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## SOCIAL STRUCTURE AND REPUTATION: THE NASDAQ CASE STUDY.

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**Abstract:** In 1996, two investigations conducted by the Securities and Exchange Commission and the American Department of Justice reported non-competitive practices among market makers on the NASDAQ. These reports also mentioned the influence of the NASDAQ social structure on market makers' behaviours. Most market makers adopted social norms in order to increase significantly their income at the expense of the customers. This paper aims to explain the rise and long-term effects of non-competitive practices, through the integration of a concrete view of "*embeddedness*" (Granovetter, 1985). We propose the use of game theory tools to achieve this goal. A rereading of Kreps' model of reputation sheds light on its structural dimension and illustrates the way social structure governs individual behaviours.

**Key words:** NASDAQ, non-competitive behaviours, embeddedness, social structure, game theory, reputation, trust.

**Classification JEL:** A12, A14, B41, L14, G14, G15

## 1. Introduction

In 1994, the Securities and Exchange Commission (SEC) and the American Department of Justice conducted investigations into market makers' operations on the NASDAQ. These investigations reported non-competitive transactions (Revest, 2000). Market makers followed numerous illicit practices such as price collusion or the spreading of private information. These practices belonged to a collective pattern: most market makers observed social norms in order to increase significantly their income at the expense of the customers. The evidence illustrates the influence of the social structure on individuals' behaviours and on the progress of transactions.

Although standard economics does study social interactions, it favours an atomistic point of view; individuals are astructural (Degenne and Forsé, 1994). The theory disregards the social context, since markets are assumed to be competitive and the price mechanism allows mediation between anonymous individuals (Hirschman, 1977). On the contrary, Granovetter puts forward a conception of exchange which highlights the embeddedness of economic actions within social structures: *"the argument that the behaviour and institutions to be analyzed are so constrained by ongoing social relations that to construe them as independent is a grievous misunderstanding"* (1985, p. 482). Even if the argument takes into account the role of social structures, it remains *"a programmatic statement"* (Uzzi, 1996)<sup>1</sup>.

This paper aims to explain how non-competitive behaviours emerged on the NASDAQ, through a concrete view of embeddedness. Game theory tools and particularly Kreps' model of reputation are mobilised (Kreps, 1990a, 1990b). At first glance, Kreps' model belongs to an under-socialised view of action: *"narrow utilitarian pursuit of self-interest"* induces the behaviours of economic actors (Granovetter, 1985, p. 485). However, a rereading of this model discloses its important implicit content, shedding light on its structuralist dimension and consequently helping to explain the way social structures govern actors' behaviours (Guennif, 2000). In other words, the purpose of this paper is to initiate a link between Granovetter's works on embeddedness and game theory, by means of an interdisciplinary method.

Firstly, the main conclusions of the investigations conducted by the SEC and the Department of Justice about the deficiencies of the NASDAQ in 1994-1996 are scrutinised. Evidence shows that some non-competitive behaviour had been stimulated by the social structure of the NASDAQ. Secondly, after analysing Kreps' model, we describe the role of trust, rational motives and social norms in the functioning of social structures. These elements generate a particular enforcement that sustains non-competitive behaviours and underlies the progress of transactions on this market.

## 2. Impediments to price competition on the NASDAQ stock market

The SEC's investigation revealed that the NASDAQ has not always operated in an open and freely competitive manner. *"NASDAQ market makers have engaged in a variety of abusive practices to suppress competition and mislead customers"* (US Securities and Exchange Commission, 1996, p. 3). In this section, we describe the main anti-competitive practices highlighted by the investigations. Then, we show that the market makers' behaviours have been influenced by the structure of the NASDAQ Stock Market. This approach corroborates the embeddedness argument of Granovetter: market makers' behaviours are constrained by social relations.

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<sup>1</sup> Since 1985, several authors have proposed a view of embeddedness and described the way social structures influence individuals' behaviours in ways neglected by standard economy theory (Zuckin and Dimaggio, 1990; Uzzi, 1996; Gulati et al., 2000).

