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Research Article

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Relational Capital as a Welfare Input: Trust, Underinvestment, and Institution-Sensitive Correction

Research Article — Theoretical Economics

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Abstract

Economic analysis routinely models physical, human, and institutional capital, yet the relational conditions that make cooperation valuable are often treated as background. This article develops a formal welfare model in which relational investment generates an individually enjoyed good and a spillover that improves the relational experience of others. Trust is represented as a productivity parameter that determines how effectively one person's investment enters another person's relational payoff. The model yields four main results. First, a unique symmetric Nash equilibrium exists under standard convex-cost conditions. Second, decentralized relational investment is inefficiently low whenever relational spillovers are positive. Third, greater trust has a paradoxical comparative-static effect: it reduces private relational effort through free riding while increasing socially optimal effort, so the underinvestment wedge widens as the relational technology improves. Fourth, a state-contingent corrective subsidy can decentralize the social optimum, but its desirability is weakened when monetary intervention crowds out intrinsic relational valuation. An institutional extension endogenizes trust through investments in settings that support repeated, respectful interaction. Numerical illustrations map the analytic results and show how corrective policy becomes more important as relational spillovers increase. The framework connects civil-economy accounts of reciprocity and relational goods with conventional externality theory while preserving the distinctive feature that relationships are jointly produced and partly noncontractible. It provides a tractable basis for analyzing welfare, institutional design, and policy when human flourishing depends on the quality of social interaction as well as material consumption.

Keywords: relational goods; trust; reciprocity; welfare economics; social capital; civil economy

JEL classification: A13; D62; D63; D91; Z13

1 Introduction

Economic welfare depends on more than the command over private commodities. People work, exchange, cooperate, care, deliberate, and participate in institutions through relationships whose quality affects both subjective well-being and the productivity of collective activity. Civil-economy scholarship has long emphasized reciprocity, public faith, relational goods, and the common good as constitutive features of economic life rather than decorative additions to an otherwise self-contained market mechanism. Contemporary evidence likewise associates the quality and intensity of relationships with life satisfaction, trust, cooperation, and organizational performance. Recent work in this journal reports that relational life and generativity are strongly associated with life satisfaction and argues that policy should take the quality of relationships seriously (Becchetti et al. 2024). The civil-economy tradition has also been restated as a relational alternative to contractualist accounts in which reciprocity and gift are central to economic and political order (Pabst 2026).

The difficulty is that the normative force of these observations is easier to state than to integrate into a tractable welfare model. Standard externality theory can say that one person's action benefits another, but it often treats the external benefit as separable from the relation through which it is produced. Social-capital models can attach productivity to trust or networks, but they often aggregate relationships into a stock without representing the joint production of a relational good. Models of reciprocity explain contingent cooperation, but their principal object is usually strategic response to kindness rather than the underinvestment problem created when relational activity is jointly enjoyed. A useful formalization for civil economy should therefore do at least three things at once: represent relational investment as chosen behavior, allow one person's investment to enter another person's experienced relational good, and preserve the possibility that institutions alter how productive such investment is.

This article proposes a deliberately small model that meets those requirements. Each agent chooses a nonnegative relational investment x_i . The term can represent time spent building trust with coworkers, effort devoted to mutual help in a neighborhood, investment in associative life, mentoring, reciprocal attention in a service encounter, or costly actions that make a cooperative relationship more reliable. Agent i enjoys a relational good composed of the agent's own investment plus a trust-weighted average of the investment supplied by others. The trust parameter τ lies between zero and one and measures relational convertibility: when τ is low, the actions of others do little to improve the focal agent's relational experience; when τ is high, reciprocal investments are legible, credible, and productive. Relational utility is concave and private investment is costly.

The model produces a comparative-static result that is not obvious from verbal discussion. Higher trust does not necessarily cause individuals to invest more in relationships. In the decentralized equilibrium, a higher τ makes others' effort more productive for the individual, which strengthens free riding and lowers own relational investment. For a social planner, however, higher τ increases the social return to each unit of investment because that unit improves the relational experience of the whole interacting group. Socially optimal investment therefore rises with τ . The difference between privately chosen and socially optimal relational investment widens as trust increases. Trust can thus make the relational economy more productive while simultaneously making laissez-faire provision less adequate.

That result matters for civil-economy policy. If institutions successfully raise trust, reciprocity, or the quality of interaction, they may also increase the welfare cost of leaving relational investment entirely to decentralized incentives. The correct implication is not that the state should purchase friendship or administratively manufacture community. The relational good is partly noncontractible and depends on authenticity. Rather, the model identifies a wedge that can be addressed through institution-sensitive tools: public spaces, organizational rules, cooperative governance, time structures, associational infrastructure, and, in some settings, financial support. A Pigouvian subsidy is derived as a benchmark, not as a universal recommendation. A crowding-out extension shows why direct monetary incentives can become counterproductive when they weaken intrinsic relational valuation, a possibility consistent with evidence on motivation crowding (Gneezy and Rustichini 2000; Frey and Jegen 2001).

The contribution is theoretical in four respects. First, it makes relational capital an explicit welfare input rather than a residual attached to social capital. Second, it separates relational productivity (τ) from relational investment (x), which makes it possible to distinguish trust-building institutions from effort by participants. Third, it derives a trust-dependent externality wedge and a decentralizing correction. Fourth, it embeds the model in a broader institutional extension in which public or organizational investments can improve the relational technology itself. These results create testable distinctions among three claims that are often conflated: that trust raises welfare, that trust raises private relational effort, and that trust reduces the need for institutional support. The model predicts that the first can be true while the second and third are false.

The analysis is not offered as a complete theory of friendship, civic virtue, or social capital. Relationships are heterogeneous, often asymmetric, and embedded in norms, identities, and histories that cannot be reduced to a scalar. Nor does welfare necessarily equal the sum of experienced utilities. The purpose of the formalization is narrower: to identify a general economic mechanism that arises whenever relational actions are costly, jointly productive, and imperfectly internalized. That mechanism can then be connected to richer normative accounts of mutual recognition, dignity, and the common good.

