time saved by hurriedly giving a bad haircut, the money pocketed from misrepresenting the collision history of a used car for sale, or the value of any other short-term benefit A derives from not living up to their side of the agreement. To reflect the fact that buyer B typically has less than perfect knowledge about A's benefits and costs from cheating, we assume that, at date 1, B regards A's gains from cheating as a random variable $\tilde{b} \geq 0$ that is realized at date 2. Without loss of generality, assume $\tilde{b}$ is uniformly distributed over the interval $[0, W]$, where W represents the potential for $\tilde{b}$ to be large. For our main results it does not matter whether A learns of the realization of $\tilde{b}$ at date 1 or date 2. *Scienter* – that is, knowingly entering the transaction with the intent to cheat – implies A knows the realized value b at date 1 and enters the transaction with the intent to cheat B at date 2. Alternatively, A might decide to cheat B only after discovering the realized value b at date 2. Such behavior is analogous to negligence or last-minute opportunism, as opposed to planned fraud.

In our setting, what deters A from cheating is the prospect of a loss in social capital, ΔS. That is, A brings a stock of social capital S to the transaction that decreases in value by the fraction Δ, $0 < \Delta \leq 1$, if A cheats B. Our notion of social capital relies on two channels by which A experiences adverse consequences when they cheat B. The first channel is A's cognitive dissonance from violating their personal or their community's moral code, which can include feelings of shame, guilt, loss of self-esteem, and emotional distress (e.g., see Charness and Dufwenberg, 2006). The second channel is A's risk of social disapprobation. By cheating their customer, for example, A may face disapproval from their peers and exclusion from valued social groupings (e.g., see Butler et al., 2016). The consequences of cognitive dissonance and social ostracism are largely non-pecuniary, but they very well could matter to A and are reflected in ΔS. The stock of social capital S reflects the seller A's reputation for honest dealing, and the scalar Δ reflects how much this reputation is depreciated if A acts opportunistically.

Social capital is not the only channel by which A can experience adverse consequences for cheating B. In Section 5, we introduce the possibility of legal action (B sues A for fraud or negligence) and lost future

sales (*A* gets a reputation for poor service). For now, however, we suppress other potential disciplinary channels and assume the only adverse consequence that can accrue to *A* is via a loss in social capital.

The seller *A*'s decision at date 2 is therefore to perform as promised and receive the surplus g_A from the transaction, or to cheat *B* and receive the additional cheating benefit $\tilde{b}$ and the consequences ΔS.

Perform as promised if $\tilde{b} \leq \Delta S$

Cheat if $\tilde{b} > \Delta S$.

If *B* knows $\tilde{b}$ and ΔS, *B*'s problem is simple: engage in the transaction if $\tilde{b} \leq \Delta S$ and do not transact if $\tilde{b} > \Delta S$. *B*'s problem is complicated, however, by the fact that she knows only the distribution $\tilde{b} \sim U[0, W]$. *B*'s trust in *A* at date 1 is therefore *B*'s subjective probability that *A* gains more from performing as promised than by cheating at date 2:

$$\pi = Pr\{\Delta S - \tilde{b} \geq 0\} = \frac{\Delta S}{W}. \quad (4)$$

Equation (4) indicates that the likelihood *A* will perform as promised increases with *A*'s loss in social capital from cheating, ΔS, and decreases with their direct gain from cheating, $\tilde{b}$.

3.d. The role of social capital in promoting trust and economic value

Figure 1 illustrates the sequence of events. With probability $(1 - y)$, *B*'s level of trust in *A* is sufficiently small such that *B* refuses to engage in the transaction. With probability y, *B* trusts *A* enough to proceed with the transaction. If the transaction occurs, then with probability π the buyer gains g_B and the seller gains g_A for a net social gain of $(g_A + g_B)$. With probability $(1-\pi)$, $\tilde{b} > \Delta S$ and the seller cheats the buyer, earning a total gain $(g_A + \tilde{b} - \Delta S)$ and leaving the buyer with a loss c instead of a gain g_B.

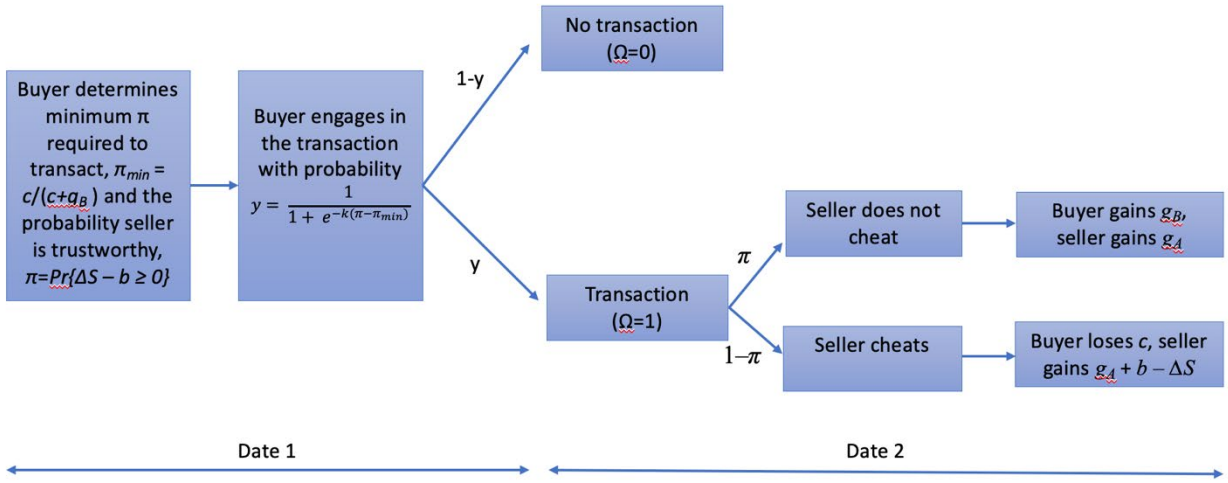


Figure 1: The relation between trust, transactions, and net gains

If a transaction occurs, the conditional gain from trade is

$$G = [\pi\,(g_A + g_B) + (1 - \pi)\,(g_A + \tilde{b} - (\Delta S + c))].$$

The seller cheats only when $(\tilde{b} > \Delta S)$, so the expected gain conditional on a transaction is the sum of A's and B's conditional expected gains.

$$E(G|\Omega = 1) = E(G_A) + E(G_B) = (g_A + \pi\, g_B) + (1 - \pi)\,(E(\tilde{b}|\tilde{b} > \Delta S) - (\Delta S + c)). \quad (5)$$

We use the shorthand $E(G)$ for the conditional gain from trade, and the unconditional expected gain from trade is $yE(G)$. A seller who cheats internalizes only the ΔS portion of the costs and imposes an external cost on society equal to the buyer's direct loss c plus the buyer's opportunity cost g_B.

The interesting case is when $(E(\tilde{b}|\tilde{b} > \Delta S) - (\Delta S + c)) < 0$ because, otherwise, even cheating outcomes would deliver positive gains from trade and we would have little reason to be concerned about the social costs of cheating. We therefore assume that A's prospective cheating behavior poses a meaningful risk to B such that $c > (E(\tilde{b}|\tilde{b} > \Delta S) - \Delta S)$. This assumption has intuitive appeal because the cost a cheating seller imposes on their counterparty typically exceeds their cheating gain. For example, a restaurant owner who lowers their expenses by using expired milk gains little compared to the patron's costly gastric consequences if they get sick.

The preceding discussion allows us to characterize the expected gain from trade.

Proposition 1: Despite the risk of costly cheating behavior and assuming the buyer avoids extreme cognitive errors, the conditional and unconditional expected gain from trade is positive.

Proof: The proof is in Appendix B. The intuition for Proposition 1, however, can be seen from rearranging equation (5):

$$E(G|\Omega = 1) = E(G) = g_A + [(1-\pi)(E(\tilde{b}|\tilde{b} > \Delta S) - \Delta S] + [\pi g_B - (1-\pi)c]$$

The first term, g_A, is positive. The second term also is positive, as the seller will not cheat unless $E(\tilde{b}|\tilde{b} > \Delta S) - \Delta S) > 0$. The third term, $\pi g_B - (1-\pi)c$, is positive whenever the buyer participates in the transaction only when their expected gain exceeds their expected cost from being cheated. Even with reasonably small cognitive errors in which the third term is slightly negative, the expected gain conditional on a transaction occurring, $E(G)$, is positive.[10] The likelihood of a transaction also is positive, $0 < y \leq 1$, so the unconditional expected gain, $yE(G)$, is positive.

Proposition 1 stipulates a condition that, while intuitively appealing, is not theoretically obvious. The logical conclusion of Akerlof's lemons problem is a world of autarky and penury because buyers refuse to engage with opportunistic sellers. Proposition 1 shows one pathway by which sellers and buyers nonetheless establish trust. Despite risks of opportunism and fraud, the expected gains from trade are positive and some trades do occur because the seller is disciplined by the prospective loss of social capital.

We are now in position to characterize the effects of social capital and trust on the probability of trade and the gains from trade, as stated in Propositions 2-5.

Proposition 2: The probability of trade: (a) increases with the buyer's trust in the seller π; (b) increases with the buyer's prospective gain from trade, g_B; and (c) decreases with the buyer's cost

[10] As shown in Appendix B, the condition that the buyer avoids extremely large and costly cognitive errors precludes situations in which buyer engages in the transaction when c is very large compared to g_A, g_B, and π.

if cheated, c. The probability of trade also (d) is higher for low-trust transactions (for which π_{min} is low) than for high-trust transactions (for which π_{min} is high).

Proof: From equation (3) and noting that $\pi_{min} = c/(c+g_B)$:

(a) $$\frac{dy}{d\pi} = ky(1-y) > 0$$

(b) $$\frac{dy}{dg_B} = ky(1-y)\frac{c}{(c+g_B)^2} > 0$$

(c) $$\frac{dy}{dc} = -ky(1-y)\frac{g_B}{(c+g_B)^2} < 0$$

(d) $$\frac{dy}{d\pi_{min}} = -ky(1-y) < 0$$

Proposition 2(a) implies that the likelihood of trade increases with counterparty trust and is consistent with a growing number of empirical findings. Guiso et al. (2009), for example, find that trade between European countries is positively related to measures of trust between the countries' populations. Bottazi et al. (2016) find that venture capitalists are more likely to invest in firms located in countries whose citizens the investor is more likely to trust. Guiso et al. (2008) find that lack of trust decreases individuals' willingness to invest in one particularly high-trust activity – investing in the stock market. Relatedly, Giannetti and Wang (2016) find that individual investors are less likely to participate in the stock market after a local financial scandal that decreases their trust in financial investing, and Gurun et al. (2018) find that investors exposed to the Bernie Madoff Ponzi scheme fraud also decreased their investment in risky assets. Dupont (2025) shows that shocks to trust in a cultural institution (the Catholic church) also affect households' trust and participation in the stock market.

