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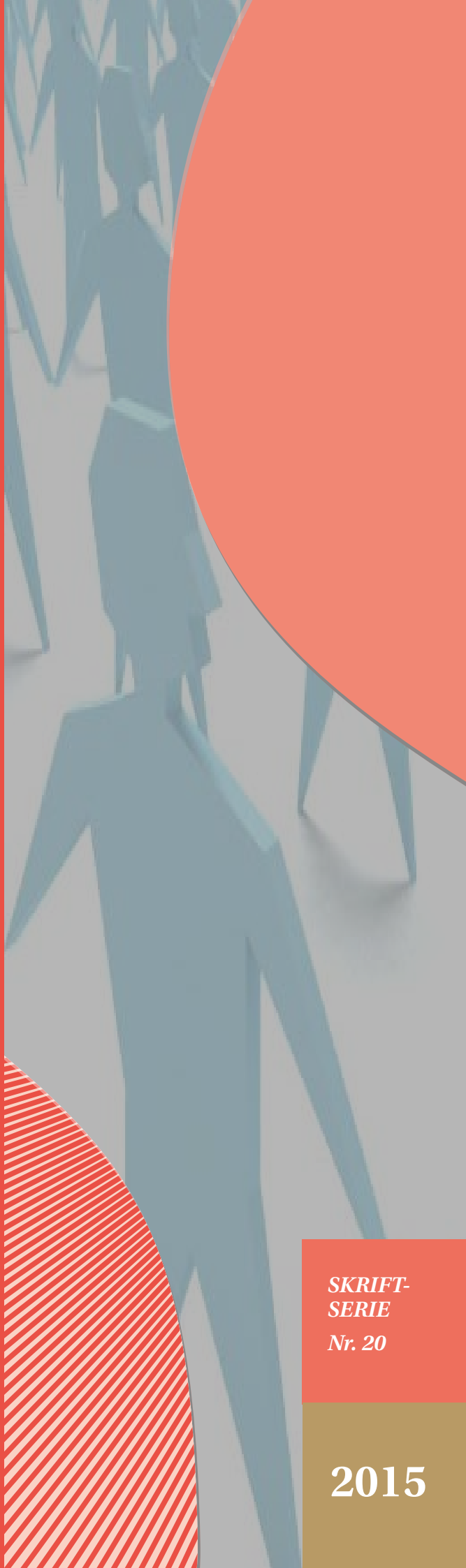
Trust as a booster

Jon Reiersen



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Trust as a Booster*

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Abstract

According to Yamagishi (2011) trust can be viewed as a "booster rocket" that provides the necessary push for the take-off from the secure ground of committed relations. The aim of this paper is to formalize this idea. I look at a situation where networks of personalized exchange relationships provide assurance against untrustworthy behavior but reduce the opportunity to profit from trade in larger markets. With the help of a simple game theoretic model I show that mutual trust relations can emerge in anonymous markets, even when there is a clear danger of opportunism and the possibility of repeated interaction is ruled out.

JEL classification: C72, D23, L22

Keywords: Trust; networks; assurance; behavioral risk; incomplete contracts.

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1. Introduction

As an extensive and fast growing literature has demonstrated, trust plays an important role in economic exchanges. Without trust markets would not function and thrive.[1]

In impersonal market exchanges, trust is particular important when contracts are incomplete – as they are in most cases. Incomplete contracts arise when buyers and sellers have asymmetric information about the goods or services they trade and when individual behavior cannot be easily verified so as to ensure compliance. Incomplete contracts expose economic agents to behavioral risk, meaning that one or more parties in an economic transaction can be hurt by opportunistic behavior by others. In such an environment, trust is important. If people generally believe that others will behave trustworthy, mutual beneficial transactions can take place even when contracts are highly incomplete, or even missing.