The remainder of the article proceeds as follows. Section 2 places the model in the literature on relational goods, social capital, reciprocity, and motivation. Section 3 introduces the environment. Section 4 derives the decentralized equilibrium and social optimum and establishes the central comparative statics. Section 5 derives a corrective instrument and an institutional extension. Section 6 considers motivational crowding and explains why the benchmark subsidy should be interpreted cautiously. Section 7 presents numerical illustrations. Section 8 develops welfare and institutional implications for civil-economy analysis. Section 9 states empirical implications and possible research designs. Section 10 discusses limitations, and Section 11 concludes.

2 Relational goods, trust, reciprocity, and the welfare problem

The starting point is the distinction between relational goods and ordinary private goods. A relational good is not simply a commodity whose consumption happens to occur in the presence of others. Its value depends on the quality of an interaction and is jointly produced in the encounter. Gui (2005) emphasizes that interpersonal encounters can generate relational consumption goods and durable relation-specific capital. Gui and Stanca (2010) develop the

connection between relational goods, interpersonal relations, and well-being, while Bruni and Stanca (2008) show empirically that relational goods are associated with life satisfaction and can be crowded out by activities that substitute away from social interaction. Becchetti et al. (2024) provide recent evidence within the *International Review of Economics* that relational life and generativity are major correlates of life satisfaction. These contributions motivate treating relationality as a direct argument in welfare rather than only as a determinant of income.

A neighboring literature treats social capital as a resource embedded in social structure. Coleman (1988) defines social capital through functions such as obligations, information channels, and norms that facilitate action. Putnam (1993) links civic association and institutional performance, while Portes (1998) stresses that social capital has multiple sources and can produce negative as well as positive consequences. Cross-country economic research connects trust and civic norms with economic performance (Knack and Keefer 1997), and theory and evidence have linked trust to investment and growth (Zak and Knack 2001). Roth (2022) surveys the relationship between social capital, trust, and growth and emphasizes that the sign and strength of the relationship need not be uniform across settings. The present article differs by using trust as a productivity parameter for relational spillovers rather than identifying trust with the entire stock of social capital.

The distinction is analytically useful. A community can have a high capacity to interpret and reward cooperative acts—a high τ —even if individuals are currently investing little time or effort in those relations. Conversely, people may exert substantial effort in a low-trust environment because cooperation is difficult and requires costly monitoring or repeated reassurance. Collapsing these states into a single social-capital index hides the mechanism. By separating τ from x , the model makes it possible to ask whether institutional improvements in trust cause additional private effort or instead induce substitution toward others' effort.

Reciprocity provides a second foundation. Fehr and Gächter (2000) show that reciprocity affects contract enforcement, collective action, and the performance of explicit incentives. Falk and Fischbacher (2006) formalize reciprocity as a response to perceived kindness that depends on both outcomes and intentions. Ostrom (2000) emphasizes the coexistence of conditional cooperators and willing punishers and the role of institutional context in sustaining collective action. These approaches highlight why the relational technology is not mechanical. The same material act can have different relational value depending on whether it is interpreted as respectful, trustworthy, or opportunistic. In the reduced-form model, τ captures this context-sensitive conversion from observed effort into experienced relational benefit.

Civil-economy theory adds a normative layer. Bruni and Sugden (2013) argue that markets can be understood as practices of cooperation for mutual benefit and that reciprocity can ground market virtues. More recent debate in this journal asks whether a virtue-theoretic defense of markets needs additional criteria to determine which mutually beneficial exchanges deserve moral approval (Calderón Gómez et al. 2025). Pabst (2026) situates reciprocity, gift, public trust, and relational goods within a broader account of civil economy and the common good. The model developed below is compatible with, but does not settle, those normative debates. Its social planner is a device for identifying uninternalized relational benefits, not a claim that aggregate utility exhausts the common good.

The model also connects to the economics of externalities. When x_i enters the utility of others, decentralized choice ignores part of its marginal social product. A Pigouvian logic follows. Yet the relational setting differs from pollution or a standard technological externality because the policy instrument can alter the meaning of the action being subsidized. If a payment changes an act from a gift or expression of reciprocity into a priced transaction, the parameter governing intrinsic relational valuation may change. Evidence that small monetary incentives can reduce performance or voluntary cooperation motivates a crowding mechanism (Gneezy and Rustichini 2000), and motivation-crowding theory provides a general account of how external interventions can weaken or strengthen intrinsic motivation (Frey and Jegen 2001). Fehr and Gächter (2000) similarly note that explicit incentives can crowd out voluntary cooperation under some conditions.

This creates a policy problem that ordinary Pigouvian analysis does not capture: the corrective instrument can change the object it is correcting. The benchmark subsidy is therefore informative as a shadow value of the relational externality, but it is not automatically the best real-world intervention. In settings where authenticity, voluntariness, and reciprocity are central to the good being produced, institutional design may be superior to direct payment. Examples include reducing time scarcity that prevents civic participation, designing workplaces for repeated cooperative interaction, supporting associations without conditioning grants on individual social acts, and creating public environments where encounter is feasible.

The article's conceptual map is summarized in Table 1. Relational investment is an individual choice. Relational productivity is a property of the interactional environment. Relational welfare is the experienced value produced by both. Institutions can act on the cost of investment, the productivity of spillovers, or the incentives surrounding participation. Keeping these margins separate is essential for deriving nontrivial comparative statics.

Object	Economic interpretation	Model representation	Primary policy margin
Relational investment	Costly contribution to a relationship or cooperative encounter	x_i	Participation cost, time, support
Relational productivity	How strongly others' actions improve experienced relational quality	τ	Trust-building and institutional quality
Relational good	Jointly produced quality experienced in interaction	$R_i = x_i + \tau \bar{x}_{-i}$	Not directly contractible
Relational welfare	Direct value of interaction net of effort cost	$a \ln(1+R_i) - k x_i^2/2$	Depends on both institutions and behavior

Table 1 Conceptual separation of relational investment, productivity, and welfare

3 Model

Consider $N \geq 2$ agents indexed by i . Each agent has a numeraire endowment m_i and chooses relational investment $x_i \geq 0$. Let the average investment of the other agents be $\bar{x}_{-i} = (1/(N-1)) \sum_{j \neq i} x_j$. The effective relational good experienced by i is

$$R_i = x_i + \tau \bar{x}_{-i} \quad (1)$$

The parameter τ in $[0,1]$ measures relational spillover productivity. At $\tau = 0$, the agent receives no direct relational benefit from others' investment; at larger values, others' investment becomes more valuable to the agent. The reduced form is intentionally symmetric. It can represent a group, team, association, neighborhood, or repeated service relation in which each person's relational conduct contributes to the interactional quality experienced by the others.