Propositions 2(b)-(d) imply that trade is more likely when the minimum trust required to make the transaction a fair bargain for the buyer is low, i.e., for low-trust transactions. Correspondingly, trade will more likely falter when the buyer's potential gains from trade, g_B, are low or the buyer's potential cost of being cheated, c, is high.

Proposition 3: Trust and the probability of trade both increase with the seller's social capital.

Proof: From equation (4),

$$\frac{d\pi}{dS} = \frac{\Delta}{W} > 0$$

From equation (3),

$$\frac{dy}{dS} = ky(1 - y)\frac{\Delta}{W} > 0$$

An increase in social capital increases *A*'s potential cost of cheating, ΔS, thus increasing the minimum value of $\tilde{b}$ that makes cheating optimal for *A*. This increases *B*'s trust that *A* will perform as promised and encourages *B* to engage in the transaction. In effect, ΔS serves as a bond that *A* forfeits if they cheat *B*.

Proposition 3 is consistent with empirical research showing that individuals' trust and propensity to engage in trade are both positively related to social capital. Guiso et al. (2004), for example, find that Italian households in high-social capital areas are more likely to use checks and invest in the stock market. Similarly, Hong et al. (2004) find that people are more likely to invest in the stock market when they have frequent interactions within socio-cultural networks, which serves as a proxy for social capital. Hasan et al. (2022) find that social capital plays an important role in peer-to-peer lending outcomes in China, as borrowers from high social capital regions receive higher bids from lenders and have higher funding success, while lenders from high social capital regions take higher lending risks.

Proposition 4: If $c > (E(\tilde{b}|\tilde{b} > \Delta S) - \Delta S)$, i.e., *c* is sufficiently large to pose a meaningful risk for *B,* the unconditional expected gain from trade increases with the buyer's trust, π.

Proof: The unconditional expected gain from trade is *yE(G)*.

$$\frac{d\big(yE(G)\big)}{d\pi} = \frac{dy}{d\pi}E(G) + y\frac{dE(G)}{d\pi}$$

As previously established, y, $dy/d\pi$, and $E(G)$ are positive.[11] In addition,

$$\frac{dE(G)}{d\pi} = g_B - \Big(E\big(\tilde{b}\big|\tilde{b} > \Delta S\big) - (\Delta S + c)\Big).$$

If $c > (E\big(\tilde{b}\big|\tilde{b} > \Delta S\big) - \Delta S)$, the term in brackets on the right side is negative. Therefore,

$$\frac{d\big(yE(G)\big)}{d\pi} > 0.$$

Proposition 4 shows that trust not only increases the likelihood of trade, as established by Proposition 2. It also increases the gains from trade. The gains from trade increase with trust for two reasons. First, an increase in trust increases the likelihood that $\Omega = 1$, i.e., that *B* will overcome their concern about being cheated and engage in the transaction with *A*. Second, an increase in trust means that the probability *A* will engage in cheating behavior is lower, thus decreasing the likelihood of the deadweight loss *c* and increasing the expected gain conditional upon the transaction occurring.

Proposition 4 is consistent with Fukuyama's (1995) argument that high trust among citizens in a country generates superior institutional and economic performance. It also supports intuition that motivates empirical research into the relation between trust and beneficial economic outcomes. La Porta et al. (1997), for example, find that trust among people is positively related to several measures of success for governmental and non-governmental organizations. Ahern et al. (2015) find that cross-border merger activity and synergy gains increase with cultural proximity, which serves as a proxy for mutual trust among the people involved in a merger.

Proposition 5: The unconditional expected gain from trade increases with the seller's social capital if the seller's potential cheating gains are bounded such that $W < \Delta S + g_B +$

[11] Again, *E(G)* can be negative if the buyer perversely makes extremely costly cognitive errors, as discussed with Proposition 1. Of course, perverse behavior leading to extremely costly errors – as opposed to relatively low-cost behavioral biases – is inconsistent with many propositions in economics.

$c + Z$, where $Z = k(1–y)E(G)$. If $W > \Delta S + g_B + c + Z$, however, an increase in social capital decreases the unconditional expected gain from trade.

Proof: The proof is in the Appendix. The intuition is provided by noting that

$$\frac{d\big(yE(G)\big)}{dS} = y\frac{dE(G)}{dS} + E(G)\frac{dy}{dS}$$

Propositions 1 and 2 show that $E(G)$ and dy/dS are positive, and y is non-negative. Solving for $dE(G)/dS$:

$$\frac{dE(G)}{dS} = \frac{\Delta}{W}(\Delta S + g_B + c - W)$$

which is positive if $W < \Delta S + g_B + c$. Therefore, the conditional economic gain, $E(G)$, increases with social capital if W is bounded. The Appendix shows that the unconditional expected gain increases with social capital, i.e., $dyE(G)/dS > 0$, even if W faces a less constrained bound, $W < \Delta S + g_B + c + Z$, where $Z = k(1–y)E(G)$.

Proposition 5 states that an increase in social capital not only increases trust and the probability of trade (as established by Proposition 3); it also increases the gains from trade – so long as the seller's maximum potential gain from cheating, W, is not too extreme. This provides a theoretical rationale for a widespread view that social capital creates value and promotes economic development (e.g., Putnam 2000). Consistent with this proposition, Knack & Keefer (1997) find that social capital is positively associated with a country's economic growth and investment. Guiso et al. (2004) find that high social capital areas in Italy have greater financial development than low social capital areas. And Hasan et al. (2017) find that firms located in U.S. counties with high levels of social capital enjoy lower bank loan spreads and looser nonprice loan terms compared to firms located in low social capital counties.

Proposition 5, however, also indicates that an increase in social capital does not always increase the expected value of economic outcomes. If A's potential gain from cheating is extremely high – i.e., W is very large – $dE(yG)/dS$ can be negative and increases in social capital can decrease expected economic

value. This occurs primarily because large realizations of $\tilde{b}$ – which are increasingly likely as W becomes larger – encourage the seller to cheat even though, in doing so, they destroy large amounts of social capital. A possible example of such a situation is Bernie Madoff, who was willing to risk sacrificing his large amount of social capital because the gains from cheating were sufficiently large (see Gurun et al. 2018).

3.e. Aggregate outcomes of social capital

Our model involves a specific transaction involving one seller and one buyer, illustrating the micro-foundations of how social capital affects economic outcomes. Both parties, however, are embedded in a larger community in which concerns about social capital arise. It is from the community that individuals learn the norms of behavior that guide expectations and impose social and psychological sanctions for poor contractual performance. In Section 4 we explicitly model the community aspects of social capital as determining the common cultural component of social norms and institutions, in addition to affecting the idiosyncratic component that reflects each person's moral code and willingness to live up to it.

When measuring the effect of social capital on economic outcomes, most empirical research focuses on aggregate measures. Guiso et al, (2009), for example, consider the effect of bilateral trust between the peoples of two countries and the amount of foreign trade. In our framework, aggregate effects are simply the sum of many individual decisions (each of which can affect the social capital of the group, as discussed below). This can be shown by amending equation (3) to refer explicitly to a specific transaction t:

$$y_t = \Pr\{\Omega_t = 1) = \frac{1}{1 + e^{-k_t(\pi_t - \pi_{min,t})}}$$

Here, k_t, π_t, and $\pi_{min,t}$ reflect the buyer's and seller's prospective gains and costs from this specific transaction t. If Y represents the total possible number of transactions per unit time, the expected amount of economic activity equals the sum of the transaction possibilities:

$$\text{Total number of transactions} = \sum_{t=1}^{t=Y} y_t.$$

The expected total economic value equals the sum of the surpluses created across all transactions represented in equation (5):

$$\text{Total expected value of economic activity} = \sum_{t=1}^{t=Y} y_t E(G_t).$$

Propositions 1-5 then apply in the aggregate as the sum of the Y potential transactions.

The t subscripts emphasize that both A's and B's costs and benefits are transaction-specific. A might, for example, experience a large loss in social capital for selling a clunker of an automobile to a neighbor, but only a small loss if selling to an out-of-town stranger. The loss might be smaller for giving a bad haircut to a fidgety child than an adult, or for pulling a poor espresso shot for customer who is ignorant of coffee compared to a knowledgeable customer. More broadly, B's trust in A, and therefore B's likelihood of pursuing the transaction, depends on an (often implicit) assessment of all legal, market, and social consequences to A from cheating, as well as A's direct benefit from cheating, b_{At}.

This discussion illustrates how the amount of social capital at stake for each party is unique to each potential transaction. For example, a barista's social capital can be large when providing coffee, contributing to their customers' trust and willingness to buy coffee from them. But that same person's social capital and trustworthiness may be low if, say, they ask their customers for a loan. That is, social capital can reside in individuals and groups, but the amount available to bond behavior in a specific transaction is unique to that transaction.

4. The creation of social capital

"Capital" implies a capital asset, an observation we use in Section 3 to provide meaning to the term "social capital." The value of A's social capital is specific to A's interaction with B and reflects the value of A's non-pecuniary benefits from living up to their personal and societal expectations. The model's key assumption is that the value of A's social capital decreases if B experiences the interaction as not successful (i.e., if A cheats B). In this section we discuss how social capital is created by a common component, C, that reflects the culture in which A operates, and an idiosyncratic personal component, P, that reflects A's unique values, attitudes, and ethics:

$$S = C + P.$$

4.a. Culture

Social capital depends in part on *A*'s and *B*'s cultural backgrounds and settings. Quoting Parsons (1951), Acemoglu and Robinson (2024) define culture as "… a stable and coherent 'normative pattern of value-orientations' that help individuals make decisions and adapt to different circumstances" and observe that "culture lives at the level of well-defined groups." Harrison and Huntington (2000) define culture as "the values, attitudes, beliefs, and orientations, and assumptions prevalent among people in society." Similarly, Guiso et al. (2006, p. 23) define culture as "…those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation."

We adopt Parsons' (1951) definition of culture as one component of social capital. Positive cultural characteristics – social norms that support honesty, fair dealing, and mutual consideration – contribute to *B*'s trust in *A* because *A* is likely to experience cognitive dissonance and social disapprobation if they violate social norms and expectations. Culture is a public good because it is non-excludable and non-rivalrous among members of the cultural group. That is, it builds trust and bonds contractual performance for many people who share the culture, simultaneously, and *A*'s reliance on culture to build trust in their transaction does not preclude others in their communities from also using culture to build trust in their transactions. Culture therefore reflects a component of social capital that, while operating at the level of each individual transaction, is common to all members of the cultural grouping. Positive cultural characteristics contribute to the social capital that *A* brings to their interaction with *B*, thereby increasing *B*'s trust in *A*.[12]

Note that, as a public good, culture is effectively endowed upon *A* as it relates to their specific transaction with *B*. However, *A*'s contractual performance can have an external effect by supporting or eroding the community's culture, which in turn affects the stock of social capital available for all subsequent

[12] The reader may note that *B*'s culture also influences the likelihood and outcome of their transaction with *A*. For example, if *B*'s culture emphasizes trust across groups, *B* is more likely to trust *A* and engage in the transaction. In Section 4.d, we model the influence of *B*'s culture as affecting *y*, the probability *B* will engage in the transaction.

transactions involving members of A's cultural community. We refer to the value of positive external effects as E^+ and the value of negative external effects as E^-. Incorporating external effects into the expected economic consequences of a transaction, we can rewrite equation (5) as:

$$E(G|\Omega = 1) = [\pi\,(g_A + g_B + E^+) + (1 - \pi)\,(g_A + \tilde{b} - (\Delta S + c + E^-))] \quad (6)$$

The direction of external effect depends on whether the seller cheats or performs as promised. With probability (1-π) the seller cheats the buyer, leading to a decrease in the seller's social capital, ΔS, the buyer's cost c, and a decrease of E^- in the broader community's culture C. Both c and E^- are external to the seller. The cost E^- arises because A's cheating decreases the value of the cultural capital that, as a component of S, helps to assure contractual performance and build trust among other members of A's cultural group. A's cheating in this one transaction therefore decreases the social capital available to others in A's cultural group, decreasing the likelihood of future transactions and increasing the likelihood of cheating among the transactions that do occur.