## **2. 1. A brief description of the NASDAQ Stock Market in 1994**

Initially intended to enhance the efficiency of the Over-The-Counter (OTC) market for stocks, the NASDAQ, founded in 1971, has experienced remarkable growth and represents a serious competitive alternative to the dominant equity exchange in the US, the New York Stock Exchange (NYSE).

The NASDAQ market is a telecommunications network linking thousands of geographically dispersed market participants. This is exclusively a dealer's market, in which a number of brokers-dealers make markets in the same security<sup>2</sup>. Making a market consists in standing ready to buy and sell securities at displayed prices. The market makers in NASDAQ quote two prices: a "bid" price, at which they are willing to buy the security, and an "ask" price, at which they are willing to sell the security. Each issuer has at least two market makers for its stock, but the average stock has eleven market makers.

Market makers seek profit by buying at lower prices and selling at higher prices (a market maker's bid price will always be lower than their ask price). The difference between the ask price and the bid price is called the "dealer spread". The spread represents part of the market maker's potential compensation. Market makers play an important role in financial markets. Demand for market making generally arises because buyers and sellers of securities do not arrive at the market at the same time or with the same quantities to trade. The market maker is thus said to provide immediacy to the market (O'Hara, 1995, Schwartz, 1991).

The quotes are displayed on the NASDAQ market's electronic quotation system. The highest bid and lowest ask prices are also separately displayed together as the "inside quotes", and the difference between the two is called the "inside spread". Display of the inside quotes allows a viewer to observe immediately the best prices quoted on the NASDAQ market for both buying and selling a given security.

Market makers in NASDAQ have to respect certain rules. They must display two-sided quotes in all stocks in which they choose to make a market, from 9.30 a.m. to 4.00 p.m., from Monday to Friday. They have to propose firm quotes. When executing a customer order, market makers are required to seek the most favourable terms for the customer under the circumstances. Market makers must also report their trades to the NASDAQ market on time. Created in 1939, the National Association of Securities Dealers (NASD) operates and regulates the NASDAQ<sup>3</sup>.

## **2. 2. The price convention and other market makers' non-competitive behaviours**

In 1994, an article by Christie and Schultz revealed larger dealers' spreads on NASDAQ than on the NYSE. As a result, the Antitrust Division of the US Department of Justice began an antitrust investigation of NASDAQ market makers, while the SEC began an investigation of the NASD (US Department of Justice, 1996, US Securities and Exchange Commission, 1996). These investigations involved extensive analysis of market data, interviews with market participants, and review of taped conversations between market makers<sup>4</sup>. Both investigative teams found several abusive practices.

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<sup>2</sup> In a dealer's market, the market makers or dealers offer bid and ask prices continuously. The alternative organisation is an order-driven market where the prices are determined by the confrontation between the buyers' orders and the sellers' orders.

<sup>3</sup> Although the NASD is a Self Regulation Organisation, it is still under the control of the SEC.

<sup>4</sup> The Department of Justice conducted numerous telephone and in-person interviews of current and former NASDAQ stock traders and investors, and listened to approximately 4500 hours of audiotapes of telephone calls between stock traders employed by the defendants and other market makers. It also analysed data showing all market makers quote changes on NASDAQ during a twenty-month period between December 1993 and July 1995.

Firstly, NASDAQ market makers widely followed a price convention. This convention was used to determine the increments by which they would adjust the displayed quotes. Market makers testified that under the convention, stocks in which dealers were quoting spreads of  $\$3/4$  or more had to be quoted in even-eighths (i.e.  $\$1/4$ ,  $\$1/2$ ,  $\$3/4$ ), thereby giving rise to a minimum inside spread of  $\$1/4$ . Stocks with dealer spreads lower than  $\$3/4$  could be quoted in both even and odd-eighths, thereby allowing a minimum inside spread of  $\$1/8$ . Therefore, the price convention limited the flexibility and competitiveness of price quotation in the NASDAQ market. In the case of quoted spreads equal to or greater than  $\$3/4$ , the avoidance of odd-eighth quote increments meant that the inside spread could not be narrowed to  $\$1/8$ . On one side, as the spread represents part of the market makers' compensation for providing immediacy, the convention resulted in a larger compensation for them. On the other side, market makers' adherence to this price convention often increased the transaction costs paid by customers. In effect, the price convention resulted in wider inside spreads, which caused trades to be executed at prices that were less favourable for investors<sup>5</sup>.