Preferences are quasi-linear in the numeraire and concave in the relational good. Agent i has utility

$$u_i = m_i + a \ln(1 + R_i) - (k/2)x_i^2 \quad (2)$$

where $a > 0$ measures the valuation of relational quality and $k > 0$ is the marginal-cost parameter. Quasi-linearity removes income effects from the core comparative statics and lets the analysis focus on the relational mechanism. The logarithmic term ensures diminishing marginal relational utility, while the quadratic cost makes excessive investment increasingly costly. The substantive results extend to a broader class of strictly increasing, strictly concave relational benefit functions and strictly convex cost functions.

The individual takes $\bar{x}_{-i}$ as given. The social benchmark maximizes the sum of utilities. Because each x_i contributes to the relational good of i with coefficient one and to each of the $N-1$ other agents with coefficient $\tau/(N-1)$, the total marginal relational contribution of one unit of x_i is $1 + \tau$ in a symmetric allocation. This is the key accounting identity. Private choice internalizes the coefficient one. Social choice internalizes $1 + \tau$.

Three features deserve emphasis. First, τ is not altruism. An agent can be entirely self-regarding and still benefit from the relational investment of others. Second, the spillover is not a public good in the standard sense because it is mediated by interaction and need not be available outside the relationship. Third, the model does not assume that relational investment is always morally desirable. If a group is exclusionary or coercive, the welfare interpretation of the relational term would have to be modified. The baseline model is intended for relations in which the experienced relational good is positively valued by participants and does not impose omitted harms on outsiders.

4 Decentralized equilibrium and social optimum

For an interior best response, agent i equates the private marginal relational benefit to marginal cost. Differentiating utility with respect to x_i gives

$$k x_i = a / [1 + x_i + \tau \bar{x}_{-i}] \quad (3)$$

In a symmetric equilibrium $x_i = x$ for all i , the effective relational good is $(1 + \tau)x$. Substitution into the first-order condition yields a quadratic equation with a unique positive root. The planner's problem has the same curvature, but the marginal relational benefit is multiplied by $1 + \tau$ because the planner internalizes the effect on the other agents.

Proposition 1 (Existence and uniqueness of the symmetric Nash equilibrium). For $a > 0$, $k > 0$, and τ in $[0,1]$, there is a unique symmetric interior Nash equilibrium, given by $x^N(\tau) = [-1 + \sqrt{1 + 4a(1+\tau)/k}]/[2(1+\tau)]$.

Proof. In a symmetric profile the private first-order condition is $kx[1+(1+\tau)x] = a$. The left-hand side is continuous, equals zero at $x=0$, is strictly increasing for $x \geq 0$, and diverges as x grows. Hence exactly one positive solution exists.

Applying the quadratic formula yields the stated root; the other root is negative. Strict concavity of individual utility in x_i makes the first-order condition sufficient.

$$x^N(\tau) = \{-1 + \sqrt{[1 + 4a(1+\tau)/k]}\} / \{2(1+\tau)\} \quad (4)$$

Proposition 2 (Social optimum and relational underinvestment). The unique symmetric social optimum is $x^P(\tau) = [-1 + \sqrt{(1 + 4a(1+\tau)^2/k)}] / [2(1+\tau)]$. For every $\tau > 0$, $x^P(\tau) > x^N(\tau)$; equality holds only at $\tau = 0$.

Proof. In a symmetric allocation, an increment in x_i raises i 's relational good by one and raises the relational good of every other agent by $\tau/(N-1)$. Summed across the $N-1$ others, the external marginal effect is τ . The planner first-order condition is therefore $kx = a(1+\tau)/[1+(1+\tau)x]$. This condition has a unique positive root by the same monotonicity argument as Proposition 1 and yields the stated formula. At any common x , the planner's marginal benefit is $(1+\tau)$ times the private marginal benefit. For $\tau > 0$ the private optimum is reached while the planner's marginal benefit still exceeds marginal cost, so strict concavity implies $x^P > x^N$.

$$x^P(\tau) = \{-1 + \sqrt{[1 + 4a(1+\tau)^2/k]}\} / \{2(1+\tau)\} \quad (5)$$

Propositions 1 and 2 establish the baseline inefficiency. The magnitude of the wedge is not fixed. It depends on the relational technology itself. This point is economically important because institutional reform is often justified on the ground that higher trust makes decentralized cooperation easier. The model agrees that higher trust makes a given vector of investments more productive, but it rejects the inference that higher trust necessarily induces more private investment. Differentiating the equilibrium conditions provides the sharper result in Proposition 3.

Proposition 3 (Trust widens the decentralized underinvestment wedge). The decentralized equilibrium investment x^N is strictly decreasing in τ , while the socially optimal investment x^P is strictly increasing in τ . Consequently $x^P(\tau) - x^N(\tau)$ is strictly increasing for $\tau > 0$.

Proof. Write the Nash condition as $F^N(x, \tau) = kx + k(1+\tau)x^2 - a = 0$. Implicit differentiation gives $dx^N/d\tau = -kx^2/[k + 2k(1+\tau)x] < 0$. Write the planner condition as $F^P(x, \tau) = kx + k(1+\tau)x^2 - a(1+\tau) = 0$. Then $dx^P/d\tau = [a - kx^2]/[k + 2k(1+\tau)x]$. At the planner solution, $a = kx/(1+\tau) + kx^2$, so $a - kx^2 = kx/(1+\tau) > 0$. Thus $dx^P/d\tau > 0$. The derivative of the difference is therefore positive.

Proposition 4 (Welfare loss from decentralization). For $\tau > 0$, per-person welfare at the planner allocation strictly exceeds per-person welfare at the symmetric Nash allocation. The loss is increasing locally with the distance between x^N and x^P and vanishes at $\tau = 0$.

Proof. Per-person welfare in a symmetric allocation is $w(x; \tau) = a \ln[1 + (1+\tau)x] - (k/2)x^2$. It is strictly concave because its second derivative is negative. Proposition 2 establishes that x^P is the unique maximizer of w and differs from x^N whenever $\tau > 0$. Therefore $w(x^P; \tau) > w(x^N; \tau)$. When $\tau = 0$, the private and social first-order conditions coincide and the loss is zero. A second-order expansion around x^P shows that the loss is approximately one half of the absolute curvature times $(x^P - x^N)^2$ for small wedges.