The possibility of external effects illustrates how social capital can be subject to a virtuous cycle or a self-reinforcing corruption trap. With probability π the seller performs as promised and contributes to a social norm of honest behavior that can build social capital for all others in A's culture group via the external effect E^+. This increases the community's cultural component of social capital, which in turn increases the likelihood of beneficial transactions and decreases the likelihood of cheating by other members in A's community – a virtuous cycle. Alternatively, if A cheats, social expectations shift to accommodate cheating behavior in general, thus lowering the social capital available to support transactions by community members and decreasing economic value across the cultural group. The negative external effect of cheating behavior on social capital can therefore spiral into a self-reinforcing corruption trap in which cheating degrades social capital, which in turn begets more cheating.

The possibility of external cultural effects does not change the intuition of Propositions 1 through 5. As shown in the Appendix, however, external effects on culture can change the magnitudes of effects

and the boundary conditions that qualify Propositions 4 and 5. If the external benefits E^+ are large, for example, an increase in social capital is even more likely to increase the unconditional expected gain from trade compared to the condition presented in Proposition 5.

4.b. Personal social capital

While culture affects social capital via community-wide social norms and orientations, it does not make all members of a cultural group equally trustworthy. This is because social capital includes an idiosyncratic component that reflects *A*'s unique values, attitudes, and ethics. We refer to this idiosyncratic component as *A*'s personal capital, *P*. It reflects *A*'s unique moral code and their value of adhering to it.

Because it is unique and affects the value of their prospective transactions, *A* has incentive to invest in their personal capital. We see this when individuals display religious symbols or perform rituals that reflect a commitment to values such as the Golden Rule, or cultivate personal relationships that help to bond their commitment to act honestly. Many people build personal social capital simply by eschewing cheating opportunities and performing as promised in their interactions with others.

The observation that people care about and work on their reputations implies that personal social capital can be augmented through costly investment. In our model, *A*'s social capital can be represented as

$$S = C + P = C + P(I),$$

where $P(I)$ reflects *A*'s ability to transform investment *I* into personal social capital *P*.

An inspection of equation (5) reveals that seller *A* has incentive to invest in social capital, but only under certain conditions. Let $\mathrm{E}(G_A)$ represent *A*'s expected gain conditional on a transaction occurring, and $yE(G_A)$ is A's unconditional expected gain. The effect of an increase in social capital on *A*'s unconditional expected gain is given by:

$$\frac{\partial\left(y\mathrm{E}(G_A)\right)}{\partial \mathrm{S}} = \frac{\Delta}{W}\left[-y(W-\Delta S) + \left(g_A + \frac{(W-\Delta S)^2}{2W}\right)y(1-y)k\right] \qquad (7)$$

The first term in brackets ($-y(W - \Delta S)$) is negative, while the second term is positive. Thus, the seller's marginal gain from investing in social capital depends on parameter values and may not be monotonic.

To illustrate the seller's incentives, we assume the seller's returns to investment in social capital are increasing and concave, $P'(I) > 0$ and $P''(I) \leq 0$, and that the cost of such investment, $\mu(I)$, is increasing and convex, $\mu'(I) > 0$ and $\mu''(I) > 0$. *A*'s marginal benefit and marginal cost from investment in social capital are:

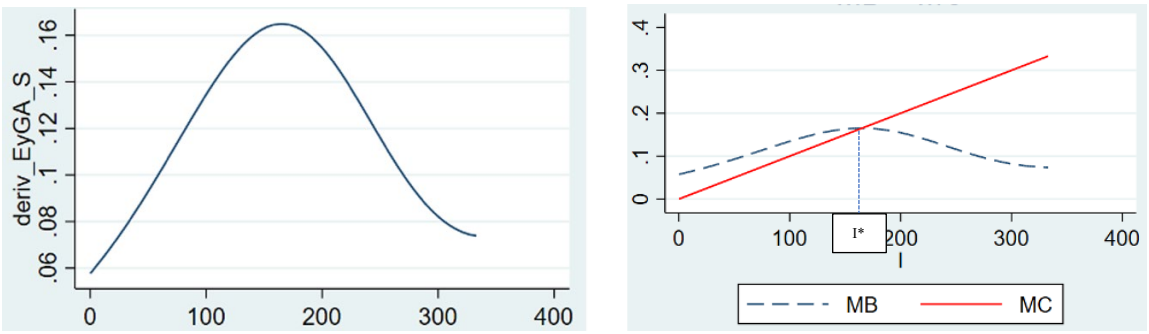
$$MB = \frac{\partial E(yG_A)}{\partial I} = \frac{\partial E(yG_A)}{\partial S} P'(I)$$

$$MC = u'(I).$$

Appendix E illustrates *A*'s investment problem for various sets of parameter values. For a basic case, assume $P(I) = h*I$, where h is a productivity constant, and $\mu(I) = \alpha(\frac{1}{2}I^2)$, where α is an arbitrary scaling parameter. Setting $MB = MC$ yields *A*'s optimal investment in social capital, I^*:

$$I^* = \frac{h\Delta}{\alpha W}\left[ky(1-y)g_A + ky(1-y)\left(\frac{(W-\Delta S)^2}{2W}\right) - y\left(\frac{W-\Delta S}{2}\right)\right]. \quad (8)$$

The optimum I^* is illustrated in Figure 2 for a simple set of parameters described in the Appendix. Panel A shows that $\partial E(yG_A)/\partial S$ is positive but non-monotonic in S. This non-monotonicity shows up as a hump-shaped marginal benefit of investment in creating additional social capital, as illustrated in Panel B. The optimal investment in social capital, I^*, is where the costs and benefits of such investment are equal at the margin.



Panel (a) Panel (b)

Figure 2: Panel (a) illustrates the hump-shaped marginal benefit of social capital to the seller for a representative set of parameter values. Panel (b) illustrates the resulting hump-shaped marginal benefit of investment in the personal component of social capital, *P(I)*, and the optimum investment for a simple increasing marginal cost function.

4.c. The determinants of social capital

One particularly vexing problem in the social capital literature is why social capital differs so widely across communities and individuals. Most previous arguments appeal to historical developments in religion or institutions. For example, Fukuyama (1995) and Putnam and Campbell (2010) argue that cultural and religious traditions such as Confucianism or Christianity explain differences in social capital, an idea that is used by Stulz and Williamson (2003) in empirical tests. Putnam (1993, 2000) emphasizes the importance of historical institutions, an idea used by Acemoglu, Johnson, and Robinson (2001) to explain the persistent effects of colonial institutions on civic trust.

Equation (8), by contrast, highlights a different pathway by which social capital can vary across individuals and, therefore, communities: Personal investments in social capital reflect the specific and heterogeneous costs and benefits from building social capital. We express this notion in Proposition 6:

Proposition 6: The seller's optimal investment in social capital increases with their prospective gain from trade (g_A). The effects other model parameters on optimal investment depend on parameter values. When social capital investment (I) and the probability of trade (y) are low, the optimal investment in social capital increases with the efficiency with which investment generates social capital (h), the common cultural component of social capital (C), the rate at which cheating

depreciates social capital (Δ), and the buyer B's gain from trade (g_B), and it decreases with the buyer's cost if they are cheated (c). These effects reverse at high levels of investment I and when the probability of trade is high.

Proposition 6 summarizes the comparative statics of A's investment problem, and Appendix F contains proofs and graphical illustrations of these effects. Intuitively, an increase in A's potential gain from trade, g_A, always increases A's marginal benefit of investment in social capital, increasing I^*, which works to encourage B to join the transaction. The effects of the other determinants, however, depend on how they affect the marginal benefit of additional social capital. At low levels of investment or when the probability of a transaction (y) is low, increases in h, C, Δ, or g_B increase the marginal benefit of investment in social capital because they have relatively large effects on the buyer's willingness to enter the transaction. At higher levels of investment, when the stock of social capital already is sufficient to encourage the buyer to engage in the transaction, the marginal cost of additional investment in social capital is more likely to exceed the marginal benefit, in which case increases in h, C, Δ, or g_B all work to decrease I^*. The effect of c is just the opposite: At low levels of investment, an increase in the buyer's potential cost c increases the buyer's minimum level of trust required for a non-negative expected outcome, π_{min}, which decreases the probability of a transaction and decreases the seller's incentive to invest in social capital.

Our framework focuses on an individual seller's investment in their personal component of social capital, $P(I)$. But we can extend the logic of Proposition 6 to the development of the aggregate social capital, including its common cultural component, C. For example, we expect the development of cultural norms to encourage trust-based activity particularly when the aggregate gains from trade (g_A) are high. Similarly, if the current level of social capital and trading activity are low, the marginal benefit of developing cultural norms that encourage honest dealing will increase with the efficiency with which such norms can be established (similar to h in equation 8), the rate at which cheating depreciates social capital (Δ), and counterparties' prospective gains from trade (g_B). Likewise, the development of trust-building cultural

norms is less likely where the consequences of cheating behavior (similar to c in equation 8) are costly, in aggregate. The comparative statics results of Proposition 6 therefore yield testable predictions about the determinants of social capital both at the individual and community (i.e., cultural) levels.

4.d. The buyer's cultural and social capital

Our model casts the problem as if cheating goes only one way, i.e., only sellers can cheat buyers. This is for expositional convenience only, as fraud, opportunism, and negligence can arise from both sides in most transactions. For example, the buyer might enter the transaction with a fraudulent form of payment that the seller discovers only after they perform their service. In this case, the problem is strictly analogous to our setting, as it is now the buyer who enters the transaction with social capital at risk. For a transaction to occur, both the buyer's and the seller's participation conditions must be met, i.e., both must have at least a minimum level of trust in the other to enter the transaction and risk being cheated.

It also has been convenient to focus on social capital held by the party who potentially can cheat, who we call seller A. The social capital of the potentially cheated party, however, also affects the likelihood and outcomes of trade. Ahern et al. (2015), for example, show that merger outcomes are affected by the cultural similarities of both the selling and buying firms. Social capital also impacts individuals' propensity to use financial services and participate in financial markets (Guiso et al., 2004; Hong et al., 2004), consistent with the notion that B's social capital also can play an important role.