Secondly, many NASDAQ market makers also adhered to a size convention, under which they did not display a new inside quote unless they were willing to trade in an amount substantially greater than the minimum volume required by NASD rules. In 1994, these rules required market makers to be willing to trade at least 1,000 shares at their quoted prices for the more actively traded stocks and lesser amounts for other NASDAQ stocks. The size convention had an anti-competitive effect. It inhibited price transparency by limiting quote changes and resulted in large spreads.

Thirdly, the investigations established that a number of NASDAQ market makers coordinated quotations, trades and trade reports with other NASDAQ market makers. On numerous occasions, market makers asked colleagues to shift their displayed quotations in a particular direction in order to help the requesting market maker to trade at the most favourable prices. Cooperating market makers acceded to these requests as they expected the requesting market maker to reciprocate in the future. Such cooperative activity improperly influenced prices, often at the expense of investors. Moreover, evidence demonstrated that market makers regularly shared information relating to the size of customer orders and sometimes to the identity of the customer. Market makers also shared information concerning their own inventory positions, their intended trading strategies and future quote movements. These practices, viewed as "courtesy", could conflict with the basic obligations of a broker-dealer toward his customers. For example, revealing the size of a customer order could be detrimental to the ability of the customer to obtain the best execution.

Fourthly, the investigation revealed numerous violations of the firm quote rule by NASDAQ market makers. Market makers have a fundamental obligation to honour their quotations. Failure to honour quotations deprived investors of the liquidity market makers could provide. For instance, market makers at times backed away from their trading obligations to avoid unwanted orders.

Finally, we can mention the practice of "late trade reporting". Numerous market makers repeatedly failed to report NASDAQ transactions on an accurate and timely basis. The Commission staff calculated that at least 3.6% of all NASDAQ trades in the period between February and December 1994 were reported late. During the same period, late trades accounted for only 0.9% of reported trades on the New York Stock Exchange. As reports of large trades are more likely to be market sensitive, market makers seeking to fill an order or cover a position may have a greater incentive to delay the reporting of large trades.

In summary, according to the investigation reports, market makers widely followed conventions, during the period 1994-1996, that were opposed to the general rules of the SEC governing the functioning of American financial markets. One important issue relates to the way the behaviours described above expanded. In other words, how did non-competitive practices emerge and spread on the NASDAQ?

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<sup>5</sup> Recently, US equity markets have moved to decimal quotations.

### 2. 3. Social relations on the NASDAQ

When questioned about these non-competitive practices, market makers insisted paradoxically on their ethical nature, which, they argued, justified the use of sanctions. The NASDAQ pricing convention was generally considered as a pricing “*ethic*”, “*tradition*” or “*professional norm*”. Violating the convention (in the parlance of market makers “*breaking the spread*”) was regarded as “*unprofessional*” or “*unethical*” trading behaviour (US Department of Justice, 1996, p. 21). Market makers who deviated from the convention were derisively said to create a “*Chinese market*”. Numerous witnesses testified to this fact. One market maker admitted that he telephoned another market maker to make him change his quotation: “*To get him to get his increment and his spread to conform to what I thought was the right thing to do*” (US Securities and Exchange Commission, 1996, p. 18).

“Insert Evidence 1”

Remarkably, market makers were not alone in perceiving the price convention as a professional norm. According to the Letter of the Securities Traders Association of New-York (3<sup>rd</sup> quarter, 1989), “*It is clearly unethical to make a Chinese market*”. During a meeting in June 1990, the NASD’s Trading Committee also concluded that the price convention was an internal ethical issue.