In settings in which trust matters most (incomplete contracts and clear behavioral risk) individuals may, however, be least likely to rely on trust. Instead, they will seek other types of control mechanisms. A common strategy to deal with behavioral risk is to restrict economic transactions to take place within networks or communities (Bowles and Gintis, 2004). Networks may function as an effective enforcement mechanism made possible by small-scale interaction. Within networks members meet regularly, they know each other well, they exchange information about each other and they may be willing to punish those who fail to keep promises. Because of these behavioral regularities, economic transactions within networks provide greater security against

[1] See Gambetta (1988), Fukuyama (1996), Torsvik (2000), Kramer and Cook (2004), Hardin (2006), Fehr (2009) and Algan and Cahuc (2013), among many others.

opportunistic behavior compared to transactions in more anonymous markets. Hence, networks can be viewed as a solution to the problem of behavioral risk (Kollock, 1994; Aoki and Hayami 2001; Bowles and Gintis, 2002).

Although networks help to solve problems related to behavioral risk they may generate problems in other areas. Due to its small size, networks restrict the opportunities to benefit from economies of scale, specialization and gains from trade. This produces a trade-off: Economic transactions within a network reduce the problems arising from incomplete contracts and behavioral risk, but they also restrict the agents' ability to reap potential gains produced in larger markets.

This type of reasoning forms the basis for the analysis of trust developed by the social psychologist Toshio Yamagishi. According to Yamagishi (2011), trust is important because it helps people to move out of established networks and to form relationships with new partners and new opportunities.[2] His argument can be summarized as follows: When people face uncertainty in their transactions they tend to build commitment relationships (networks), which reduces uncertainty and gives them assurance against opportunistic behavior. But this strategy reduces the prospect of dealing with strangers outside the commitment relationship, which will give them higher returns if the strangers are trustworthy. Hence, the main function of trust is that it acts as a "booster" that makes it possible for people to move out of mutually committed relations and to invest their resources in more uncertain but at the same time more profitable projects.

While Yamagishi's idea about trust is widely cited within the general social science literature, it has received little attention in the

[2] See also Yamagishi and Yamagishi (1994) for an earlier statement.

business and economics literature. The main purpose of this paper is to formalize Yamagishi's idea within a simple game theoretical framework and by this to contribute to a better understanding of why trust is important for well-functioning market exchanges.

The model developed also makes it possible to clarify the concept of trust. There is a large literature discussing the concept of trust, but it seems to be no agreement on the question of what trust really is. Within the framework studied in this paper, trust is a willingness to accept vulnerability based upon beliefs about the behavior of others. Hence, trust is not a behavior (e.g., cooperation) or an action (e.g., taking a risk). Trust is an underlying condition that can cause such behavior. Seen in this way, trust is essential for good economic performance because it helps people to conduct mutual beneficial transactions when contracts are incomplete or even missing.

Finally, the model demonstrates the need to distinguish between trust and assurance, a distinction highlighted by Yamagishi (2011) but that has not been noticed clearly in past research on trust. Trust is important in situations characterized by a high level of social uncertainty, in which there are incentives to act untrustworthy and the consequences of being the target of untrustworthiness are costly. Networks of personalized exchange relationships typically remove the incentives to act opportunistically through repeated interaction and social control. Hence, people within stable groups or networks generally feel safe with insiders. Networks therefore create assurance and not trust. Trust becomes important when people step out of networks to deal with strangers that are unconstrained by explicit or implicit promises of future rewards or punishments.

The rest of the article proceeds as follows: In the next section I build a simple game theoretic model of trust based on the ideas of Yamagishi (2011). The model is then used to analyze the role trust plays for the decision to transact in networks or markets. In Section 3 I briefly discuss how lack of trust creates problems in situations where the opportunity cost of networks are large. Section 4 concludes the paper.

2. The Model

2.1 The Costs and Benefits of Networks and Markets

Consider two players m and n who have the possibility of managing on their own or exchange goods and services with each other. The former strategy produces the payoff d for both, while the latter strategy gives both a payoff of c. There are gains from trade, which means that $c > d$.