In our model, B's social capital is important because it can affect B's decision – as the potentially cheated party – to engage in the transaction with A. We represent the buyer's social capital as S_B. S_B could be high if, for example, B comes from a cultural environment with high generalized trust, if B's personal values emphasize openness toward others, or if B has personality trait agreeableness.[13] A high S_B implies

[13] Generalized trust refers to a proclivity to trust others, even strangers (e.g., see Guiso et al. (2003)). High generalized trust implies that, all else equal, B is more likely to trade with A. Trait agreeableness reflects sympathetic and cooperative tendencies, which also implies willingness to engage with others.

that, all else equal, *B* is more likely to trust and trade with *A*, imparting an upward bias to the probability of transacting, *y*. That is, $\partial y/S_B > 0$.

The buyer's social capital can contribute to what we describe in Section 3 as a cognitive error, that is, the decision to engage in the transaction even if the expected value to the buyer is negative. A naïve tourist from a high-trust country, for example, might trust a local vendor more than risk-neutral expectations would indicate. But it is also possible for a high S_B to offset the buyer's risk aversion, encouraging the buyer to engage in trades with positive expected value that the buyer otherwise would forgo. The effect of the buyer's social capital on the buyer depends on π and π_{min}. If $\pi > \pi_{min}$, the buyer's expected gain is positive and an increase in the buyer's social capital increases their likelihood of engaging in trade that has positive expected value.

Importantly, an increase in the buyer's social capital also generally works to increase the overall expected gain from trade. This can be seen by differentiating $yE(G)$ with respect to S_B:

$$\frac{\partial yE(G)}{\partial S_B} = \frac{\partial y}{\partial S_B} E(G) + y \frac{\partial E(G)}{\partial S_B} \tag{9}$$

In equation (9), $\partial y/S_B > 0$ and $\partial E(G)/S_B = 0$. Proposition 1 shows that $E(G)$ is positive as long as we rule out self-destructive behavior by *B*. Therefore, all terms on the right-hand side of equation (9) are positive, indicating that an increase in *B*'s social capital works to increase the overall expected gain from trade. This result is consistent with research showing that economic activity and growth are higher in communities with high generalized trust (Knack & Keefer, 1997; Putnam 2000). The tendency for trusting individuals to enter trade places them at greater risk of being cheated. Nonetheless, such trust works to increase the amount and value of overall economic activity.

4.e. Negative social capital and sociopathy

Some theorists posit the existence of negative social capital, that is, social capital that inhibits trade and the creation of value. For example, Banfield (1958) blames persistent poverty in Southern Italy on a

culture of mistrust and corruption, or negative social capital. Putnam (2000, p. 22) argues that bonding social capital can build cohesion within a community, but also "…can be directed toward malevolent, antisocial purposes, just like any other form of capital."

Potentially negative consequences associated with social capital can arise in our framework via three pathways. First, Propositions 3 and 5 indicate that low levels of social capital are associated with low levels of trust, economic activity, and value creation. Such situations as documented by Banfield (1958) reflect not so much the low consequences of negative social capital, but rather, the negative consequences of low social capital. Low levels of social capital, in turn, can be perpetuated because of a self-reinforcing corruption trap, as discussed in Section 4.a, or low incentives to invest in social capital, as discussed in Sections 4.b and 4.c.

The second pathway by which social capital can be associated with negative consequences relates to Claridge's (2023) argument that social capital can have positive or negative value depending on how it is used. The gains from trade in our model, g_A and g_B, are assumed positive with no negative spillover effects. If there are spillover effects in addition to g_A and g_B, however, social capital can work to encourage behavior that destroys rather than promotes economic value. As an example, Putnam (2000) refers to social capital within a criminal gang that facilitates trust and exchange among gang members that imposes net costs on the broader community.

The third pathway by which social capital can have negative consequences is if it is, in fact, negative. Our default assumption has been that the seller *A* places positive value on *B*'s experience of the transaction, i.e., that Smith's (1759) fundamental assumption about humans' deep-seated empathy toward others is true. Hence, while *A* might be willing to cheat *B* when the gains from doing so are high, *A* suffers cognitive dissonance from doing so (as well as possible social disapprobation). In our model, this is the same as assuming *P(I)* is positive and that it contributes to *A*'s social capital.

Simple observation indicates that *P(I)* differs across individuals, as people differ in the psychological toll their own misconduct extracts in the form of guilt, shame, and anxiety, i.e., cognitive dissonance. *P(I)* could even be negative for some people, for example, Dark Tetrad personalities that are

characterized by narcissism, psychopathy, Machiavellianism, and sadism (e.g., see Međedović and Petrović 2015). If *A*'s personal component of social capital, *P(I)*, is sufficiently negative, ΔS can be negative, in which case *A* yields a net social and psychological benefit from cheating *B*, in addition to the direct benefit *b*. Stated simply, negative social capital can arise from sociopathy in which one party derives psychological benefits rather than shame, remorse, or guilt from cheating others.

The prospect of sociopathy and negative social capital highlights an important aspect of *A*'s potential cheating behavior. Our model assumes buyer *B* knows the seller *A*'s potential loss in social capital if *A* cheats, ΔS. But what if *B* does not know ΔS with certainty? *A* has incentive to represent to *B* that ΔS is large, to encourage *B* to join in the transaction. If B has imperfect knowledge about ΔS, *A* may be able to convey false information, for example, representing that *P(I)* is larger than it is.

Less than perfect information about *P(I)*, and therefore ΔS, complicates *B*'s decision to engage in the transaction with *A*. We can incorporate *B*'s uncertainty about ΔS into the model by introducing a known distribution for an uncertain ΔS, in which case the intuition of Propositions 1-6 continues to hold.[14] However, the possibility of false signaling about *P(I)*, and *B*'s uncertainty about ΔS, illustrate a key pathway by which cheating arises in our framework. In general, cheating occurs when *B*'s expectations of *A*'s cost of cheating are higher than *A*'s expectations of those same costs. For example, *B* might enter a transaction on the belief that *P(I)* is positive and large, when in fact *P(I)* is small because *A* suffers no remorse, guilt, or shame for cheating *B*. Along these lines, behavioral psychologists have explored the ways people work to (i) credibly signal trustworthiness and (ii) unmask false representations of trustworthiness by their counterparties. In our framework, if *B* has incomplete information about *A*'s personal social capital, *B* must work to distinguish counterparties for whom *P(I)* is genuinely large from those who falsely signal large *P(I)*.[15]

[14] If ΔS is uncertain, we replace the condition for A to cheating changes from $\tilde{b} > \Delta S$ to $\tilde{b} > \widetilde{\Delta S}$. If we represent the joint distribution of $\tilde{b}$ and ΔS as uniform [0, W'], the results in Propositions 1-6 are qualitatively unaffected.

[15] See, for examples, Paulhus (2014) and Furnham, Richards, and Paulhus (2013). With uncertainty about counterparty social capital, we conjecture that sellers will work to convey trustworthiness and buyers will work to gain information about their counterparties. Such investigation and bonding costs in building trust are analogous to Jensen and Meckling's (1976) bonding and monitoring costs of agency.

5. Legal, market, and social capital

To this point we have assumed *A* experiences no legal or market consequences if they cheat *B*. In this section we relax this assumption and consider the interaction of social capital with legal enforcement (*L*) and market reputational capital (*M*). We define trust capital (TC) as the sum of the legal, market, and social capital that *A* brings to their transaction with *B*:

$$TC = L + M + S.$$

Legal capital refers to the laws, regulations, and legal institutions that discourage cheating by penalizing it. One reason *A* is encouraged not to cheat is that they do not want to pay a fine, lose a license, or face jail time. Legal enforcement is costly and can be ineffective in adjudicating some types of contractual performance (e.g., is that really a bad cup of coffee?), so it is unlikely to be the sole channel that encourages *A*'s satisfactory performance in many types of transactions. Previous findings indicate, however, that legal capital helps to guarantee contractual performance and is positively associated with firm value and performance, financial market development, and economic growth.

Market capital, *M*, consists of the monetary losses imposed on *A* if *A*'s cheating causes it to lose future sales or for its counterparties to adversely change the terms of contract. As an example, Beechnut Inc. lost sales when it was discovered to have sold as apple juice for infants what was actually beet-sugar sweetened water.[16] Similarly, Sears Roebuck, Inc. lost sales in its automotive repair division when it was discovered billing customers for fraudulent repairs.[17] Klein and Leffler (1981) and Shapiro (1983) show that the prospect of such losses can be sufficient to encourage non-cheating behavior even in the absence of legal institutions and third-party enforcement of contracts. In particular, firms perform as promised when the value of the quasi-rents they earn from honest dealing exceeds the value of the short-term gain from cheating. Karpoff and Lott (1993) label the value of such quasi-rents that are at risk if a firm cheats its "reputational capital." Here, we use the term "market capital" to emphasize that such losses are imposed

[16] E.g., see https://case-law.vlex.com/vid/u-s-v-beech-888331242.
[17] E.g., see https://www.huffpost.com/entry/learn-from-sears-dont-mak_b_5511481.

when the cheating firm or individual faces less favorable terms of contract with their counterparties when they are discovered to have cheated.

Using this expanded notion of total capital, *B*'s trust in *A*, π, depends on *A*'s total ex-post consequences if *A* fails to deliver the promised goods or service. Substituting ΔTC for ΔS in equation (4),

$$\pi = Pr\{\Delta_L L + \Delta_M M + \Delta_S S \geq b\} \qquad (10)$$

Here, Δ_L, Δ_M, and Δ_S are the fractions of *L*, *M*, and *S* that *A* loses if he cheats *B*. Δ_S is the same as Δ in previous sections. $\Delta_L L$ represents the value of any legal sanctions imposed on A, and $\Delta_M M$ is the value of *B*'s loss in market reputational capital. Δ_L, Δ_M, and Δ_S are all bounded between 0 and 1, so we can state equation (10) as

$$\pi = \pi\{TC, b\} = \pi\{L, M, S, b\} \qquad (11)$$

where $\pi\{.\}$ is increasing in *L, M,* and *S,* and decreasing in *b*. That is, *A*'s potential loss ΔTC is positively related to the amounts of legal, market, and social capital that *A* brings to their transaction with *B*.

The condition for the transaction to have non-negative value to *B* is:

$$Pr\{\Delta_L L + \Delta_M M + \Delta_S S - b \geq 0\} \geq c/(c+g_B).$$

5.a. Interactions between social capital, legal institutions, and market forces

Including legal and market consequences complicates the relation between social capital, trust, and economic value added, i.e., Propositions 3 and 5. Proposition 3, for example, is that trust is positively related to social capital. From equation (11), however.

$$\frac{d\pi}{dS} = \frac{\partial \pi}{\partial S} + \left(\frac{\partial \pi}{\partial L}\frac{dL}{dS} + \frac{\partial \pi}{\partial M}\frac{dM}{dS}\right) \qquad (12)$$

Proposition 3 states that $\partial\pi/\partial S > 0$. The sign of $d\pi/dS$ in equation (12), however, is affected by the interaction effects dL/dS and dM/dS. If an increase in social capital substitutes heavily for, say, market capital, $dM/dS < 0$ and $d\pi/dS$ could be negative. An example could be a socially tight-knit community in which sellers do not invest in market capital that helps to bond performance in a repeated game setting.