Market makers enforced adherence to the price convention in different ways. Traders testified that they were taught (by the senior traders) to follow the convention. Therefore, they followed it and they expected other traders to follow it as well.

In addition, market makers who violated the price convention were subjected to harassing telephone calls. Traders testified that the telephone calls were effective in deterring market makers from entering quotes that were inconsistent with the pricing convention. In general, the mere threat of such harassment was sufficient to discourage market makers from violating the convention. One trader explained why, when he was a junior trader, these telephone calls dissuaded him from narrowing spreads, stating: “*because, many years ago, as a junior trader, I wanted to be accepted*” (US SEC, 1996, p. 18).

“Insert Evidence 2”

Firms that repeatedly entered quotations in violation of the quoting convention were punished. The most effective mechanism was the refusal to deal. A refusal to deal has negative consequences for market makers. For example, when a market maker does not want to fill a retail or institutional order from his own account, he must be able to find other market makers willing to fill this order. Otherwise, his clients will soon look elsewhere for trading services. Consequently, the threat that other firms will not trade with them was often sufficient to discourage market makers from violating the convention.

When a market maker violated the convention, he was subject to harassment and punishment. He no longer had access to the informal resources of the traders’ network and his remuneration therefore fell. If, on the other hand, he followed the convention, then he gained access to private information, and could take advantage of the opportunities offered by the network.

In conclusion, the investigations conducted by the SEC and the US Department of Justice revealed the influence of the NASDAQ’s structure on the behaviours of market makers. In order to understand this influence more clearly, we shall illustrate the embeddedness argument by means of Kreps’ reputation model. Even if Granovetter (1985) asserts that game theory propositions belong to an under-socialised view of social relations, we now propose a new reading of Kreps’ reputation model. This rereading makes it possible to overcome the under-socialised bias and, above all, to grasp the way social structures may influence individuals’ behaviour.

### 3. Kreps' model of reputation: from an atomistic to a structuralist view of interaction

For transactions in which free-riding behaviour is a feature, game theory tries to define the conditions required for the emergence of cooperative behaviour and the achievement of an optimal equilibrium. In this perspective, Kreps asserts that the prisoner's dilemma is solved in infinitely repeated games among  $n$  players when a self-enforcing mechanism built upon strict economic incentives produces trust and induces cooperative behaviour. This mechanism is reputation. It satisfies a huge theoretical objective: the obtaining of a private arrangement capable of sustaining spot-market transactions. Yet, according to us, reputation operates within social structures where the embeddedness of players activates social mechanisms for the performance of transactions. Hence, reputation and others mechanisms such as trust, solidarity and ostracism are part of a social arrangement that underlies the performance of any transaction, such as those between market makers.

#### 3. 1. The atomistic dimension and private arrangement

Kreps analyses a very particular game. On first sight, it is an one-round game: an actor  $A_i$  must decide whether or not to trust an actor B.  $A_i$  knows that if he elects to interact with B, the latter can choose to act opportunistically, as a free rider. B may impose severe losses on  $A_i$  and obtain maximum gains. This is the "*selfish temptation*" (Axelrod, 1984). Trust is the risk  $A_i$  takes on B's behaviour (Luhmann, 1979; Dasgupta, 1988; Coleman, 1990; Lorenz, 1993; Guennif, 2000).

In fact, the game is repeated: B must successively decide whether to honour or to abuse the trust of  $A_1, A_2, A_3, \dots A_n$ . The game thus begins with a single transaction between actors  $A_1$  and B and continues with another transaction between  $A_2$  and B, and so on. So, "*instead of having one individual who offers trust and a second who honours or abuses that trust, we have a sequence of individuals A who must choose whether or not to trust a single trading partner B*" (Kreps, 1990a, p. 106). Kreps posits that the game is infinitely repeated: there is a 90 percent chance that another transaction will follow the present one.