Assume now that all trade is governed by incomplete contracts which give room for opportunistic behavior. This does not, however, create any problems for trade that takes place within networks. Following Yamagishi (2011), we assume that networks give full assurance against opportunistic behavior. Due to repeated interaction, social control and threat of retaliation against opportunism, networks allow informal agreements on cooperation to be self-enforcing.[3] We model this in the following simple way: If player m and n form a network and trade with each other, they receive the payoff c with certainty.

Due to their small size and restricted exchange possibilities networks may, however, restrict the ability to achieve further benefits

[3] See e.g. Fudenberg and Maskin (1986), Taylor (1987), Kandori (1992), and Gibbons (2001) for a more formal analysis of how repeated interaction allows informal agreements on cooperation to be self-enforcing.

related to gains from trade in larger markets. Again following Yamagishi (2011), we term this the *opportunity cost* of network: "*[A] commitment relationship is a relationship in which one is paying an opportunity cost. When one maintains a commitment relationship, one foregoes opportunities for getting a better outcome offered by alternative partners. That better outcome forgone is the opportunity cost.*" (Yamagishi, 2011 s 53). This opportunity cost can be taken into account by assuming that the players can reap the payoff b by trading outside the network, where $b > c$. We call this a *market transaction*.

Although a market transaction produces a higher payoff if the partner acts trustworthy, a market transaction also produces behavioral risk. As players in the market are unknown to one another, their interactions are effectively non-repeated, precluding the formation of self-enforcing agreements on cooperation that is possible for interactions within networks. Yamagishi (2011) refers to another economic concept, transaction costs, in order to illustrate the problem this creates: "*Transaction cost is the time, effort, money etc., that is consumed to conduct transactions (...). Losses from being cheated in transactions are also included in transaction cost (...).*" (Yamagishi, 2011 s 54). The latter point is particularly important in Yamagishi's analysis, and we take it into consideration in our model in the following simple way: If a player decides to leave a network and jump into a transaction with a stranger in the market, the player reaps the payoff b if the stranger is trustworthy. If the stranger is untrustworthy the player suffers a loss of $-e$.

The balance between costs and benefits will then shape the players' decision to transact in networks or markets. On the one hand, a market transaction produces a risk of opportunistic behavior which

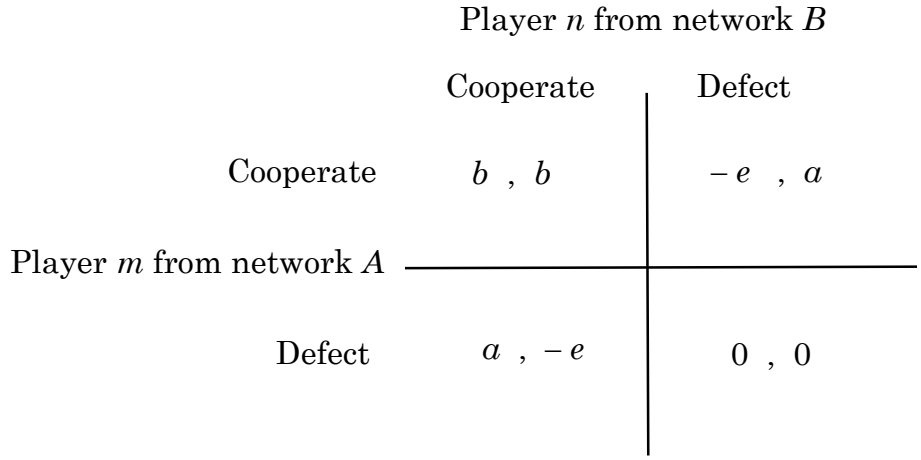
leads to a loss of $-e$. This risk is removed within a network which produces the payoff c with certainty. On the other hand, networks restrict the ability to achieve further benefits related to gains from trade (the payoff b). Stated in the words of Yamagishi: "*[F]ormation of a commitment relationship reduces transaction cost on the one hand, but generates opportunity costs on the other hand. Whether or not formation of commitment relationships with specific partners is a clever choice depends on the relative size of the savings in the transaction cost and the opportunity costs incurred.*" (Yamagishi, 2011 s 54). However, regardless of the size of costs and benefits related to networks and markets, *trust* plays an important independent role for the decision regarding where to transact. This can be seen more clearly from Figure 1, which summarizes available actions and payoffs in a market transaction.