5.b. Are legal, market, and social capital substitutes or complements?

The extent to which legal, market, and social capital serve as substitutes or complements in developing trust is an important policy matter. Carlin et al. (2009) develop a model in which social capital and legal provisions can be complements or substitutes, but they argue the two generally work as substitutes. In high social capital societies, less regulation is needed because trust is primarily informed by social capital. Similarly, Karpoff and Lott (1993) argue that legal penalties work as substitutes for firms' reliance on reputational (or market) capital. In their framework, higher legal penalties for corporate misconduct will result in lower firm reputational investments and less reliance on market capital, i.e., the repeat purchase mechanism, to deter misconduct.

Equation (10) highlights how *B*'s trust in *A* is formed by the interrelated influences of legal, market, and social capital. Taking the total derivative,

$$d\pi = \left(\frac{\partial \pi}{\partial M}\frac{dM}{dL} + \frac{\partial \pi}{\partial S}\frac{dS}{dL}\right)dL + \left(\frac{\partial \pi}{\partial L}\frac{dL}{dM} + \frac{\partial \pi}{\partial S}\frac{dS}{dM}\right)dM + \left(\frac{\partial \pi}{\partial L}\frac{dL}{dS} + \frac{\partial \pi}{\partial M}\frac{dM}{dS}\right)dS.$$

Setting $d\pi = 0$ shows how a given level of trust can be formed using different combinations of legal, market, and social capital. Because of interaction effects, an increase in one may or may not correspond to a decrease in another. Take, as an example, the effect of legal institutions on social capital. We might conjecture that, to create a given level of trust, a setting with poor legal institutions will rely more on social capital. But this depends on interactions with market capital. Setting $d\pi = 0$:

$$\frac{dS}{dL} = -\frac{\left(\frac{\partial \pi}{\partial M}\frac{dM}{dL} + \frac{\partial \pi}{\partial S}\frac{dS}{dL}\right)}{\left(\frac{\partial \pi}{\partial L}\frac{dL}{dS} + \frac{\partial \pi}{\partial M}\frac{dM}{dS}\right)}$$

The sign of *dS/dL* depends on the interactions of *S* and *L* with market capital *M*. A community with poor legal institutions, for example, may rely heavily on market capital – that is, the repeat purchase mechanism – and not substitute into greater investment in social capital. Similar observations apply to *dS/dM* and *dM/dL*.

Some empirical research suggests that legal, market, and social consequences sometime also work as complements to build trust and facilitate economic transactions. Knack and Keefer (1997), for example, find that social capital (proxied by norms of civic cooperation) is stronger where legal provisions toward contracting and property rights are stronger. La Porta (1997) find that lower social capital countries have less efficient judiciary and suffer from more corruption, indicating a low level of legal capital. As another example, Stulz and Williamson (2003) find that Catholic countries have lower creditor rights than Protestant countries. This effect is distinct from legal origin and it persists within civil law countries. One explanation for this result is that Catholics' low social capital implies that they do not encourage cooperation between individuals through contracts and investment—consistent with Weber (1905)'s analysis of the impact of religion on market activity.

We propose that the relations between social capital and a community's legal and market institutions is an important but underexplored area for empirical research. For example, does social capital serve as a substitute for legal capital? If so, social capital can help to offset the growth-stunting effects of poor legal institutions. If, in contrast, legal, market, and social capital serve as complements, the development of stronger institutions in one domain tent to prompt an increase in trust via the other domains as well. A strengthening of social norms and capital, for example, can have a direct effect on trust formation and economic growth, and an indirect effect if it facilitates the functioning of a community's legal institutions.

6. Why cheating occurs

Repeated game models of trust formation sometimes yield equilibria in which no cheating occurs (e.g., Klein and Leffler 1981), despite the observation that cheating behavior is common. By contrast, cheating behavior arises naturally in our framework because with probability $(1-\pi)$, A finds it optimal to cheat on their agreement because $\tilde{b} > \Delta_L L + \Delta_M M + \Delta_S S$, i.e., their net short-term cheating gain exceeds the sum of their lost legal, market, and social capital. Thus, one pathway by which cheating arises is that the seller's short-term cheating gain turns out to be unexpectedly high.

There are other pathways as well. Throughout, we have assumed that the legal, market, and social capital at stake if A cheats are common knowledge. In practice, however, the seller and buyer can have different information and expectations of $\Delta_L L$, $\Delta_M M$, and/or $\Delta_S S$. Let $E^A[\Delta_L L + \Delta_M M + \Delta_S S]$ equal A's expected loss in total capital and $E^B[\Delta_L L + \Delta_M M + \Delta_S S]$ equal B's expectations of A's loss in total capital. If these expectations diverge such that $E^A[\Delta_L L + \Delta_M M + \Delta_S S] < E^B[\Delta_L L + \Delta_M M + \Delta_S S]$, B will consider A to be more trustworthy than A actually is, leading A to cheat in some circumstances even if, from B's perspective, $\tilde{b} < E^B[\Delta_L L + \Delta_M M + \Delta_S S]$. As discussed in Section 4.c., for example, A might suffer less cognitive dissonance or social disapprobation from cheating than B expects, or expect fewer regulatory repercussions than B expects. Notice that the mistake – i.e., the difference between expected losses and ex post losses – can come from either party. Either B can underestimate A's net gain from cheating or A can overestimate their net gain from cheating. All that is required is that A expects their net losses to be less than B expects.

We have assumed that, when contracting at date 1, A and B agree on the contractual terms. In practice, buyers and sellers frequently disagree about their terms of contract, whether or not the terms are stated explicitly. In our model, the absence of a meeting of minds over contractual terms can be represented by relaxing our assumption of common knowledge about the direct gains to trade, g_A and g_B. For example, an apple buyer might expect the agreement is that the apple was picked fresh the day of purchase, while the seller might think they made no such representation about the apple's freshness. So, the buyer's expectation of g_B is lower than the true (ex post transaction) value of g_B. Equation (2) shows that π_{min} is decreasing in g_B, implying that, by misjudging g_B, the buyer's participation condition is mistakenly low and the buyer engages in some transactions they would not if they had full information about g_B.

Fraudulent or cheating behavior thus arises when the seller and buyer enter the transaction with different expectations of their own or the other's net gains from cheating. This can happen when: (i) the seller's short-term gain b turns out to be unexpectedly large; (ii) the seller's expectations of their losses in total capital, $E^A[\Delta_L L + \Delta_M M + \Delta_S S]$, are less than the buyer's expectations of the seller's losses; or (iii) the

seller and buyer have different information or expectations about each other's direct gains from the transaction.

7. Conclusions

This paper develops a model in which social capital is formed via shared culture plus idiosyncratic personal values and works to build trust. In the model, culture is an input that helps to build social capital, and trust is the primary output of social capital. Trust, in turn, facilitates mutually beneficial exchange activity, inhibits fraud and opportunism, and promotes economic efficiency and growth.

The model's comparative statics yield a rich set of predictions about the relations between trust, social capital, trade, and economic outcomes, which can be used to better understand previous empirical findings and motivate new empirical research. These results show that, in most circumstances: (i) trade increases with the level of trust among counterparties (Proposition 2); (ii) counterparty trust increases with social capital (Proposition 3); and (iii) gains from trade increase with counterparty trust and social capital (Propositions 4 and 5). The model also proposes that the amount of social capital is endogenously determined, at least in part, by the benefits and costs of investment in it (Proposition 6). In particular, a seller's personal investment in social capital increases with their gain from trade, and when social capital is low, generally increases with the efficiency with which investment generates social capital, the cultural component of social capital, the rate at which cheating depreciates social capital, and their counterparty's gain from trade. In contrast, at low levels of social capital, a seller's investment generally decreases with their counterparty's prospective cost of being cheated.

Our framework yields additional insights as well. We model culture as the non-excludable and non-rivalrous set of norms and values that contributes to the social capital of every member of the cultural group. An individual's behavior, however, has external effects on the group's culture and the social capital of its members. Honest dealing increases the members' social capital by incrementing the social norm of honest behavior, while cheating diminishes members' social capital by degrading the social norm of honest

behavior. Such external effects create the possibility of a virtuous cycle in which honest dealing builds more social capital, or a corruption trap in which cheating encourages more cheating.

Social capital combines with legal institutions and market mechanisms to help guarantee performance and build trust among counterparties. Legal, market, and social capital are additive in their effects on the total capital a person brings to a transaction, but previous research is mixed on whether they work as substitutes or complements in the building of trust. Some findings imply substitutability, for example, when an increase in legal penalties for misconduct results in less reliance on market or social capital. Other findings imply complementarity, for example, when strong legal institutions contribute to a community's social capital.

Our model also highlights shows how, despite the bonding provided by social capital, fraud and cheating behavior sometimes occur. The key is that the cheating party's expected benefits from cheating are larger than expected by the cheated party. This can happen in any of several ways. The cheater can discover the benefits of cheating are unexpectedly high. The parties to a transaction can have different information or expectations about the legal, market, and social consequences for cheating behavior. Or, the parties can have different understandings of the (explicit or implicit) contractual arrangement. In the model, the failure of a meeting of minds in contract formation manifests as differing expectations of the surpluses each party earns from the transaction. Such differing expectations can lead to the formation of trust when, with better information about their counterparty's expectations, the cheated party would have avoided making the contract in the first place.

The pathways by which social capital bonds honest performance and disciplines cheating behavior highlight the fundamental nature of mutual expectations and trust for economic activity. As economic agents, we constantly assess our counterparties' trustworthiness and our willingness to engage with them. Our assessments amount to predictions of our counterparties' behavior, which are based on our expectations of the legal, market, and social consequences they will incur if they treat us badly – just as they are making similar predictions about our own behavior. Even the simplest transactions – one's morning coffee and muffin, for example – involve complex projections of our own and others' future behavior. Such projections

frequently are implicit and made unconsciously, but they form the foundation upon which cooperative exchange and production activity is built.

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Appendices for "A Theory of Social Capital and Trust"

Appendix A: Alternative conceptions of social capital and trust

Our model of social capital and trust borrows liberally from others' treatments of these concepts, including Putnam (1990), Fukuyama (1995), and Gambetta (1998). Still, our definitions do not align perfectly with previous discussions of these concepts. Indeed, "social capital" and "trust" refer to such a wide range of concepts, beliefs, and activities that we doubt any specific definition – including ours – will subsume all others. This appendix provides a brief sketch of several prominent alternative definitions of trust and social capital, illustrating the overlapping but not perfectly congruent treatments of these concepts.

