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## The Cost of Trust: A Pilot Study

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### Abstract

Trust is a fundamental precondition underpinning exchange and economic coordination but is costly to maintain. Given the potential for agents to enjoy zero-sum gains by opportunistically betraying the trust of exchanging counterparties, an edifice of occupational roles, organizational forms and institutional practices have emerged in an effort to uphold trust. In simple terms, there exists a “cost of trust.” This paper provides numerical estimates of the cost of trust for the United States economy, based on an attribution of labor force occupational data with varying degrees of trust-maintenance. Occupations represented in high cost-of-trust activities include managers, lawyers and judges, tax professionals, accountants and auditors. Overall, it is estimated that the cost of trust accounts for 35 per cent of U.S. employment in 2010. The cost of trust has significant implications for the economic applicability of blockchain compared with conventional forms of ledger technology largely maintained by centralized third-party organizations.

**Keywords:** *blockchain, measurement, opportunism, transaction costs, trust*

**JEL Classifications:** D02, J21, K42, O33, Z13

### 1. Introduction

Assessments of the economic dimensions of trust appear to have enjoyed a resurgence of interest in recent decades. Despite the contribution of trust in promoting coordination economically, it is conceded trust is an economically fragile condition potentially degraded by a temptation to attain zero-sum gains by acting dishonestly, therefore betraying trust [1]. An environment conducive to trustful economic relations thus requires various kinds of commitments, supported by the allocation of resources, on the part of agents. This very notion of commitment implies there are costs incurred to uphold trust amongst heterogeneous agents in the face of bounded rationality and opportunism [2].

The institutional economics literature has illuminated the various ways in which economic agents partake in efforts to enforce trust amongst each other. Contracts may be structured to encourage parties to act in a trustworthy manner [3, 4]. Coase [5] alluded to the rationale for the modern corporation as resting in the desire to avoid potential mistrust in bilateral market trades. The aim of this paper is look beyond specific arrangements, as important as they may be, and consider the broader, economy-wide costs incurred in efforts to minimize exchange-related mistrust.

One of the distinctive contributions of this paper is that we provide preliminary numerical estimates of the economy-wide “cost of trust” for the United States. Drawing upon detailed occupational data it is illustrated that the cost of trust is sizeable, in terms of the employment share of the economy.

The importance of the cost of trust in modern economic management is underlined by recent forms of ledger innovation. The adoption of distributed ledger technology, maintaining cryptographically-secure distributed databases on peer-to-peer computing networks, is held to reduce the cost of opportunism and, consequently, galvanise trust with respect to data integrity [6]. It is supposed that one way that blockchain could reduce the cost of trust is through the use of smart contracts to substitute for conventional activities that aim to uphold trust within labour markets.

### 2. Trust: Economically valuable, but costly to maintain

It is a truism to suggest that, as sociable animals, human beings are dependent on other people, not only for survival but for the achievement of deeper senses of flourishing. Although the significance of

trust has long been recognized by researchers, including in the economics discipline, the definition of trust itself is subject to considerable ambiguity. For convenience, we draw upon the Oxford Dictionary definition of trust to describe it as a state or precondition wherein a person (or persons) has (or have) a belief in the reliability, truth or ability of someone or something to undertake or perform a given task or objective (tangible or intangible). Subsumed within this definition is an appreciation that trusting relations consist of the qualities of vulnerability, risk and expectation (or uncertainty) [7].

The first aspect of trust (vulnerability) refers to a given individual's *ex ante* belief that others will at least not betray them, when they need not be obliged to do so. It is in this context that we suggest trust is a relational attribute with two generic classes of people involved: the trustor and trustee. The trustor is the party who places themselves in a vulnerable situation, whereas the trustee is the party on whom trust is placed and who has an opportunity to potentially take advantage of the trustor's vulnerability [8].

Trust is also supposed to entail risk [1, 9]. As suggested by Oliver Williamson, "trust is warranted when the expected gain from placing oneself at risk to another is positive, but not otherwise. Indeed, the decision to accept such a risk is taken to imply trust" [9, p. 463]. Of course, it is possible for the trustor to avoid a risky situation by abstaining from exchange. However, when doing so one forgoes the associated advantages that go with exchanging with the trustee, should trust be maintained [10].

Finally, there is the expectation that the trustee will not take advantage of the opportunities opened up to betray the trustor's trust. Trust is warranted when the trustor expects the benefit from making themselves vulnerable to the trustee (whose behavior is, ultimately, not amenable to control) to be positive [11]. In the absence of uncertainty, trust is not a significant issue under a certain scenario the outcome is the same whether a trusting act was involved.