Kreps then specifies the conditions required for the transactions between actors  $A_i$  and B to take place. On the one hand, any  $A_i$  will only trust B if B has not abused the trust of his previous partners. Thus, the past behaviour or the reputation of B determines the choice of each  $A_i$  for the present round. On the other hand, B knows that if he wants to exchange with another  $A_i$  for the next round, he must preserve his reputation. In other words, he must honour his partner's trust in the present round. To sum up, B maintains his reputation unsullied by honouring  $A_i$ 's trust, and thus obtains the possibility of repeated transactions with them. In this way, B gains maximum profits through repeated rounds. He receives \$10 in each round, according to the Kreps' Trust game (1990a, p. 100). On the contrary, if B abuses the trust of the current  $A_i$ , his reputation is irremediably sullied. He gets the maximum pay-off resulting from defective behaviour (\$15), but he can no longer transact with  $A_i$ . By choosing opportunistic behaviour, B renounces the \$10 for each honest future transaction he would have had with  $A_i$ . B will therefore choose to protect his reputation, an asset that will give him high levels of income in the future. Each  $A_i$  knows that B is rational and will keep his reputation unsullied by honouring the trust of his partners. For this reason, each  $A_i$  will decide to trust B and will choose to transact with him. Thus, reputation is a "*process-based*" mechanism linked to the repetition of transactions (Zucker, 1986 p. 60). Finally, the mechanism is built upon the expectation that the business partner will behave more or less as he did in the past<sup>6</sup>.

Ultimately, Kreps' propositions overcome the prisoner's dilemma and satisfy significant theoretical objectives. For example, as an informal self-enforcing mechanism, reputation supports the progress of spot-market transactions. Reputation produces the trust necessary for

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<sup>6</sup> Similarly, Breton and Wintrobe (1986) claim that trust results from belief formulations in repeated transactions. The perspective of future gain motivates ex-post good behaviour and legitimates ex-ante trust between players (Meidinger et al., 1999).

the occurrence of transactions that contain a risk of opportunistic behaviour, of strategic or behavioural uncertainty (Williamson, 1985). Thanks to reputation, a “self-enforcing arrangement” can be found; there is no need for any third party involvement or arbitration (Lester, 1980; Klein, 1980). To put it differently, the progress of transactions relies on a private arrangement, which is all the more efficient in the neo-institutional sense of the term. The informal self-enforcing mechanism explains how transactions take place without any complete contingent contract<sup>7</sup>. Trust thus based on reputation saves on transaction costs (Arrow, 1974; Leibenstein, 1987; Kreps, 1990a; Sako, 1992; Guennif, 2000).

Despite these important theoretical points, the trust game has certain limits (Kreps, 1990a, p. 103). For instance, Kreps recognises that his construction “depends crucially on each A seeing precisely how B has behaved previously” (Kreps, 1990b, p. 71) and leads to many equilibriums. B may say to A<sub>i</sub> “I intend to honour your trust two out of three times and to abuse it once every three times” (Kreps, 1990a, p. 102). The 90 percent chance that the game will go on after the present round is also arguable. Nevertheless, our objection lies on a different level: the model does not belong to an atomistic view of interaction. A rereading of this model discloses its structuralist dimension.

### 3. 2. The structuralist dimension of the model

Strictly, following Kreps’ propositions, reputation produces a particular link between each A<sub>i</sub> and B, i.e. trust. Trust motivates cooperative behaviour and induces transactions. In the diagram below, this trust links figures in bold type to indicate that it supports an exchange that involves the two players. According to us, the argument is much more complex than Kreps’ assertions suggest. Any transaction between A<sub>i</sub> and B occurs thanks to several trust links. In order to make this point explicit, let us consider a transaction: A<sub>2</sub> must decide to trade with B. What are the conditions of trust among players and what are the conditions for the occurrence of a transaction?