A.1. Alternative conceptions of social capital

- Bourdieu (1980) conceives of social capital as embodied outcome of an individual's network of relationships. That is, social capital is "…The sum of actual or potential resources linked to the possession of a *lasting network of relationships* that more or less institutionalized, of inter-connections and inter-recognitions; or, in other words, of *belonging to a group*, as a set of agents who are not only endowed with common traits (which can be perceived by an observer, by others or by group members themselves) but are also united by permanent and useful *links*" (Bourdieu, 1980, our translation, original emphases).
- In a later definition, Bourdieu (1986) defines social capital is "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition."
- For Coleman (1990), "social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors-whether persons or corporate actors-within the structure."

- Durlauf & Fafchamps (2005) define social capital as encompassing the norms of cooperation shared by members of a network.
- Fukuyama (1995) calls social capital "the capability that arises from the prevalence of trust in a society or in certain parts of it."
- Loury (1977) defines social capital as "the consequences of social position in facilitating the standard human capital characteristics"
- Putnam (1993) defines a community's social capital as "norms of reciprocity and networks of civic engagement" and "features of social organizations, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinating action." Later, Putnam (2001) acknowledges that "social trust is not part of the definition of social capital but it is certainly a close consequence.

A.2. Alternative Definitions of Trust[18]

- Baier (1995) defines trust "…as accepted vulnerability to another person's power over something one cares about, *in the confidence* that such power will not be used to harm what is entrusted."
- Trust is "an attitude, disposition, or inclination to act in certain ways in light of various beliefs one has both about oneself and others. Typically, these beliefs concern one's own vulnerability and the restraint the trusted agent is prepared to exercise not to take advantage of that vulnerability." (Brenkert, 1998)
- For Cohen and Dienhart (2013) "when A trusts B to do X, A invites B to acknowledge and accept an obligation to do X. When—or if—B accepts the invitation, B takes on that obligation. In that way trust creates an obligation and forms a trust relationship."

[18] See Cohen and Dienhart (2013) for a review of the concepts of trust in philosophy and business ethics. Our list does not include conceptions of trust as a response to a potential counterparty's trustworthiness, so called "motive-based theories" (McLeod, 2023).

- Trust is "the expectation that arises within a community of regular, honest, and cooperative behavior, based on commonly shared norms, on the part of other members of that community" (Fukuyama, 1995)
- "When we say we trust someone or that someone is trustworthy, we implicitly mean that the probability that he will perform an action that is beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of cooperation with him" (Gambetta, 1998).
- Mayer et al (1995) define trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the [trustor's] ability to monitor or control that other party."

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Appendix B. Proof of Proposition 1

Proposition 1 states that, "Despite the risk of costly cheating behavior and assuming the buyer avoids extreme cognitive errors, the conditional and unconditional expected gain from trade is positive." Here, we show the condition for *E(G)* to be positive and the boundary condition that defines an "extreme cognitive error" or "self-destructive choice" in our model.

From equation (5),

$$E(G) = g_A + [(1-\pi)\,(E(\tilde{b}|\tilde{b} > \Delta S) - \Delta S] + [\pi\, g_B - (1-\pi)c]$$

The first and second terms are positive, *E(G)* can be negative only if the third term, $\pi g_B - (1-\pi)c$, is strongly negative. This third term is positive when the buyer's expected gain from the transaction exceeds their expected cost from being cheated. It can be negative only if the buyer participates in the transaction despite a negative expected value.

In particular, *c* must be quite large to make the expected value of the transaction negative:

$$E(G) < 0 \;\; iff \;\; c > \; g_B + \frac{\pi}{1-\pi}\,(g_A + g_B) + \frac{W-\Delta S}{2} \qquad \text{(A.1)}$$

Condition (A.1) defines what "extreme cognitive error" means in our model. It shows that the buyer *B* makes an "extreme cognitive error" if they enter a transaction for which the possible bad outcome *c* is very large compared to the potential good outcome g_B. Such situations can arise when *c* is large compared to *B*'s potential gain (g_B), the odds of not being cheated ($\pi/(1-\pi)$), and/or the expected value of *A*'s cheating gain conditional on cheating ($(W-\Delta S)/2$). In such situations, *B*'s expected value from participating in the transaction is so negative that the combined expected gain for both *A* and *B* is negative.

Appendix C. Proof of Proposition 5

Proposition 5 states that, "The unconditional expected gain from trade increases with the seller's social capital if the seller's potential cheating gains are bounded such that $W < \Delta S + g_B + c + Z$, where $Z = k(1-y)E(G)$. If $W > \Delta S + g_B + c + Z$, however, an increase in social capital decreases the unconditional expected gain from trade."

Taking the derivative of the unconditional expected gain with respect to social capital *S*:

$$\frac{dyE(G)}{dS} = \frac{\Delta}{W}[ky(1-y)E(G) + y(g_B + c + \Delta S - W)]$$

Hence, $dyE(G)/dS > 0$ if the term in brackets on the right-hand side is positive. Rearranging, the term in brackets is positive if

$$W < (\Delta S + g_B + c) + k(1-y)E(G)$$

which implies

$$W < (\Delta S + g_B + c) + Z$$

where $Z = k(1–y)E(G)$.

Appendix D: Effects of external effects

Section 4.a of the paper examines how a transaction's outcomes can have external effects on the cultural component of social capital. Cheating can depreciate the social capital available to all others in the seller's cultural group, while honest behavior builds the cultural component of social capital. Incorporating external effects does not change the intuition of Propositions 1 – 5, although it changes the specific proofs of Propositions 4 and 5.

Proposition 4 states that, "If $c > (E(\tilde{b}|\tilde{b} > \Delta S) - \Delta S)$, i.e., *c* is sufficiently large to pose a meaningful risk for *B,* the unconditional expected gain from trade increases with the buyer's trust, π." With external effects, an increase in trust has an even more positive effect on the expected gains from trade because it increases the probability of the positive externality and decreases the probability of the negative externality. In particular, the effect of trust on the conditional expected gain is:

$$\frac{dE(G)}{d\pi} = g_B + (E^+ + E^-) - \left(E(\tilde{b}|\tilde{b} > \Delta S) - (\Delta S + c)\right)$$

With the condition $c > (E(\tilde{b}|\tilde{b} > \Delta S) - \Delta S)$, each term on the right side is positive, thus assuring $dE(G)/d\pi > 0$ and $dE(G)/d\pi > 0$.

Proposition 5 states, "The unconditional expected gain from trade increases with the seller's social capital if the seller's potential cheating gains are bounded such that $W < \Delta S + g_B + c + Z$, where $Z = k(1–$

y)E(G). If $W > \Delta S + g_B + c + Z$, however, an increase in social capital decreases the unconditional expected gain from trade." With external effects E^+ and E^-, the effect of social capital on the expected gains from trade becomes:

$$\frac{dyE(G)}{dS} = \frac{\Delta}{W}[ky(1-y)E(G) + y(g_B + c + \Delta S - W + E^+ + E^-)].$$

$dyE(G)/dS > 0$ if the term in brackets on the right-hand side is positive. Rearranging, the term in brackets is positive if

$$W < (\Delta S + g_B + c) + k(1-y)E(G) + E^+ + E^-$$

which implies

$$W < (\Delta S + g_B + c) + Z'$$

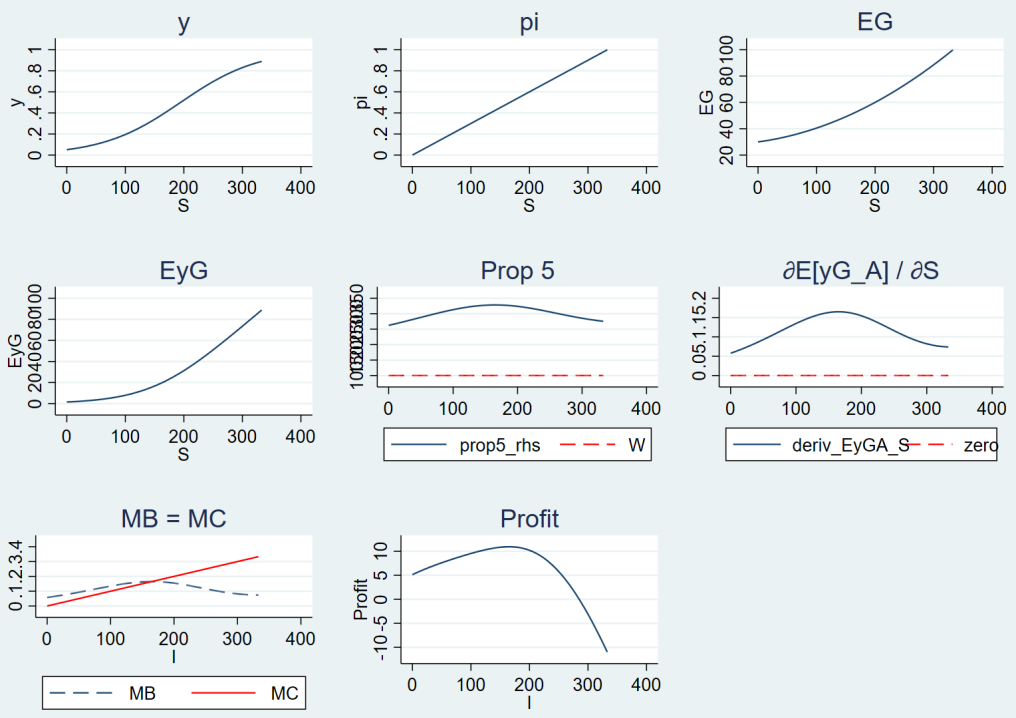
where $Z' = k(1–y)E(G) + E^+ + E^-$. Thus, with external effects, an increase in social capital leads to an increase in expected economic benefit over an even larger range of values for W. Stated differently, the presence of external effects from honest or cheating behavior increases the benefits of social capital.