In an industrialized market sphere, one may discern generalized trust as entailing the fulfilment of commitments made in an exchange process. In a generic sense it is said that, "whenever there are gains from trade, there is a productivity advantage to any institution or norm that assures traders that the other side will hold up their end of the deal" [12, p. 83]. Whilst this statement is generically correct, the many guises of market activity dictates that the economic manifestations of trust are equally highly contextual in nature [13].

Let us consider the conceptual basis for trust as described by institutional economic theory. Writing in 1937, Ronald Coase famously asked: if market activities are so efficacious, as is so often lauded by economists, then why is so much market-oriented activity practically mediated through organisations such as centralised, hierarchical firms? His answer is that conducting exchange transactions within markets is quintessentially costly [5].

There are "transaction costs" incurred in "obtaining relevant information, the cost of bargaining and making decisions, and finally the costs of policing and enforcing contracts" [14, p. 180].

For Coase, the firm helps absorb transaction costs enabling transaction possibilities, and economic coordination, to expand.

Oliver Williamson extended Coase's insights by theorizing about when internalization of transaction costs is the preferred strategy for launching productive economic activity. Williamson [2, 9] suggests that internalization is necessary under conditions of bounded rationality, small numbers of trading partners, asset specificity and, most importantly, the exercise of opportunism in exchange relations. Opportunism suggests that economic agents will act strategically, "a condition of self-interest seeking with guile" [2, p. 30], to the detriment of the economic interest of others. The potential for incomplete contracting prevailing in economic situations, including as a result of "hold up" refraining to commit to contractual terms, also suggests that opportunism is an important problem to be redressed [15].

Williamson is at pains to stress that not everyone will constantly act in an opportunistic manner. Nonetheless, institutions are seen as necessary to enforce trustworthy behavior on the part of those who are otherwise prepared to exhibit opportunism in economic exchange. The modern firm, for instance, is not only an organizational strategy to redress transaction costs but is an evolved hierarchical structure of contracts aimed at solving the opportunism problem [16].

At this point it should be recognized that scarce economic resources are absorbed in the process of upholding the trust which leads to reductions in transaction costs and dynamic improvements in economic coordination. In short, there is a cost of trust that should be duly considered within the broader purview of trust discourse. The notion of the cost of trust is prevalent in numerous activities undertaken by economic agents – e.g. IT security spending, costs of record keeping, managerial control and workplace surveillance, advertising and product branding, and so on.

In no small part, the cost of trust is influenced by the context in which trust-building efforts are maintained. Economic exchanges differ in their complexity and their scope for opportunism. It seems generally costlier to instigate specialized, trust-galvanizing mechanisms when exchange occurs only once or infrequently. Bromiley and Harris indicate that "optimal governance structure should vary depending on these assessments. Economic actors should build less costly control systems for relatively trustworthy people than for less trustworthy people" [17, p. 126].

We concede there is some overlap between the cost of trust and generic transaction costs associated with market exchange. The costs borne by individuals to demonstrate they are trustworthy is but one aspect of total costs in engaging with others economically. For example, the cost of trust is distinct (though not completely) from the search costs of obtaining information about goods and services. From this standpoint the cost of trust can be assumed to be sub-set of transaction costs, which have been estimated to account for a sizeable portion of national product [18].

It should be briefly noted there are similarities between our research and the effort of McCloskey and Klamer [19] to establish a "cost of persuasion." Referring to the cultural and sociological dimensions of trust, Paul Lewis suggests that trust represents an

inter-subjective social reality promulgated through (time-consuming) discursive activity: “talk (along with other features of conversations, such as smiling and laughter) is central to the creation of trust” [20, pp. 189-190]. We concur with these assessments that persuasion can be trust-building, but that trust also helps create the social context in which persuasion is used [21].

### 3. Measuring the trust economy: Cost of trust estimates for American economy

#### 3.1 Method

In this paper we attempt to provide a preliminary assessment of the cost of trust for key segments of the United States economy. This raises the immediate question: on what basis might activity be delineated on the basis of the cost of trust?

The methodological approach employed in this paper is similar to that presented in [19]. The 2012 Statistical Abstract of the United States [22] reported that there were about 139.1 million civilian non-institutional employees aged 16 years and over in 2010. Table 616 of the Abstract provides information on the number of employed civilians by the following occupational categories: management, professional and related; service; sales and office; natural resources, construction and maintenance; production, and transportation and material moving. A further employment-by-occupation breakdown is provided in the Supplemental Material.