5 Corrective policy and institutional quality

A useful benchmark is a marginal subsidy s paid per unit of relational investment. Because the numeraire is quasi-linear, a lump-sum financing arrangement can be abstracted from when deriving the local corrective rate. The private first-order condition becomes

$$kx = a/[1+(1+\tau)x] + s \quad (6)$$

Evaluated at the social optimum, the difference between the social and private marginal relational benefits is exactly the external component. This yields a state-contingent Pigouvian benchmark.

Proposition 5 (Decentralizing marginal subsidy). A marginal subsidy $s^*(\tau) = a\tau/[1+(1+\tau)x^P(\tau)]$ decentralizes the symmetric social optimum when financed by a nondistortionary lump-sum transfer and when a and τ are invariant to the subsidy.

Proof. At x^P , the planner's marginal relational benefit equals $a(1+\tau)/D$, where $D=1+(1+\tau)x^P$. The private marginal relational benefit equals a/D . Their difference is $a\tau/D$. Setting s equal to this difference makes the private first-order condition identical to the planner condition at x^P . Strict concavity gives implementation of the unique optimum.

$$s^*(\tau) = a\tau / [1 + (1+\tau)x^P(\tau)] \quad (7)$$

The subsidy result is best interpreted as a shadow price, not as a universal policy prescription. Civil-economy institutions often operate by changing the relational technology rather than paying for individual relational acts. Let $q \geq 0$ denote institutional investment in interactional quality: examples include deliberative procedures, reliable dispute resolution, shared governance, civic spaces, predictable schedules that make repeated participation possible, or organizational practices that reward trustworthy conduct. Suppose $\tau = \tau(q)$, with $\tau'(q) > 0$ and $\tau''(q) \leq 0$. Let the per-person resource cost of institutional quality be $C(q)$, with $C'(q) > 0$ and $C''(q) > 0$.

A planner now chooses x and q to maximize per-person welfare $a \log[1 + (1 + \tau(q))x] - (k/2)x^2 - C(q)$. The first-order condition for x is the same as before with endogenous τ . The envelope condition for q is

$$C'(q) = a x \tau'(q) / [1 + (1+\tau(q))x] \quad (8)$$

The left-hand side is the marginal cost of improving the institutional environment. The right-hand side is the marginal relational value created because institutional quality makes existing relational investment more productive. This condition formalizes a point often made informally in civil-economy analysis: institutions do not merely constrain behavior; they can change the productivity of reciprocity itself.

Institutional investment and socially optimal relational investment are complements in the following sense. Because $dx^P/d\tau > 0$, any q that increases τ also raises the planner's desired x . A government or organization that succeeds in improving trust but leaves the cost of relational participation unchanged may therefore create a larger gap between desired and privately supplied investment. Conversely, measures that reduce the private cost k —time flexibility, lower participation barriers, or accessible associational infrastructure—can support the higher relational investment that a high-trust environment makes socially valuable.

The model can also be given a dynamic interpretation. Let τ_{t+1} depend on current relational experience $Q_t = (1 + \tau_t)x_t$ as well as depreciation of trust. A generic law $\tau_{t+1} = (1 - \delta)\tau_t + \eta H(Q_t)$, where H is increasing and bounded, can produce persistence and multiple steady states when H is sufficiently S-shaped. The mechanism is not that private x necessarily rises with τ ; Proposition 3 shows the opposite. Rather, effective relational experience Q can rise because spillover productivity increases faster than private effort falls. High-quality encounters then reinforce expectations of trustworthy behavior. Conversely, repeated low-quality encounters can erode the productivity of future relational investment. The dynamic extension suggests why temporary institutional interventions may have persistent effects if they shift the system across a basin boundary, although a full dynamic welfare analysis is left for future work.

6 Motivation crowding and the limits of a price correction

Direct incentives are potentially problematic because relational activity has motivational content. The benchmark model holds a fixed, but a payment can change the meaning of the act being rewarded. To represent this possibility parsimoniously, let the intrinsic valuation parameter fall with the subsidy: $a(s) = a_0 \exp(-\chi s)$, where $\chi \geq 0$ is a crowding parameter. The individual first-order condition becomes $kx = a(s)/[1 + (1 + \tau)x] + s$.

When $\chi = 0$, the standard price effect operates: a larger subsidy increases x . When $\chi > 0$, the subsidy simultaneously raises the pecuniary return to x and lowers the intrinsic relational value generated by a given interaction. The net welfare effect can therefore be nonmonotonic. This extension is not a claim that all payment crowds out reciprocity. Motivation-crowding theory explicitly allows crowding in as well as crowding out (Frey and Jegen 2001). The point is that a relational correction is institution dependent: an instrument that works in a setting where participation is understood as a compensated service may fail in a setting where the same payment signals control, mistrust, or commodification.

This distinction helps reconcile economic and civil-economy reasoning. The externality is real even when a monetary subsidy is inappropriate. The planner's shadow value can instead guide the scale of indirect support. If a community program creates relational benefits that participants cannot privately capture, it may be efficient to subsidize the platform, lower fixed participation costs, or finance complementary infrastructure without paying people per friendship, per meeting, or per cooperative gesture. Likewise, workplace policy can preserve time for mentoring and peer support rather than attaching a piece rate to each interaction.

The crowding mechanism also limits the interpretation of revealed preference. If policy changes the valuation parameter a , observed responses to incentives do not identify a stable demand for relational goods. Evaluating relational policy therefore requires attention to framing, voluntariness, governance, and the perceived intentions of the institution. This aligns with reciprocity models in which the same material consequence can trigger different responses depending on perceived kindness and intention (Falk and Fischbacher 2006).

Proposition 6 (Crowding can make the welfare effect of direct incentives nonmonotonic). If intrinsic relational valuation $a(s)$ falls sufficiently rapidly with the subsidy s , then there exists a range of s for which increasing the subsidy lowers social welfare even though it raises the pecuniary marginal return to relational investment.