To simplify, the market is assumed to be composed of a large number of players who act in pairs. Again, we consider the two players m and n. They are now, however, assumed to be member of their respective network A and B. A market transaction where both players cooperate (act trustworthy) gives them a payoff of b. If both defect (act untrustworthy) they get a payoff of 0. If m cooperates and n defects, m suffers a loss of $-e$ while n gets a, and vice versa. If $a > b > c > 0 > -e$ the economic interaction is described by the familiar prisoner's dilemma.

When actions taken by each are not subject to complete and enforceable contracts, 'defect' is the dominant strategy equilibrium for this interaction. If all players know this, there will be no market transactions. Both players stick to their networks where they get the payoff c (with certainty), and the gains from trade will not materialize. This observation leads us to the question that forms the core of Yamagishi's analysis: *Can the existence of trust make possible market*

transactions even though contracts are incomplete and there is a potential danger of opportunistic behavior?

Figure 1 *The payoffs from market transactions*



Both everyday observations and results from controlled experiments show that many act trustworthy in situations like the one described above.[4] This is difficult to explain without taking norms into account. Let us in the social interaction described above introduce the idea that, besides monetary considerations (captured by the payoffs in Figure 1), players are motivated by norms. Consider the following reciprocity norm: "It is wrong to act untrustworthy against a person who trusts you". Assume also that the norm is fully internalized by those who carry it, meaning that the behavior pattern described is followed even when violation is impossible to detect and sanction by others.

Let $z > 0$ indicate the internalized socio-psychological cost of breaking the norm. From the payoff matrix shown in Figure 1 we note

[4] See e.g. Bowles and Gintis (2011) and Johnson and Mislin (2011) and references cited therein.

that a player will cooperate when the other player cooperate if $b > a - z$, i.e. if

(1) $$z > a - b$$

Let us further allow individuals to be of two types: Those with $z = 0$ are referred to as *untrustworthy types* and those with $z > a - b$ are referred to as *trustworthy types*. Hence, an untrustworthy type always defects while a trustworthy type cooperates if the other player cooperates (the trustworthy types have Assurance Game preferences while the untrustworthy types have Prisoner's Dilemma Game preferences). The proportion of trustworthy types in network A is denoted p_A, while the proportion of trustworthy types in network B is denoted p_B.

On the anonymous market, the players do not know the type of their partner. Assume, however, that players have a belief about the proportion of trustworthy types. The proportion of trustworthy types determines the probability of not being cheated on the anonymous market. The belief about others' trustworthiness is therefore a measure of trust in society. If the players perceive the probability that other players act trustworthy (cooperate) as low, they will be more reluctant to take the chance of entering the market. This is particularly true if the cost of being cheated is high, and/or the payoff from trade in markets is low relative to the payoff from trade in networks. If, however, the payoff from trade in markets is high relative to the payoff from trade in networks, players may be willing to leave their networks even for a low level of trust. They are willing to take the chance of being cheated because the gain from a mutual trust relationship is so high.

These examples illustrate that the decision to transact in networks or markets is not straightforward, but depends on the

interplay between the players' beliefs about others' trustworthiness as well as the cost and benefits of markets and networks. A more formal analysis of the players' decision problems is therefore needed to derive their results and to discuss their implications.

2.2 Should I Stay or Should I Go?

The social interaction specified above consists of two stages: In the first stage, players n and m have to decide whether to stay in their networks or enter the market. If they decide to enter the market, they play a game with incomplete information about the type of each player, where they have to decide whether to cooperate or not.