We present an aggregate cost of trust by subjectively assigning weights to occupations. These weights reflect an assessment about the percentage of time or marginal product in each occupation spent on maintaining or improving trustful relationships. A weight of 1.0 indicates that personnel in an occupation given such weighting spend all their time or effort in upholding trust. Other weights used in this paper (0.75, 0.50 and 0.25) reflect our assessment that employees in the relevant occupation use 75 per cent, 50 per cent or 25 per cent of time or marginal product to uphold trust, respectively.

Cost of trust weightings are assigned to all occupations. Once weights are assigned, the employment figures are multiplied by the weight to give a “cost-of-trust adjusted” employment total for the U.S. economy. This aggregated total indicates the amount of employment absorbed by (costly) activity dedicated to upholding trust in the economy.

Although the assignment of weights to occupational categories are subjective, they are informed by judgment partly relying upon sources we consider help gauge the extent to which certain employees primarily engage in trust-upholding activity:

- It is estimated in [18] that the aggregate size of transaction costs in the U.S. economy over the period 1870 to 1970 by demarcating occupations (and industries) into transaction and non-transaction-intensive classifications. The transaction cost-intensive occupations include managers, owners and proprietors; foremen; sales workers; clerical workers; professional workers; and protective workers. Wallis and North [18] consider the costs borne by sellers and buyers to establish market credibility as a transaction cost component.

These costs could also be considered to be part of the cost of trust.

- In [19] subjective weights were assigned to occupations on the basis of the perceived proportion of time that laborer in varied occupations engage in persuasive communication with client groups. Lawyers, judges, public relations specialists, managerial supervisors, and salespeople were classified as belonging to the high-persuasion category. Persuasion is undertaken for a variety of reasons economically, one of which is that a party to a potential transaction (usually a seller) wishes to communicate they are trustworthy as an exchange partner.
- A December 2017 Gallup survey provided information on the degree to which people in various occupations are rated “high” or “very high” with regard to honesty and ethics [23]. Amongst the occupations rated as highly or very highly honest and ethical include nurses, teachers, doctors and police officers. People in occupations rated honest and highly ethical are, *ceteris paribus*, perhaps less likely to endure costs associated with developing or demonstrating trustworthiness in economic exchange.

In addition to these sources, we draw upon the recent literature of occupational task complexity [24, 25] as another background source of information assisting in the derivation of cost-of-trust weights. Highly complex occupational roles are perceived to impose a high cost-of-trust, given the higher probability of individuals working in such roles to opportunistically betray trust by taking advantage of informational asymmetries and other unique features of the working role.

#### 3.2 Results and discussion

The result of the analysis for the U.S. economy in 2010 is presented in Table 1, showing raw employment-by-occupation subtotals and cost-of-trust adjusted employment for major occupational categories. Overall, it is estimated that about 35 per cent of employment in the United States relates to activity aimed at upholding trustful economic relationships. The cost of trust ranges from 48 per cent in management, professional and related occupations to 13 per cent in natural resources, construction and maintenance occupations.

Taking a deeper look at the distribution of cost of trust related activity by sub-category, the cost of trust accounts for more than 50 per cent of time or product in protective service, health care, business and financial operations and management occupations. At the other end of the spectrum, it is estimated less than 20 per cent activities undertaken by those in occupations related to farming, fishing and forestry and production (a broad category largely encompassing manufacturing activities) are accounted for by the cost of trust.

#### 3.3 Caveats

It is stressed that the results presented in this paper are preliminary, and subject to several qualifications. The most important of these is that the occupational trust weightings are subjective. A cost of trust reweighting of the occupational figures will yield different results, both in terms of the aggregate cost of trust adjusted

Table I: Distribution of United States occupational employment, adjusted for cost of trust [22]