Proof. Social welfare is $W(s)=a(s)\ln[1+(1+\tau)x(s)]-(k/2)x(s)^2$, abstracting from pure transfer financing. Differentiating gives a direct negative term $a'(s)\ln[1+(1+\tau)x]$ plus the indirect effect through $x(s)$. At an interior region where the absolute direct crowding term exceeds the welfare gain generated by the induced change in x , $dW/ds < 0$. Because $a'(s) = -\chi a(s)$ under the exponential specification, sufficiently large χ or sufficiently high s satisfies this inequality. Hence the sign of the welfare effect is not globally positive.

7 Numerical illustrations

The analytical results are illustrated with a normalized parameterization $a = 1$ and $k = 2$. The exercise is not an empirical calibration and should not be interpreted as an estimate for a population. Its purpose is to display the comparative statics implied by the propositions. The trust parameter τ is varied from zero to one. For each value, the closed-form Nash and planner solutions are computed, along with the corrective marginal subsidy and the per-person welfare difference.

Figure 1 shows that decentralized relational investment falls as τ rises, whereas socially optimal investment rises. Figure 2 therefore shows a widening underinvestment gap. At $\tau = 0.70$, for example, x^N is approximately 0.323 and x^P is approximately 0.472, so the planner calls for about 46% more relational investment than the decentralized equilibrium in normalized units. The corresponding per-person welfare gain from moving to the planner allocation is about 0.033 normalized utility units. These values have no direct empirical interpretation; they are internal checks on the model's logic.

Figure 3 reports the marginal subsidy that decentralizes x^P . It rises with τ because the uninternalized part of relational productivity rises. At $\tau = 0$, the subsidy is zero because there is no spillover. At positive τ , the benchmark correction is positive even though private relational investment is itself falling. This is a useful reminder that observed low effort in a high-trust environment need not signal that relations have little social value; it can instead reflect intensified free riding on a productive relational technology.

Figure 4 introduces the crowding extension at $\tau = 0.70$. With $\chi = 0$, welfare initially rises with the subsidy as the externality is corrected. With positive crowding, the welfare-maximizing subsidy is smaller and high subsidies can reduce welfare because the deterioration in intrinsic relational valuation outweighs the price effect. The figure is illustrative, but the qualitative message is general: the shadow price of an externality and the best implementable instrument need not coincide when policy changes preferences or social meaning.

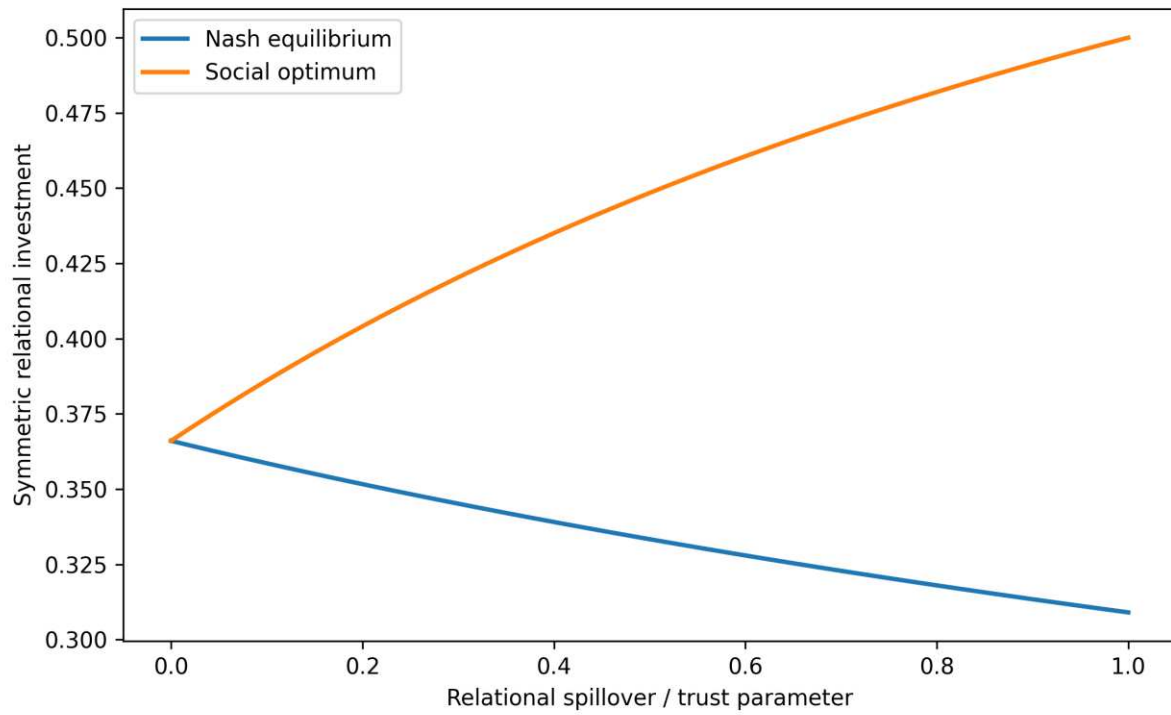


Fig. 1 Symmetric decentralized investment and social optimum as relational spillover productivity increases