Appendix E: Simulation results summary

Section 4.b and Figure 2 in the paper summarize the results of a simulation to illustrate the seller's optimal investment in the personal component of social capital. The results illustrated in Figure 2 use the following base case parameters:

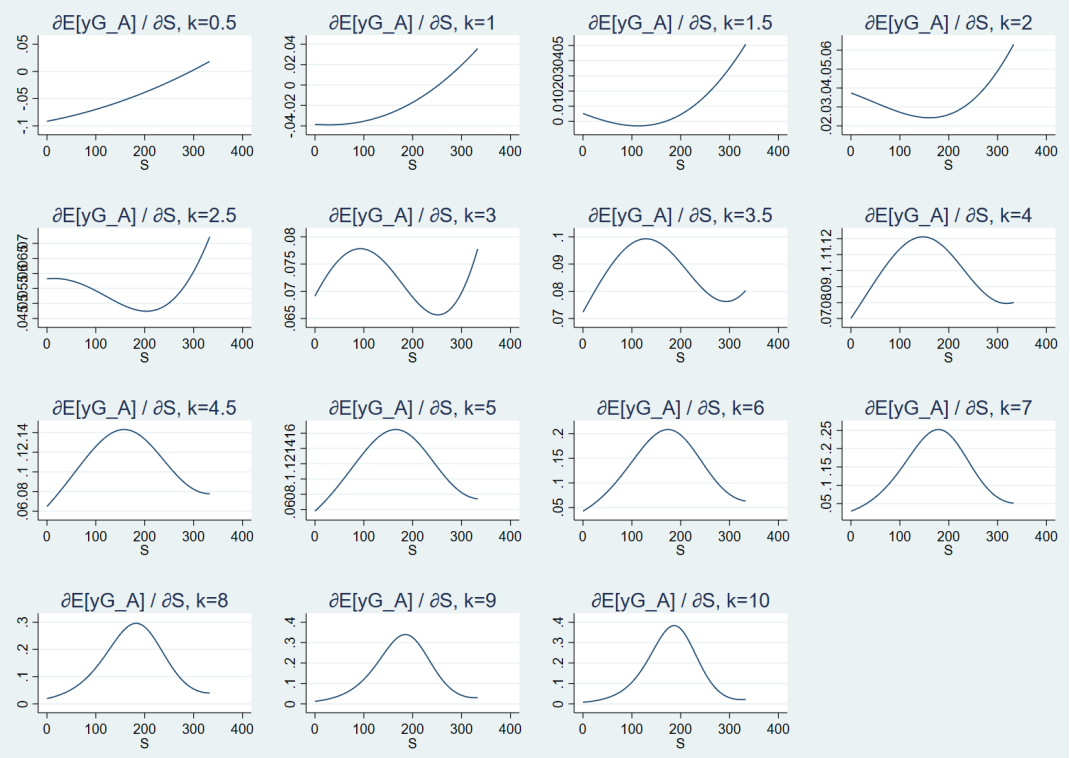
Seller's potential gain: $g_A = 50$
Buyer's potential gain: $g_B = 50$
Buyer's cost if cheated: $c = 70$
Fraction of seller's social capital lost if they cheat: $\Delta = 0.3$
Steepness parameter in buyer's logistic decision function: $k = 5$
Upper bound of seller's cheating gain: $W = 100$
Shared cultural component of social capital: $C = 0$
Productivity of social capital investment: $h = 1$
Production of the personal component of social capital: $P(I) = h*I$
Cost of producing $u(I) = \alpha(0.5)(I\text{^}2)$, where α is a scaling parameter set to .001.

The outcomes under the baseline parameters look like the following:

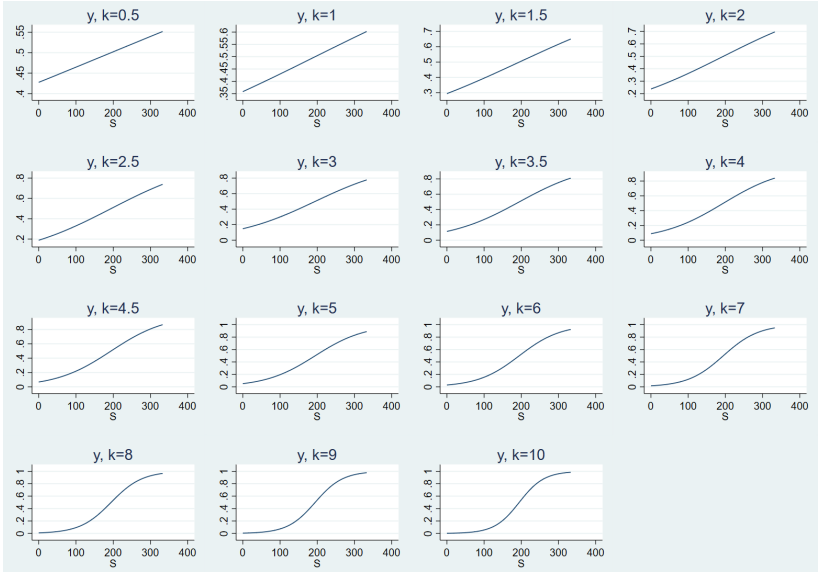


We examined various influences on the sign and shape of the marginal benefit of investment in the personal component of social capital, *MB*. Assuming a simple production function, *MB* is similar to the effects of the seller's social capital *S* on their expected gain, $d\mathrm{E}[yG_A]/\mathrm{d}S$, because $MB = d\mathrm{E}[yG_A]/\mathrm{d}S * P'(I) = d\mathrm{E}[yG_A]/dS * \mathrm{h}$.

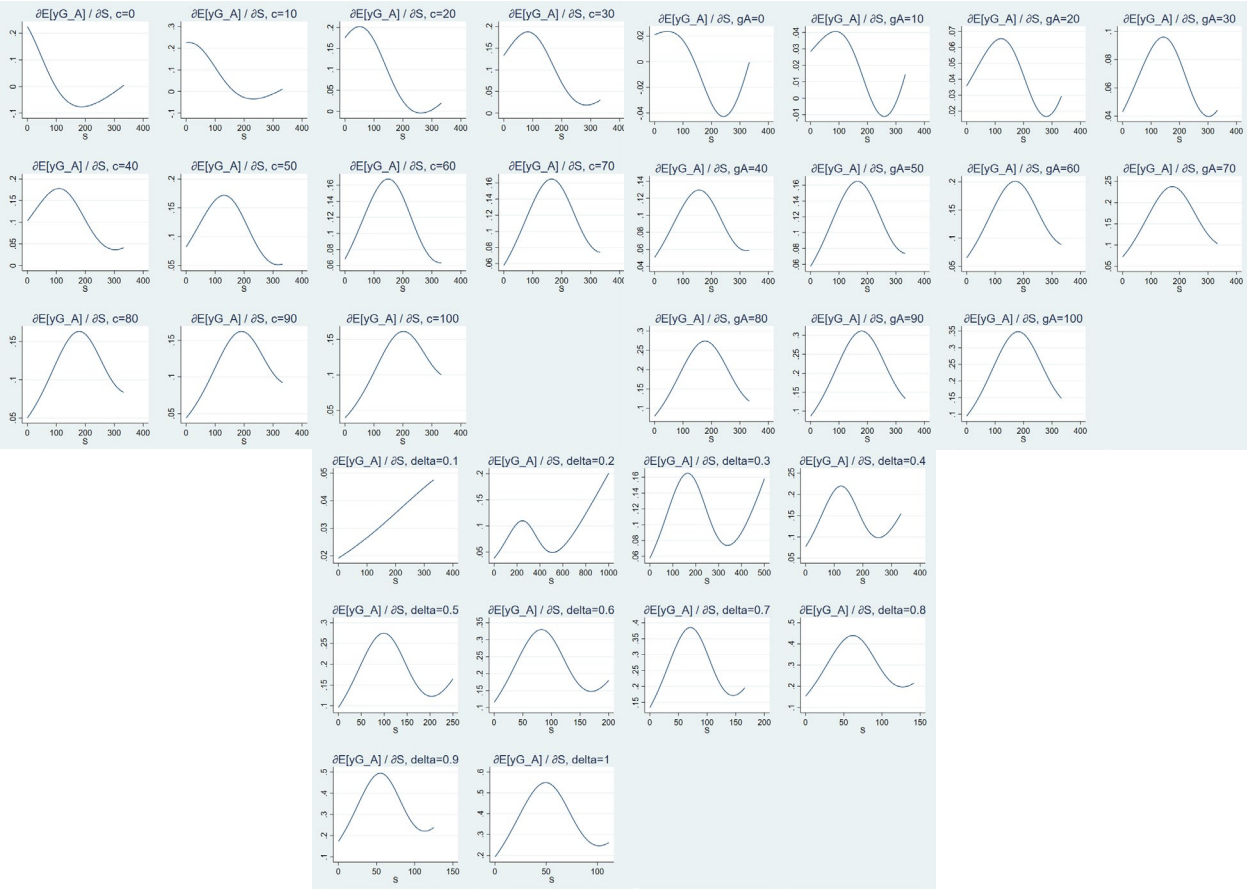
A central result from these simulations is that the marginal benefit of investment in the personal component of social capital, *MB*, is hump-shaped, i.e., first increasing and then decreasing, except in extreme value cases. Most notably, the *MB* curve is not hump-shaped for very low levels of the steepness parameter *k*. A very low *k* corresponds to virtually random behavior by the buyer because the buyer might engage in transactions even if they have extreme negative expected outcomes for the buyer. The following graphs show how the level and shape of the marginal benefit are affected by *k*. In our base case simulations, we use k=*5*.



Again, the buyer acts more like a risk-neutral value-maximizer as *k* increases. This is evident in the following figures, which show how y, the probability of the deal going through as a function of social capital, changes with *k*:



Other model parameters also affect the specific investment optimum, as illustrated in the following graphs showing the effects on *MB* of g_A, c, and Δ. Except for extreme values, however, the optimum investment results from costs and benefits as illustrated in Figure 2 of the paper.



Appendix F. Proof and discussion of Proposition 6

Proposition 6 states that, "The seller's optimal investment in social capital increases with their gain from trade (g_A). The effects of other model parameters on optimal investment depend on parameter values. In general, when investment I and the probability of trade (y) are low, the optimal investment in social capital increases with the efficiency with which investment generates social capital (h), the cultural component of social capital (C), the rate at which cheating depreciates social capital (Δ), and the buyer B's

gain from trade (g_B), and it increases with the buyer's cost if they are cheated (c). These effects tend to be reversed at high levels of investment I and when the probability of trade is high."

These are statements about the partial derivative of I^* with respect to each of the model parameters. From equation (8) in the paper:

$$I^* = \frac{h\Delta}{\alpha W}\left[ky(1-y)g_A + ky(1-y)\left(\frac{(W-\Delta S)^2}{2W}\right) - y\left(\frac{W-\Delta S}{2}\right)\right]$$

which we rewrite as

$$I^* = \frac{h\Delta}{\alpha W}[\beta]$$

where

$$\beta = ky(1-y)g_A + ky(1-y)\left(\frac{(W-\Delta S)^2}{2W}\right) - y\left(\frac{W-\Delta S}{2}\right)$$

For non-negative investment, β must be positive. Simulations, as in Appendix E, show that β is indeed positive for the great majority of combinations of parameter values, but not all.

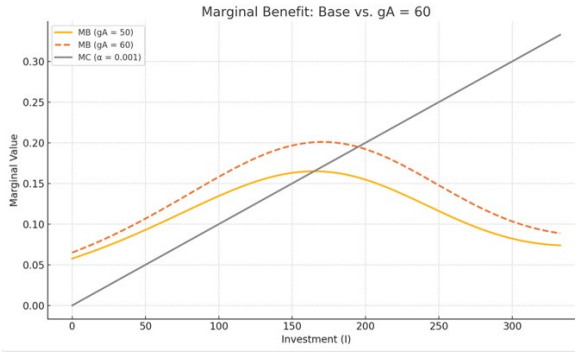
Investment in social capital affects S and y, so parameter changes that affect I^* can have indirect influences on I^* through their effects on S and y. The discussion below simplifies these effects by focusing on partial derivatives, effectively fixing y and yielding insights about the effects on I^* at different levels of y.