Occupation	Total employed (000s)	Total, weighted by CoT (000s)
<b>Total, 16 years and over</b>	<b>139,064</b>	<b>48,338</b>
<b>Management, professional &amp; related occupations</b>	<b>51,743</b>	<b>23,152</b>
..Management	20,938	10,604
..Business and financial operations	5,937	3,236
..Computer and mathematical	3,531	1,017
..Architecture and engineering	2,619	951
..Life, physical, and social science	1,409	334
..Community and social services	2,337	918
..Education, training, and library	8,628	3,915
..Arts, design, entertainment, sports, and media	2,759	748
..Healthcare practitioner and technical	7,805	4,666
<b>Service occupations</b>	<b>24,634</b>	<b>8,765</b>
..Healthcare support	3,332	2,143
..Protective service	3,289	2,243
..Food preparation and serving related	7,660	1,914
..Building and grounds cleaning and maintenance	5,328	1,332
..Personal care and service	5,024	1,134
<b>Sales &amp; office occupations</b>	<b>33,433</b>	<b>9,937</b>
..Sales and related	15,386	4,198
..Office and administrative support	18,047	5,739
<b>Natural resources, construction, and maintenance occupation</b>	<b>13,073</b>	<b>3,298</b>
..Farming, fishing, and forestry	987	26
..Construction and extraction	7,175	1,623
..Installation, maintenance, and repair	4,911	1,020
<b>Production, transportation, and material moving occupations</b>	<b>16,180</b>	<b>3,187</b>
..Production	7,998	1,295
..Transportation and material-moving	8,182	1,892

employment data, as well as the distribution of occupations by weight.

Other measures to establish the cost of trust are potentially available. It may be possible to use a proxy measure of regulatory intensity to indicate which economic activities bear a heavier cost of trust. One may associate the degree of trust, for example, on an industry basis with a measure of “regulatory restrictiveness” [26, 27]. The regulatory restrictiveness measure, provided by the Mercatus Center of George Mason University, provides a count of words contained in U.S. federal legislation which is likely to limit economic and social choices, such as the words “shall,” “must,” “may not,” “prohibited” and “required.” In this context, it is may be possible to conceive certain industries as necessitating a relatively high cost of trust to maintain their operations.

Another, and arguably more straightforward method, is to itemize and aggregate the level of expenditures undertaken by the private and public sectors to maintain trust in their operations. Such expenditures may include IT security expenditures, record auditing costs, the costs of tax filing, and the costs of complying with certain government regulations.

#### 4. Significance of cost of trust in presence of distributed ledger technology

A host of techniques and strategies have been developed to solidify trust economically. These include the development of a sound personal reputation, ratification of contractual arrangements, creation of firms that organize internal transactions and propagate a “corporate culture” of honesty and reliability, and state institutions to enforce trustworthy behavior and punish trust defection.

Another, albeit much underappreciated, practice to uphold generalized trust comes in the form of a ledger. In a generic sense, the purpose of a ledger is to record and verify facts in their economic, political or social manifestations. Ledgers contain information jointly known about matters such as ownership, identity, relations and exchange, all of which elicit economic activity [28]. To promulgate a sense of generalized trust in a human context, with idiosyncratic individuals maintaining different languages, cultures, perspectives and objectives, ledgers help establishes some kind of “common reality that everyone can bind to” [29, p. 33].

The maintenance of ledgers has been identified by some scholars as pivotal to long-run economic development [30, 31], and they also appear to be a necessary condition for trustful relations to occur. However, this condition is by no means sufficient because opportunists could enjoy zero-sum gains by falsifying ledger

information. For ledgers to be economically effective there must be a high degree of trust in them.

In the modern economy, firms and governments have come to act as “controlling authorities” over the state and condition of ledgers. The extent of allotted authority to such organizations include what kind of information is to be (or not to be) presented in a ledger, and what sorts of information is allowed (or not allowed) to be added. This “institutionalized trust” has, to a considerable extent, relegated (or even displaced) the role and importance of personalized, small-scale trust networks into the background of contemporary economic affairs.

The emergence of third party, ledger-controlling organizations, which tend to exude hierarchic list and centralist characteristics, have been associated with economies of scale and the Weberian rationalization of political affairs. However, it has become apparent, at least in some quarters, conventional ledger controls have, themselves, come at some cost. For example, control over ledger information by firms and governments potentially enable them to concentrate power and capture significant rents [32].

Even more fundamentally, it is debatable to what extent the organizational arrangements described here actually promote trust. Centralized, hierarchical entities unwittingly pose as single points of attack by cheaters, fraudsters, hackers and others seeking to manipulate data to their advantage (in the field of accounting, for example, see Jones [33]). In other words, hierarchical centralization is insufficient to protect the integrity of ledgers. The imposition of top-down ledger protocols could also reduce the degrees of freedom to discover alternative bases of trust within society, undermining intrinsic motivations by diverse economic actors to forge trusting relations.