We are particularly interested in specifying the conditions for the emergence of mutual trust relationships on the market. That is, we search for an equilibrium in which players m and n leave their networks, and trustworthy types cooperate while untrustworthy types defect. This equilibrium expresses a typical situation of trust: *Trust is important when a person faces a possibility of getting a higher return and a risk of being cheated simultaneously*.

By solving the game by backward induction we can specify the conditions for the formation of mutual trust relationships. This means that we first derive the condition for trustworthy types to act trustworthy on the market. Then we derive the condition for both trustworthy and untrustworthy types leaving their respective networks, given that the trustworthy types act trustworthy. Since the game is symmetric, with payoff structures of the same types of players being identical, we can look at the decision facing a trustworthy and an untrustworthy type from network i, where $i = A, B$.

A trustworthy type cooperates on the market if the expected payoff of doing so is larger than the expected payoff of defecting, that is if $p_i b + (1 - p_i)(-e) > p_i(a - z) + (1 - p_i)0$. This inequality is satisfied if

$$p_i > \frac{e}{z + b - a + e} \equiv p_i^+ \tag{2}$$

where $p_i^+ \in (0,1)$ since $z > a - b$ from (1). Recall also that an untrustworthy type never cooperates.

The next step is to find the condition for the two types leaving their respective networks and entering the market, given that (2) is satisfied. Both the trustworthy and the untrustworthy type will enter the market if the expected payoff from a market transaction is larger than payoff from staying in a network. Hence, a trustworthy type enters the market if $p_i b + (1 - p_i)(-e) > c$, which is satisfied if

$$p_i > \frac{c + e}{b + e} \equiv p_i^* \tag{3}$$

Likewise, an untrustworthy type enters the market if $p_i a + (1 - p_i)0 > c$, which is satisfied if

$$p_i > \frac{c}{a} \equiv p_i^\# \tag{4}$$

It follows from (3) and (4) that $p_i^* > p_i^\#$, which means that an untrustworthy type will take the risk of entering the market for a lower p_i than a trustworthy type. This can be seen by a simple examination of the expected payoff from a market transaction for the two types. Since an untrustworthy type never cooperates on the market, he gets a higher

payoff no matter what type he meets compared to a trustworthy type. Hence, if the proportion of trustworthy types is large enough for the trustworthy types to enter the market, the untrustworthy types will do the same.

2.3 Trust as a Booster

By combining inequalities (2) - (4) we find the condition for mutual trust relationships to be formed on the market. We have already stated that $p_i^* > p_i^{\#}$. It then follows that the three inequalities given in (2) - (4) all are satisfied if $p_i^* > p_i^+$. The condition for mutual trust relationships to be formed on the market is thus

(5) $$p_i > \frac{c+e}{b+e} \equiv p_i^*$$

which is the same as the inequality given in (3). (5) says that trustworthy types take the risk of leaving their networks only if they perceive the probability that the (unknown) counterpart behaves trustworthy as large enough ($p_i > p_i^*$). Hence, (5) is a formalization of Yamagishi's idea that in situations; "(…) *in which both social uncertainty and opportunity costs of maintaining commitment relationships are large, general trust (...), plays the role of a 'booster rocket' providing necessary 'thrust' from the 'takeoff' from commitment relationship*." (Yamagishi, 2011 s 55).

How much trust is needed in order to establish mutual trust relationships? As can be seen from (5) this depends on the ratio between the payoffs produced in networks and markets (b, c and e), since these payoffs determine the size of the critical value p^*. e is the cost of being cheated on the market. It follows from (5) that an increase in e drives

up p^*, making it harder to form mutual trust relationships, unless the players are more trusting. Put differently: If the cost of being cheated is high, players will be reluctant to run the risk of being cheated unless they are very sure that other players are trustworthy.