(i) Effect of g_A:

$$\frac{\partial I^*}{\partial g_A} = \frac{h\Delta}{\alpha W}\, ky(1-y) > 0.$$

The effect of g_A on I^* is unambiguously positive. When the seller has more to gain from the transaction, the payoff to investing in social capital increases.

The effect of an increase in g_A is illustrated in the diagram below, which displays the marginal benefit and marginal cost of investment in social capital for the base case parameter values described in Appendix E. An increase in g_A from 50 to 60 shifts up the marginal benefit of investment and increases I^*.

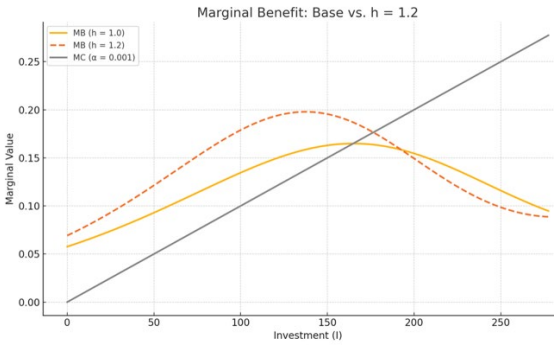


(ii) Effect of h:

$$\frac{\partial I^*}{\partial h} = \frac{\Delta}{\alpha W}\,\beta.$$

This expression is positive for most parameter values, consistent with the intuition that optimal investment increases with the efficiency of investment. The exception occurs only when additions to social capital create little marginal benefit for the seller. Such exceptions can arise at high levels of investment, at which the probability of a transaction (y) is relatively high.

These effects of an increase in h are illustrated in the diagram below.



(iii) Effect of S (via the endowed cultural component, C):

S increases with both the choice variable, I, and the cultural component, C. For most of our analysis we treat C as endowed as the seller enters the prospective transaction with the buyer. Here, we consider changes in C that affect S.

Note that S (via a change in C) affects both y and $x = (W–\Delta S)$:

$$\frac{dy}{dS} = \frac{dy}{d\pi}\frac{d\pi}{dS} = ky(1-y)\frac{\Delta}{W}.$$

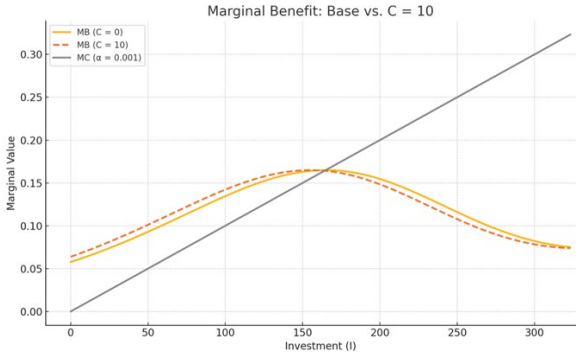
$$\frac{d(W-\Delta S)}{dS} = \frac{dx}{dS} = -\Delta.$$

These help in the interpretation of ∂I/∂S:

$$\frac{\partial I^*}{\partial S} = \frac{h\Delta}{\alpha W}\left[\frac{k^2 g_A \Delta}{W} y(1-y)(1-2y) + \frac{k^2\Delta x^2}{2W^2} y(1-y)(1-2y) - \frac{3k\Delta x}{2W}\, y(1-y) + \frac{\Delta y}{2}\right]$$

The sign of this expression depends on specific parameter values. But, in general, the effect of S on I^* is positive when I is small and the probability of a transaction, y, is small; it is negative when I and y are large. This is evident in the $(1\text{-}2y)$ terms, which are positive when $y < 0.5$ and negative when $y > 0.5$. The intuition is that an increase in S (via C) increases the marginal benefit of investment in additional social capital when it can have a material effect on the buyer's willingness to engage in the transaction. If the stock of social capital already is sufficient to encourage the buyer to engage in the transaction, the marginal cost of additional investment in social capital is more likely to exceed the marginal benefit.

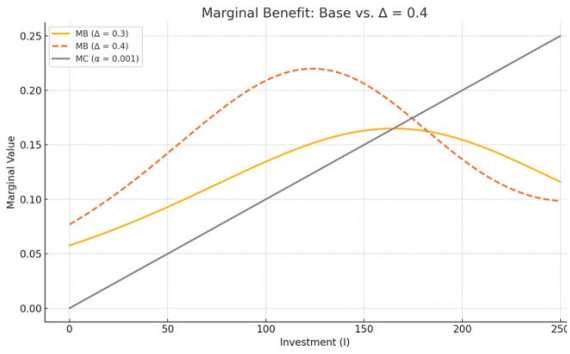
These effects are illustrated in the diagram below, which compares the base case to a case in which S is increased by increasing the cultural component of social capital from 0 to 10. The effect is to shift the *MB* curve to the left by 10 units, leading to a higher marginal benefit of investment at low I and a lower marginal benefit at high I.



(iv) Effect of Δ*:*

$$\frac{\partial I^*}{\partial \Delta} = \frac{h}{\alpha W}\beta + \frac{h\Delta}{\alpha W}\frac{\partial \beta}{\partial \Delta}.$$

The sign of $\partial\beta/\partial\Delta$ is ambiguous and depends on parameter values (results available upon request), so the sign of $\partial I^*/\partial\Delta$ is ambiguous. In general, the effect of Δ on I^* is positive at low levels of I and when the probability of a transaction, y, is small, and negative at high levels of I and when y is large. This is because an increase in Δ increases the marginal benefit of investment in social capital when it can have a material effect on the buyer's willingness to engage in the transaction. This effect is illustrated in the following diagram, which displays the base case (where $\Delta = 0.3$) to the case where $\Delta = 0.4$.



(v) Effect of g_B*:*

Note that the buyer's prospective gain, g_B, affects I^* only to the extent it affects π_{min}.

$$\frac{\partial \pi_{min}}{\partial g_B} = -\frac{c}{(c + g_B)^2}$$

implying:

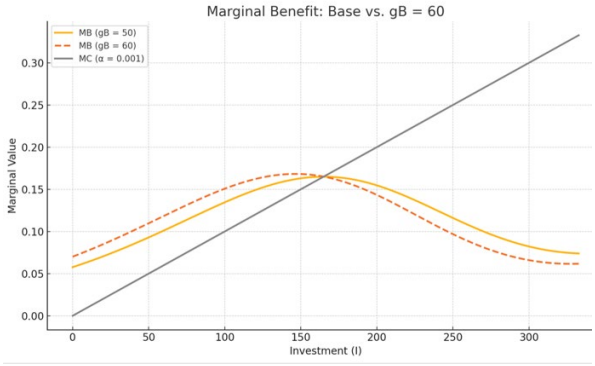
$$\frac{\partial y}{\partial g_B} = ky(1-y)\frac{c}{(c + g_B)^2} > 0.$$

By the chain rule,

$$\frac{\partial I^*}{\partial g_B} = \frac{h\Delta}{\alpha W} ky(1-y)\left(\frac{c}{(c+\ g_B)^2}\right)\left[k(1-2y)\ \left(g_A + \frac{(W-\Delta S)^2}{2W}\right) - \left(\frac{W-\Delta S}{2}\right)\right]$$

This expression tends to be positive for low levels of *I* and negative for high levels of *I*. The positive effect arises because an increase in the buyer's potential gain, g_B, decreases the buyer's minimum level of trust required for a non-negative expected outcome, π_{min}, which increases the probability of a transaction, *y*, increasing the seller's incentive to invest in social capital. When *I* is large, however, the probability of a transaction already is high and the incremental benefit of additional social capital is lower.

These effects are illustrated in the following diagram, in which the base case is compared to the situation in which g_B is increased from 50 to 60. The effect of this change given these particular parameter values is negligible, but the overall positive effect at low levels of *I*, and negative effect at high levels of *I*, are apparent.



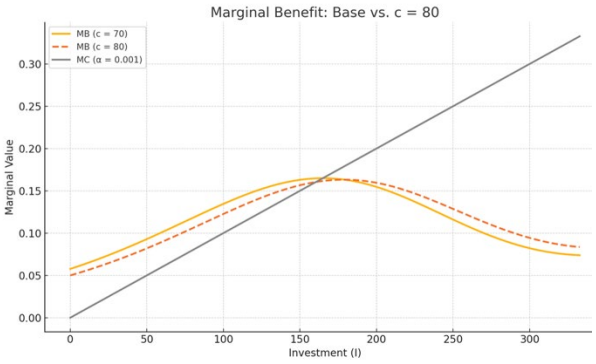
(vi) Effect of c:

The effect of *c* on *I** depends on ∂ß/∂c.

$$\frac{\partial \beta}{\partial c} = -ky(1-y)\left(\frac{g_B}{(c+\ g_B)^2}\right)\left[k(1-2y)\ \left(g_A + \frac{(W-\Delta S)^2}{2W}\right) - \left(\frac{W-\Delta S}{2}\right)\right]$$

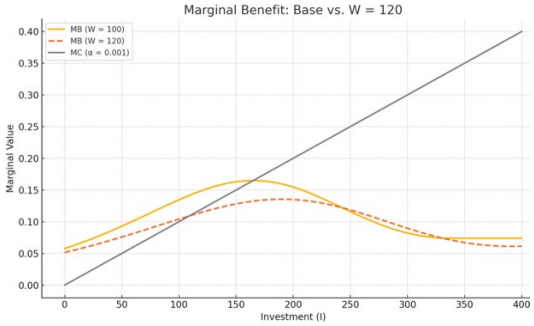
In general, $\partial\beta/\partial c$ is negative when investment and/or y is low (less than 0.5), and positive when investment and/or y is high (greater than 0.5). The intuition is the opposite for changes in g_B. At low levels of y and/or I, an increase in the buyer's potential cost c increases the buyer's minimum level of trust required for a non-negative expected outcome, π_{min}, which decreases the probability of a transaction, y, decreasing the seller's incentive to invest in social capital.

These effects are illustrated in the following diagram, in which the base case is compared to the situation in which c is increased from 70 to 80. The effect of this change given these particular parameter values is negligible, but the overall negative effect at low levels of I, and positive effect at high levels of I, are apparent.



(vii) Effect of W:

An increase in W increases the risk to the buyer because it increases the chance of an extreme value for the seller's gain from cheating, b, thus increasing the probability of cheating for any level of social capital. For most parameter values, this decreases the marginal benefit of investment in social capital and a lower I^*. The intuition for this result is that the increased likelihood of cheating decreases the buyer's expected outcome and decreases the probability of a transaction. The seller's ability to overcome the buyer's reluctance by investing in more social capital is limited because the prospect of a large cheating gain (i.e., a high W) means that there are plausible outcomes in which the seller will cheat even if they have a larger amount of social capital at stake. As illustrated in the diagram, however, when I is large, there is a small range of I over which the effect of an increase in W is to slightly increase I*.


Marginal Benefit: Base vs. W = 120
MB (W = 100)
MB (W = 120)
MC (α = 0.001)
Marginal Value
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
50
100
150
200
250
300
350
400
Investment (I)