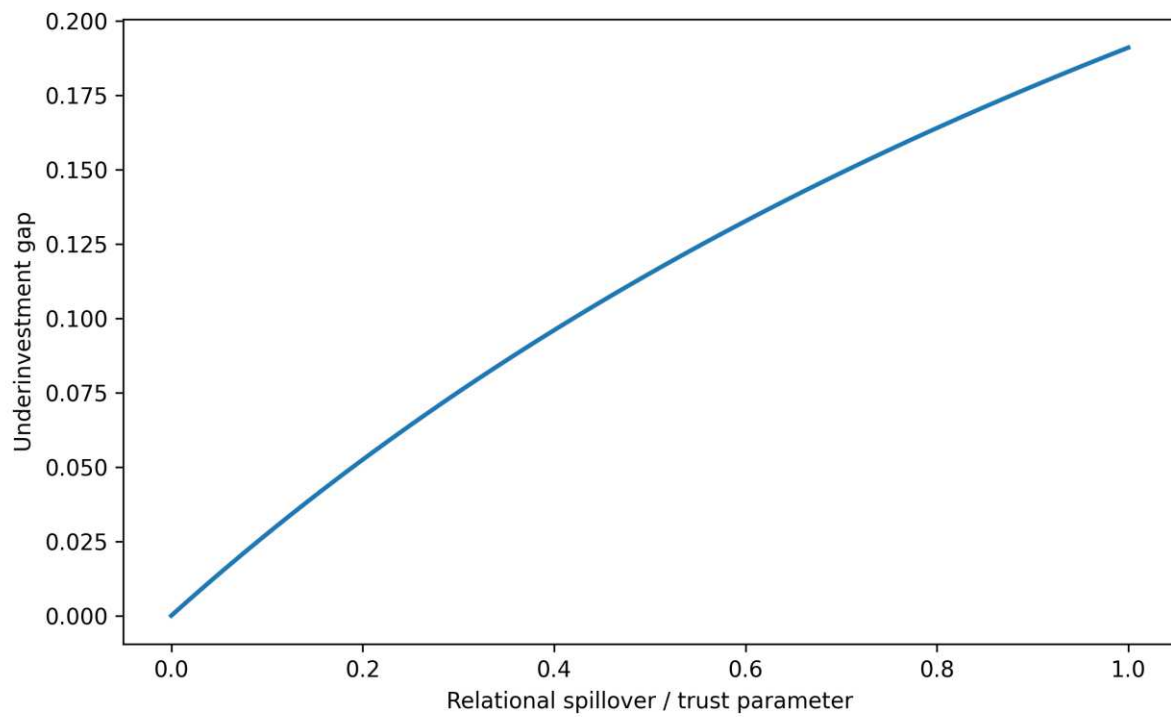


Fig. 2 The relational underinvestment wedge widens with the trust/spillover parameter



Fig. 3 Benchmark marginal subsidy required to decentralize the social optimum

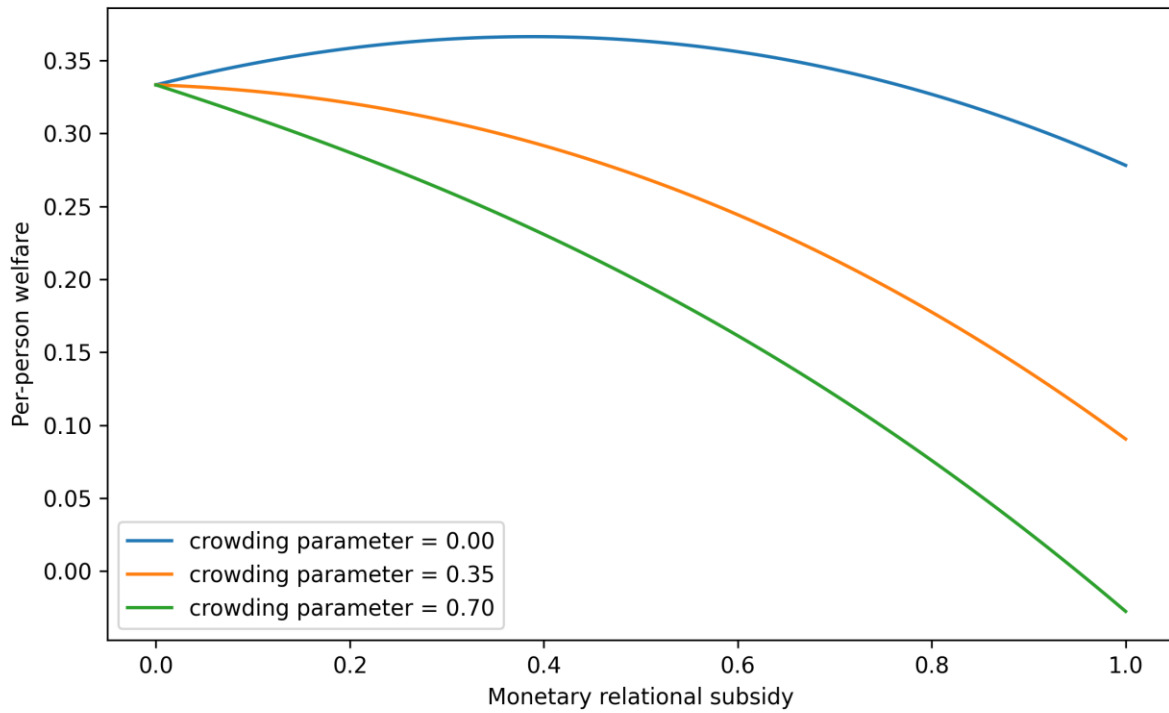


Fig. 4 Illustrative welfare effects of a direct subsidy when intrinsic relational valuation is crowding-sensitive

8 Welfare and institutional implications for civil economy

The first implication concerns the interpretation of trust. Trust is commonly treated as a substitute for formal intervention: if people trust one another, they can cooperate with fewer contracts, less monitoring, and lower transaction costs. That reasoning is valid for many production and exchange problems, but the relational-good mechanism adds a countervailing force. When one person's relational investment becomes more productive for others, each person can rely more heavily on the surrounding relational environment. The private incentive to contribute falls even though the total return to contribution rises. High trust can therefore reduce some transaction costs while increasing the externality associated with relational underprovision.

This distinction is relevant to workplaces. Suppose organizational culture becomes more cooperative, so a worker's mentoring, knowledge sharing, or supportive behavior creates greater value for colleagues. The model predicts that the social value of such behavior rises. Yet a worker deciding how much uncompensated time to devote to mentoring may reduce own effort if others' supportive behavior becomes more available. Management that interprets the improved culture as a reason to remove all support for mentoring can therefore move in the wrong direction. Appropriate responses could include workload design, recognition systems, protected mentoring time, or team governance rather than narrow output incentives.

The second implication concerns public space and associational infrastructure. Relational goods often require opportunities for repeated encounter. Parks, libraries, community centers, transit accessibility, local events, and digital or physical platforms for association can lower k , raise τ , or both. A public-space investment that makes encounter safer and more predictable increases the conversion of private participation into relational welfare. The model suggests evaluating such projects not only by foot traffic or property values but also by their effect on the relational production function. A setting that generates repeated, low-friction, noncoercive encounters can create benefits that no participant can fully appropriate.

The third implication concerns the design of social policy. Many welfare institutions are evaluated by the quantity of transfers delivered. Civil economy asks additionally how the interaction between citizen and institution affects dignity, trust, and reciprocity. A policy process that treats recipients as presumptively untrustworthy may reduce τ in future encounters even if the immediate transfer is unchanged. Conversely, transparent procedures, respectful communication, and reliable administration can improve the relational productivity of state-citizen interaction. The model therefore gives a formal reason to treat procedural quality as an economic input rather than only an ethical side constraint.