Firstly, for reputation to be the self-enforcing mechanism, A<sub>2</sub> must be able to observe B’s behaviour during the previous transaction. Kreps assumes such a capacity. On the contrary, Kandori argues that “the agent only observes the results of the trades he is engaged in” (1992, p. 65). Because of imperfect observability, A<sub>2</sub> identifies at best A<sub>1</sub> and requests his “private information”, asks for his “personal experience” (p. 64). Then, the decision whether to trust B depends on A<sub>2</sub>’s access to the information A<sub>1</sub> holds and above all on the credit A<sub>2</sub> gives to this information. As shown in the diagram, another trust link appears and underlies Kreps’ reputation construction: if A<sub>2</sub> trusts A<sub>1</sub> to communicate his private information without any distortion, and if A<sub>1</sub> claims that B acts honestly, then A<sub>2</sub> elects to trust B and exchange with him<sup>8</sup>. When one of these conditions is not satisfied, A<sub>2</sub> refuses to trust B and renounces trade with him<sup>9</sup>.

The prime trust link that binds A<sub>2</sub> and A<sub>1</sub> is a necessary condition for the development of trust between A<sub>2</sub> and B. A<sub>1</sub> is “a trustworthy informant” (Granovetter, 1985), an “intermediary in trust” (Coleman, 1990; Nooteboom, 1999; Uzzi, 1996), a “third party” (Burt, 1996). Trust connecting A<sub>2</sub> and B displays a medial nature since it presupposes a former trust link between A<sub>1</sub> and A<sub>2</sub>. Hence, one may consider the existence of a “trust chain” (Coleman, 1990).

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<sup>7</sup> This is a critical point since actors are unable to draft contingent contracts; they face difficulties in measuring individual performance, in observing compliance (Alchian and Demsetz, 1972; Hart, 1996) and in predicting. Finally, bounded rationality impedes the drafting of complete contracts (Simon, 1978).

<sup>8</sup> In other words, to trust B, A<sub>2</sub> must have information about B’s reputation (his past behaviour), and A<sub>1</sub>’s reputation (his capacity to give good information about his partners’ behaviour).

<sup>9</sup> If the transaction ends up with problems between A<sub>1</sub> and B, A<sub>1</sub> can declare that he has been cheated by an opportunist. In the same circumstances, B can declare he has fulfilled his obligations, that A<sub>1</sub> was unlucky. Therefore, the question of the credit A<sub>2</sub> gives to A<sub>1</sub> arises. A<sub>1</sub> may declare that he has been cheated to hide his undue requirements. Then B may refuse to commit his reputation and may renounce trade with such individuals (Lorenz, 1988).

Secondly, before trusting B,  $A_2$  must be sure that any opportunistic behaviour on the part of B will be punished by  $A_3$ , i.e. the player who will next decide whether to exchange with B. Therefore,  $A_2$ 's trust relies on the belief that  $A_3$  will ostracise B in the case of opportunism. Introducing a doubt about B's next partner, it follows that the trust  $A_2$  invests in B depends on the belief any  $A_i$  will boycott transaction with an opportunist B. Thus, as shown in the diagram,  $A_2$  decides to trust B and exchange with him under the condition that  $A_2$  believes that  $A_i$  will ostracise B if he defects.

Consequently, to ostracise B for opportunistic behaviour, all  $A_i$  must ultimately rely on the private information  $A_2$  delivers.  $A_i$  necessarily trusts  $A_2$ . Trust between  $A_2$  and  $A_i$  is therefore mutual, as the two-way arrows in the following diagram illustrate.

To sum up, the accomplishment of a transaction between any  $A_i$  and B is not due to a single trust link between the two players, as Kreps stated. According to our argument, it relies on several trust ties:  $A_2$  trades with B if he trusts him, if he trusts his peers and if they trust him in return. When one of these trust links is not fulfilled,  $A_2$  renounces the exchange with B. These trust connections make up the following "chain of trust":

"Insert Figure 1"

At this point, a significant gap arises between the reputation argument set out by Kreps and the outcome of a careful examination of his model. Following the latter, all the conditions required for the progress of any transaction ultimately suggest that players operate within social structures. Thus, the assertion that transactions take place within a private arrangement characterised by a self-enforcing mechanism is questionable. Our argument is that transactions take place thanks to a "social arrangement" (Uzzi, 1996) featuring a specific enforcement that we shall define below. In other words, against all expectations, a new reading of this model can be used to illustrate Granovetter's embeddedness hypothesis<sup>10</sup>.