(5) also illustrates that the payoffs b and c affect the critical value of p^* in a natural way. b is the payoff from a mutual trust relationship on the market, while c is the payoff from staying in a network (where $b > c$). Remember that c is received for sure within a network, while b is received with probability p outside the network. That is, the payoff b comes with a risk of being cheated. The larger c is, the higher p^* must be, and the more trust must be present for the trustworthy types to take the risk of entering the market. Increasing the payoff from a mutual trust relationship (b) has the opposite effect. An increase in b lowers the threshold p^*, making it easier to form a mutual trust relationship at lower levels of trust. The greater the value of mutual trust, the greater risks the players will be willing to take in an effort to achieve it.

The relationship between b, c and e can be interpreted as the relationship between transaction costs and opportunity costs, using the terminology of Yamagishi (2011). b is the opportunity cost of networks, defined as the forgone opportunities for getting a better outcome outside the network. The higher this opportunity cost is (for a given c and e), the more networks appear as a constraint rather than an asset. On the other hand, a player can save transaction costs by staying in a current network in which untrustworthy behavior is precluded. Hence, the higher c and e are (for a given b), the more networks appear as an asset rather than a constraint. In sum, whether or not it pays to stay in current networks

depends on the relationship between transaction costs and opportunity costs.

3. When Trust is Missing

It follows from the above analysis that if the level of trust is low and people feel the need to safeguard their interests in established networks, it will be harder to profit from trade in larger markets. Again, note that b is the opportunity cost of networks, defined as the forgone opportunities for getting a better outcome outside the network. A main point stressed by Yamagishi (2011) is that this opportunity cost of networks is now steadily increasing due to a more integrated world economy and larger markets. In this situation general trust is the key for a successful reorganization of society, a reorganization which implies less networks and more open trade where new opportunities and relationships play a more prominent role.

In order to illustrate this observation, Yamagishi (2011) offers an interesting discussion of the recent history of economic development in Japan. From being an economic "success-story", Japan today is marked by a lack of innovation and poor economic performance. Yamagishi argues that this is partly due to the rigid and dysfunctional social, political and economic networks that dominate the Japanese society. While many have interpreted these networks as productivity enhancing and a sign of widespread trust, Yamagishi draws the opposite conclusion. He considers the extensive networks in the Japanese society as a sign of lack of trust and as an important obstacle to economic change and development. He states that: "*[I]n future Japanese society, the traditional practice of closing off relationships to the outside and*

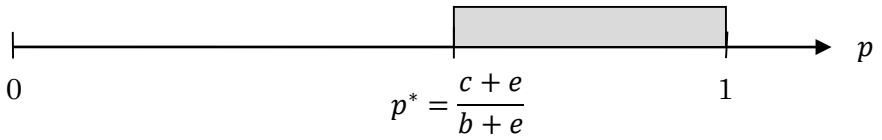
building internal cooperation will damage rather than enhance economic, political and social efficiency. (...) Japanese society needs to abandon the collectivist behavioral pattern centered around the security of stable relationships, and distrust in and discrimination towards outsiders." (Yamagishi, 2011 p. 3-5).

The reason why many seem to think about Japan as a trust-society is, according to Yamagishi (2011), that people do not distinguish between the concepts of 'trust' and 'assurance'. Networks typically remove the incentives to act opportunistically through repeated interaction, social control and easy access to information about the network members' past behavior. Networks therefore create assurance and not trust. Trust is important in situations characterized by social uncertainty, that is in situations where you do not know whether your trading partner is trustworthy or not. This is typically the situation on the more anonymous market. Hence, trust becomes important when actors consider moving out of established networks to deal with strangers that offer new opportunities and more profitable projects, but where these strangers are unconstrained by explicit or implicit promises of future rewards or punishments.