The fourth implication concerns cooperative and mutual organizations. Because members are simultaneously users, contributors, and governors, cooperative structures can internalize part of the relational spillover through repeated interaction and shared residual control. In the model, such governance can be represented as an increase in the share of the social marginal benefit that an individual internalizes, thereby narrowing the wedge without requiring an external subsidy. This interpretation suggests an extension in which ownership and governance determine the

internalization parameter. The comparative institutional question would then be whether a cooperative form reduces the relational externality sufficiently to offset any additional decision costs.

The fifth implication concerns measurement. If researchers measure only observed relational effort x , they may incorrectly infer that higher trust reduces the importance of relational life because x^N falls with τ . The model instead predicts that effective relational experience $Q = (1 + \tau)x$ can rise even while own effort falls. Empirical work should therefore separate inputs from productivity. Candidate measures include time spent in interaction, perceived responsiveness, trust, reciprocity, network reliability, and reported quality of relationships. Becchetti et al. (2024) demonstrate the empirical importance of relational intensity and generativity for life satisfaction; the present model suggests that future research could identify whether observed associations operate through more investment, higher productivity of a given investment, or both.

The sixth implication is distributive. The baseline model assumes identical a and k , but relational investment costs are unlikely to be equal. Time poverty, disability, caregiving obligations, unsafe environments, or exclusion from institutions can raise k for particular groups. If relational goods enter welfare directly, unequal access to the means of producing them is a distributive concern even when material income is equal. A civil-economy policy agenda should therefore ask not only who receives income but who has feasible opportunities to participate in mutually beneficial relationships. In a heterogeneous extension, the optimal intervention would depend on both the externality and the distribution of participation costs.

The seventh implication is that the common good cannot be operationalized by maximizing relational intensity without qualification. Portes (1998) warns that social capital can generate exclusion and constrain outsiders. Strong bonding relations can coexist with low bridging trust. The model's τ should therefore be interpreted as the productivity of welfare-enhancing relational spillovers within a defined domain, not as a normative endorsement of any cohesive group. A broader social planner would subtract harms imposed on nonmembers and might value bridging relations differently from bonding relations. This qualification is essential if the model is applied to polarized communities or organizations with strong internal loyalty and external exclusion.

Finally, the model sharpens the distinction between policies that support relations and policies that command relations. Because the welfare term is generated jointly, coercive participation can alter its quality. A requirement to attend a community event is not equivalent to creating a setting in which voluntary participation is feasible and rewarding. The model's corrective logic is therefore most naturally implemented through opportunity, institutional reliability, and cost reduction. Direct mandates are likely to be poor substitutes for the voluntary and reciprocal character of the relational good itself.

9 Empirical implications and identification strategies

The model yields several empirical predictions that can be investigated without treating relational goods as directly observable commodities. First, holding other factors constant, a rise in trust or perceived responsiveness should increase the marginal effect of others' relational effort on individual well-being. This is a productivity

prediction. It can be tested in teams or communities where repeated measures of trust, peer support, and well-being are available.

Second, after an exogenous increase in relational productivity, own relational effort may fall even as reported relational quality rises. This is the free-riding comparative static. A plausible design would exploit institutional changes that improve the reliability of cooperation—such as reforms to team governance, conflict resolution, or scheduling—and measure both individual contribution and experienced support. Evidence of reduced own effort would not by itself imply policy failure if effective relational quality and welfare rise.

Third, the planner-private wedge should be larger where spillovers are stronger. In an experiment, the same costly cooperative act could be placed in settings where its effect on peers is more or less observable and durable. If participants do not internalize the peer benefits, the gap between privately chosen effort and group-preferred effort should widen with spillover strength.

Fourth, indirect support should outperform direct piece-rate incentives when relational meaning is sensitive to commodification. Field experiments could compare a platform subsidy or time-cost reduction with a payment per relational act. Outcomes should include not only the quantity of acts but perceived sincerity, trust, repeated participation, and downstream cooperation. The crowding parameter χ is then empirically interpretable as the sensitivity of intrinsic relational valuation to the incentive regime.

Fifth, institutional quality q should have two separable effects: it should directly increase the productivity of existing relational investment and, through the planner's complementarity condition, increase the socially desired level of investment. Empirical evaluation should therefore distinguish the treatment effect on relational productivity from the treatment effect on private contribution. Many studies report only the latter.

These predictions point toward a mixed empirical strategy. Laboratory and field experiments can identify short-run incentive and reciprocity mechanisms. Panel surveys can examine whether trust changes the association between relational inputs and well-being. Organizational data can test whether governance changes alter both peer-support productivity and contribution. None of these designs requires assuming that a scalar trust measure captures the full civil-economy concept. The formal model instead serves as a device for decomposing mechanisms that richer qualitative and institutional analysis can interpret.

10 Limitations and extensions

The model is intentionally sparse and has several limitations. First, utility is additive in material and relational components, whereas relational goods may change the value of material consumption itself. Second, the interaction structure is symmetric. Real networks are heterogeneous, and central agents can create larger spillovers than peripheral agents. A network version would replace $\bar{x}_{-i}$ with a weighted adjacency matrix and would generate node-specific corrective wedges.

Third, τ is one-dimensional. Trust, reciprocity, recognition, fairness, and shared identity are not interchangeable. A multidimensional relational technology could distinguish, for example, reliability from

benevolence or bonding from bridging social capital. Fourth, the social planner uses a utilitarian criterion. Civil-economy accounts of the common good often reject the idea that shared flourishing is reducible to an aggregate of individual utilities. The planner should therefore be understood as an efficiency benchmark, not a complete normative theory.

Fifth, the crowding extension is reduced form. It does not model how perceived intentions or institutional legitimacy determine whether an incentive crowds out or crowds in intrinsic motivation. Integrating reciprocity models more fully would endogenize $a(s)$ through beliefs about the principal. Sixth, the analysis abstracts from general-equilibrium time allocation. Relational investment competes with paid work, care, and leisure; policies that raise x may have opportunity costs outside the model.

These limitations define a research agenda rather than invalidate the mechanism. The central result requires only that relational actions create uninternalized benefits and that trust changes the productivity of those benefits. Richer models can add heterogeneity, networks, distributive weights, and endogenous institutional legitimacy while retaining that structure.