### 3. 3. Embeddedness and non-private enforcement of transactions

According to us, reputation operates neither solely nor within a private arrangement. The reputation mechanism is one among several elements comprising the "structural enforcement" (Guennif and Plociniczak, 2002), which ensures the accomplishment of transactions within social structures.

In sociological literature, a social structure represents an organisation of economic life in which formal and informal social relations among actors matter. Here, social relations among players contribute to the progress of any transaction on the basis of trust given or received within the network, i.e. "a saturated structure in which every actor is directly linked to every other individual" (Knoke and Kuklinski, 1990, p. 175) and where "a specific type of relation links a defined set of persons" (Mitchell, 1969, p. 45).

These social structures influence economic decisions: all transactions are shaped by and depend on social relations among actors. This influence refers to Granovetter's embeddedness. Accordingly, transactions occur within a web of social relations whereby actors are bound and influenced in one way or another by systems of more or less stable and lasting social relations, within which tangible and intangible resources such as materials, money, information, knowledge, norms or rules diffuse and circulate (Guennif and Plociniczak, 2002).

Concretely, the influence of social structures on players' behaviour is possible through the operation of a non-private enforcement of the accomplishment of transactions. Enforcement refers to the formal and informal mechanisms defined and used by actors to inhibit opportunism

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<sup>10</sup> Given their appurtenance to standard economic theory and its under-socialised view of economic behaviour, Granovetter argues that the reputation models proposed by game theorists are useless for capturing the essence and effective influence of embeddedness (1985, p. 490).

and to incite cooperative behaviour so that transactions can take place (Guennif and Plociniczak, 2002)<sup>11</sup>. For us, the acknowledgement of embeddedness clarifies the path from private enforcement to structural enforcement, in which reputation plays a role and players' motivations for action are much more complex.

As figure 2 summarises, trade conditions result on the left-hand side from an under-socialised vision of action. In order to fulfil theoretical propositions, social structure is neglected and a private arrangement is proposed through the reputation mechanism. The enforcement of transaction relies strictly on a bilateral foundation: two players trust each other and exchange thanks to formal and informal mechanisms built upon economic incentives. These mechanisms are defined and used by players to prevent opportunism from their partners and to facilitate the accomplishment of transactions. In this perspective, reputation produces economic incentives not to cheat and induces individual actions sufficient for the efficient enforcement of spot-market transactions:  $A_2$  trusts B and agrees to exchange with him because he believes B will not cheat because he values his reputation as the condition for present and future gains.

On the right-hand side, social structure is taken into account. Consequently, trust is all the more important as a lubricant for its functioning. Players' behaviour is influenced by the social context, which makes it easier to resort to a structural enforcement that goes beyond the private arrangement, the bilateral enforcement described by Kreps. This enforcement expresses the idea that relationships between actors shape behaviour in ways neglected by standard economic theory. Resorting to social mechanisms hinders opportunism and induces cooperative behaviour during market transactions. Hence, the rational motive (preserving reputation) and social norms (solidarity, ostracism or reciprocity) are both involved in the accomplishment of transactions.