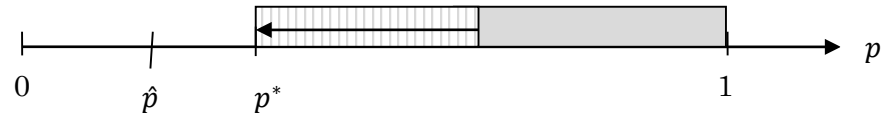
This idea can be illustrated more formally with the help of Figure 2 and the model developed above. The grey area in Figure 2 shows the range of p that makes possible mutual trust relationships, for a given value of c, e and b (this follows from the condition given by (5)). Assume, however, that the players have a belief about p that is lower than p^*, meaning that they will not take the risk of entering the market – they will stay in their current networks. Given their beliefs about others' trustworthiness, the players consider the payoff from a market

transaction (b) as too low relative to the payoff from a network transaction (c) and the cost of being cheated on the market (e).

Figure 2 *The range of p that produces mutual trust relationships*



An increase in b lowers the threshold p^*:



If b increases, making trade on the market more attractive relative to network trade, p^* moves to the left. Players may then be willing to enter the market and establish trust relationships depending on their belief about others' trustworthiness.

If the players have an initial belief about p that is in the shaded area, they will move out of their current networks when b increases. If, however, the players have a belief about p that is outside the shaded area, for instance $\hat{p}$, they will stay in their current networks despite the increase in b. Hence, both the individual and society will not be able to reap the increased gains produced in markets due to lack of trust.

The main message following from this is that the societies that will be most successful in profiting from rapidly increasing benefits associated with free and open trade are those that possess a high degree of general trust. The Nordic countries (Denmark, Finland, Norway and

Sweden) may serve as interesting cases. Algan and Cahuc (2013) have collected data for average levels of generalized trust for 111 countries, generated from responses to various surveys.[5] These surveys ask the familiar question "Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people"? The trust variable is given the value 1 if the respondent answers that "Most people can be trusted" and 0 if the respondent thinks that one "Need to be careful". Trust levels vary substantially between countries, with Norway, Sweden, Denmark and Finland as the top four in the ranking. In Norway, 68.1 percent of the population trusts others. At the opposite end of the ranking lies Trinidad and Tobago, with an average trust level of only 3.8 percent. In Japan, 41.6 of the population exhibits interpersonal trust. The Nordic countries are clearly high-trust societies. At the same time the Nordic countries are among the richest countries in the world.

Seen in the light of the model developed above, the good economic performance of the Nordic countries may be partly due to their high trust levels and their ability to exploit the gains both from networks and markets. The Nordic countries are well known for embracing free trade and openness (except for agricultural products). Measured by import and export relative to GDP, the Nordic countries are among the most open economies in the world (Barth and Moene, 2013). This may be seen as an indication that these countries have managed to secure a good combination of networks and markets, producing good economic performance. Admittedly, this observation has a distinctly speculative flavor. On the other hand, it is not "merely" a speculation, but a speculation guided by structured economic reasoning. In addition, my

[5] The World Values, the European Values Survey, and the Afrobarometer.

speculation points to a link between trust and economic performance that has been little investigated, but which deserves more attention in future work.

4. Conclusion

The main objective of this paper has been to formalize Yamagishi's (2011) concept of trust and the role trust plays for social organization and economic performance.

Incomplete contracts expose people to social uncertainty and behavioral risk. A common strategy to deal with this is to restrict economic transactions to take place in networks. Networks allow informal agreements of cooperation to be self-enforcing through repeated interaction and threat of retaliation against opportunism. Hence, networks may be regarded as a mechanism for the reduction of behavioral risk. At the same time, networks generate an important opportunity cost. Due to their small size and exclusionary practices, networks restrict the opportunities to benefit from gains from trade in larger markets.

When the gains from market transactions are large, maintaining networks is not necessarily advantageous even though they reduce behavioral risk. When market transactions produce behavioral risk and the opportunity cost of networks are large, trust becomes important. Trust acts as a "booster rocket", which makes it possible for people to break out of established commitments and invest their resources in more uncertain but also more profitable projects.

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