Despite the longstanding methodological attributes of ledgers, and the organizational apparatuses used to sustain them economically, in recent years ledger technologies have been subject to significant innovation. One of the more prominent instances of ledger innovation has been the blockchain – a ledger enabling data and information to be appended, stored and validated on a cryptographically-secure basis amongst a distributed, peer-to-peer network of computers. The blockchain aims to operate in such a way that “the integrity of the devices and of the transactions can be assured by a tamper-proof record that both parties can trust, this mutual lack of knowledge about each other doesn’t matter” [29, p. 127]. This starkly contrasts the traditional model predicated on intermediated (but tamper-prone) third parties claiming authoritative control over ledger amendment, security and verification, in the name of galvanizing trust.

A key method through which blockchain can serve to uphold trust is through the design and maintenance of “smart contracts,” defined as “computer programs that secure, enforce, and execute settlement of recorded agreements between people and organizations” [34, p. 101]. It is conceivable that the blockchain-enabled smart contract could serve as a pivot to help reduce the cost of trust, at least relative to techniques employed in the conventional economy. As explained by Van Rijmenam and Ryan [35], “smart contracts are automatically and autonomously executed, thereby taking out the need for human judgement and minimizing the need for trust. In addition, smart contracts remove

the need for developing, implementing, or evaluating decisions by management or employees ... it becomes possible to automate decision-making” [35, p. 20].

Given the terms of the smart contract are defined, executed and enforced by its underlying programming code, there appears a lesser need to maintain those pervasive, yet costly, timing-consuming and labor-absorbing, techniques to uphold trust in the non-blockchain economy. The opportunity to relieve workers of tasks dedicated toward upholding trust has potentially significant implications for future labor markets.

The cost of trust could, in one sense, be reduced to the extent that smart contracting adoption displaces existing occupational roles mainly devoted to upholding inter-personal trust (“Schumpeterian” role disruption mechanism). Consider, for example, the potential of smart contracts to automate legal and regulatory provisions could displace (to some extent) the need for lawyers [36]. The diffusion of smart contracts, and the concomitant devolution of complex agreements and standards to the blockchain, could also enable workers to renegotiate working roles away from trust-intensive activity and toward service delivery, strategic thinking and other roles (“Kirznerian” role arbitrage mechanism). Both mechanisms are likely to operate in complementary fashion and are hypothesized to potentially reduce the cost of trust as blockchain, and in particular smart contracting, become more prevalent.

We suppose that the cost of trust represents a standalone cost category to ensure the conduct of exchange relations in the economy grounded in trustful relations. As this paper suggests, the cost of trust in a non-blockchain environment predominated by third-party, centralized trust hierarchies is relatively substantial in an economy-wide perspective. Cost of trust estimates should be compared against the costs of blockchain use cases as an alternative to the conventional trust-model of organizational hierarchy, or of “forking” exercises within blockchain spaces intended to create new domains of distributed trust.

## 5. Conclusion

There has been scant recognition thus far to the idea that the establishment and perpetuation of trust in the economy necessitates investment and other efforts and, as such, trust is costly. Using an occupational dataset for the United States, we establish that the cost of trust is a significant economic factor in the modern economy. The aggregate cost of trust (proxied by the amount of time and effort expended in each occupation to uphold trusting relations) were estimated to account for about 35 per cent of U.S. employment in 2010. To put it simply, the cost of trust to the American economy is considerable.

This study draws attention to the significance of the cost of trust in the context of ledger innovation, chiefly in the form of blockchain (distributed ledger) technology. Questions concerning the economic value of blockchain vis-à-vis conventional ledger technologies would ideally incorporate cost of trust considerations in their appraisals. In addition to this, specific applications of ledger innovation could also be the subject of cost of trust research. The potential for “tradetech” (i.e. the application of distributed ledger technology and other technological advances to supply chain

management) to reduce the cost of trust amongst supply chain participants is one example of this.

We also see the cost of trust as a generalized framework for rigorously contemplating the implications of trust bonds between exchanging parties in the economy. Has the cost of trust changed over time and, if so, how? What is the empirical relationship between the cost of trust and aspects of macroeconomic or industry-level performance? Does the cost of trust meaningfully affect labor markets in any meaningful fashion, including through the generation of wage premiums? How do public policies, and even forms of public governance, interact with the cost of trust? There is also a scope to refine the methodology for estimating the cost of trust as new and improved forms of data become available. These are only a few of the potential array of issues amenable to further investigation by economists and other social scientists with an interest in matters of trust.

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