11 Conclusion

Relational goods are jointly produced, partly noncontractible, and central to many accounts of human flourishing. A formal welfare model should therefore distinguish the effort people devote to relations from the institutional conditions that make such effort productive. This article has developed a tractable framework around that distinction.

The model shows that decentralized relational investment is inefficiently low when one person's effort improves the relational experience of others. More importantly, greater trust can widen rather than close the inefficiency: private effort falls because agents can rely more on others, while the social optimum rises because each unit of effort has a larger spillover. A trust-enhancing institution can therefore make relational life more productive and simultaneously increase the need to support relational investment.

A Pigouvian subsidy provides a benchmark value for the externality, but relational policy cannot be reduced to paying for prosocial acts. When incentives alter intrinsic motivation or the social meaning of an interaction, indirect institutional support can dominate a direct price instrument. Civil-economy policy is therefore naturally interpreted as the design of environments in which reciprocity, participation, and mutual recognition are feasible and productive.

The broader lesson is methodological. Trust, social capital, and relational goods should not be collapsed into a single index. Separating relational investment from relational productivity reveals comparative statics that remain invisible in purely verbal accounts. That separation creates a bridge between conventional welfare economics and the civil-economy concern with the quality of human relationships, while leaving room for richer ethical accounts of dignity, virtue, and the common good.

Appendix A: Robustness beyond logarithmic relational utility

The logarithmic specification is useful because it yields closed-form expressions, but the basic underprovision result is not tied to that functional form. Let relational benefit be $v(R)$, where v is twice differentiable, strictly increasing, and strictly concave, and let investment cost be $c(x)$, where c is twice differentiable, strictly increasing for $x > 0$, and strictly convex. In a symmetric allocation $R = (1 + \tau)x$. The private first-order condition is $c'(x) = v'[(1 + \tau)x]$, whereas the planner condition is $c'(x) = (1 + \tau)v'[(1 + \tau)x]$. Whenever $\tau > 0$, the planner marginal benefit exceeds the private marginal benefit at any common x . Strict convexity and concavity therefore imply a unique planner choice above the unique private choice whenever interior solutions exist.

The private comparative static with respect to τ is also robust. Differentiating $c'(x) = v'[(1 + \tau)x]$ gives $[c''(x) - (1 + \tau)v''(R)] dx/d\tau = v''(R)x$. The bracketed term is positive and $v''(R) < 0$, so $dx/d\tau < 0$. Higher spillover productivity lowers private investment because it increases the relational benefit produced by others and thereby reduces the private marginal return to own effort at the symmetric allocation.

The result that planner investment rises with τ is stronger and depends on curvature. Differentiating the planner condition gives $[c''(x) - (1 + \tau)^2 v''(R)] dx/d\tau = v'(R) + (1 + \tau)v''(R)x$. The denominator is positive, but the numerator need not be positive for every concave v . The logarithmic case used in the main text satisfies the positivity condition globally. More generally, socially optimal investment rises with τ whenever the elasticity of marginal relational utility is not so large in absolute value that the decline in marginal utility offsets the direct increase in social productivity. This qualification is useful empirically: the underprovision result is general, while the widening-wedge result is a testable property of the relational benefit function.

A general corrective benchmark follows immediately. At the planner allocation the difference between social and private marginal benefits equals $\tau v'(R)$. A marginal subsidy equal to that wedge decentralizes the planner allocation if the subsidy does not itself change v , τ , or the cost function. The crowding extension in Section 6 can be understood precisely as a violation of this invariance condition.

Appendix B: Interpretation of the relational productivity parameter

The parameter τ is a reduced-form measure of how effectively one person's relational investment becomes a benefit for another. Several microfoundations are possible. One is informational: trustworthy environments make cooperative actions easier to interpret, so a given supportive act produces more expected future cooperation. A second is enforcement-based: repeated interaction and reliable norms reduce the probability that an investment is exploited, raising its effective return to counterparties. A third is expressive: mutual recognition changes the experienced value of the same material act. A fourth is network-based: institutional arrangements can increase the number or persistence of pathways through which an act affects others.

These interpretations need not move together. A workplace can have strong enforcement but weak mutual recognition, or dense networks but low generalized trust. Empirical applications should therefore operationalize τ with context-specific measures rather than assume that one survey trust item is sufficient. The model requires only

that the chosen measure predict the marginal effect of others' relational investment on the focal person's relational payoff. That requirement provides a direct empirical criterion for measurement validity.

Appendix C: Partial internalization through governance and group structure

The baseline Nash equilibrium assumes that each agent internalizes only the direct effect of x_i on the agent's own relational good. Some institutions can internalize part of the spillover without a public subsidy. Let ω in $[0,1]$ denote the fraction of the external relational benefit that an agent effectively internalizes through shared ownership, peer evaluation, repeated team incentives, or governance rights. The individual first-order condition becomes $c'(x) = [1 + \omega \tau] v'[(1 + \tau)x]$ in the general model. The planner still internalizes the full factor $1 + \tau$. The remaining corrective wedge is therefore $(1 - \omega)\tau v'(R)$.

This extension provides a simple interpretation of cooperative governance. A governance form does not have to eliminate the relational externality to improve efficiency. If members share residual benefits, participate in decisions, or expect future reciprocal returns from current relational investment, ω can rise. The required external correction then falls continuously. At $\omega = 0$ the model reduces to the baseline decentralized case. At $\omega = 1$ the agent internalizes the full relational spillover and the Pigouvian correction is zero, even though τ remains positive.

Group size by itself does not change the baseline symmetric wedge because the spillover to each of $N-1$ others is scaled by $\tau/(N-1)$. This normalization keeps the total external marginal effect equal to τ . Alternative network structures can make group size matter. If each additional member creates an unscaled spillover, the externality grows with N ; if attention is scarce and spillovers decay with network distance, the effective τ can fall as groups become larger. The normalized model is therefore best understood as holding total relational reach constant while varying the productivity of that reach.

For empirical work, ω and τ should be distinguished. τ describes how productive relational acts are for others; ω describes how much of that external value feeds back into the decision maker's incentives. A high-trust cooperative can have both high τ and high ω , producing strong relational value with little underprovision. A high-trust but weakly governed platform can have high τ and low ω , producing a large wedge. This distinction helps explain why similar levels of interpersonal trust can coexist with different levels of cooperative investment across institutional forms.

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