Indeed, Granovetter's proposition concerning the joint involvement of selfish and unselfish motives in the accomplishment of transactions is confirmed. B protects his reputation as an asset that represents important future income. In addition,  $A_2$  chooses to exchange with B because he believes that peers will sanction any defection by refusing to transact with B in the future<sup>12</sup>. Ostracism is therefore an internal voice attitude that derives from trustworthiness, loyalty towards peers (Hirschman, 1977). It is a social norm deriving from potential sanction within a community when improper behaviour is observed (Elster, 1989). Therefore, utility maximisation and social norms play both a major role in the functioning of social structures. To put it differently, the rationality principle is insufficient and other motives, such as loyalty and solidarity, are essential for explaining individuals' behaviour (Arrow, 1971; Boyer and Orléan, 1997)<sup>13</sup>. To sum up, whereas bilateral enforcement logically emphasises strict economic incentives or selfish motivations, structural enforcement stresses the importance of both selfish and unselfish motivations.

"Insert figure 2"

Similarly, on the NASDAQ, market makers act inside a social structure, a "*professional network*" (Bowles and Gintis, 2002) where a chain of trust underpins the accomplishment of any

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<sup>11</sup> For a presentation of the operation of the two kinds of enforcement in social networks, see Guennif and Plociniczak (2002).

<sup>12</sup> In the same vein, Kandori describes "*community enforcement*": "*dishonest behaviour against one partner causes sanction by other members in the society*" (1992: 63). This "*community enforcement*" also prevails for peers that do not sanction the defector (64). Structural enforcement is also defined as "*community governance*" or "*network governance*" (Bowles and Gintis, 2002; Jones et al., 1997).

<sup>13</sup> Analysing industrial districts, Saglio reveals how individuals observe a set of social rules that contains economic rules (1991, p. 531). Studying industrial vertical disintegration in Japan in the 60s and 70s, Dore notes that subcontracting relations involve both "*benevolence and self-interest*" (1983, p. 170). Hirschman insists on "*sweet trade*". According to him, trade is communication based on closed contacts among people who make promises, trust each other, claim and complain (1984, p. 69). Williamson admits that social norms such as ostracism sustain transactions. They limit self-interest, "*individual aggressiveness*" (1975, pp. 106-107).

transaction and where both selfish and unselfish motives operate<sup>14</sup>. A market maker  $A_2$  agrees to exchange with another market maker B because he chooses to trust him. He does so in order to increase his gain and obtain a higher compensation.  $A_2$  assumes that B will follow informal rules such as a price convention or a quantity convention because these non-competitive conventions may increase market makers' compensation. Nonetheless, he assumes that if B defects and decides not to follow such conventions, he will never receive this compensation. B's defection will impose losses on  $A_2$ .

In addition,  $A_2$  trusts B because he assumes that the  $A_i$  adhere to certain common rules: - social norms<sup>15</sup>. More precisely, individuals do not respect common rules unconditionally, following what Granovetter calls an over-socialised view of action. Collectively, players define and use social mechanisms expecting that most of the time these mechanisms will work to their advantage and only sometimes impose costs on them<sup>16</sup>.  $A_2$  anticipates that peers will punish B if he defects. B will be subjected to harassment and above all, he will be ostracised. The  $A_i$  will impede B's access to network information and other tangible and intangible resources. Thus, maverick market makers who often improved the best quote would not get an execution. This refusal to trade is known as being "*traded through*". Maverick market makers were also subject to "*backing away*" and "*being made last call*" by other market makers. "*Backing away*" involved the failure of one market maker to honour its posted quote to another market maker, as required by SEC and NASD rules. Being made "*last call*" involved only trading with the maverick market maker when the market began to turn against the maverick, or when a market maker had no other alternative but to trade with him. Victim of one of these sanctions, defector B will not increase his compensation.

As a result, the market makers followed the price convention, quoted large dealer spreads and increased their profit at the expense of their customers. The price convention limited the flexibility and competitiveness of price quotations in the NASDAQ Stock Market.

#### 4. Discussion

We intend to develop a theoretical contribution to embeddedness based on game theory tools. The passage from the bilateral enforcement described by standard economic theory to structural enforcement throws light on the influence of social structures. Reputation is one of the mechanisms that underpin the accomplishment of spot-market transactions. As individuals are not astructural, social norms or common rules underpin every transaction. Using this theoretical approach, we can describe the way the NASDAQ social structure in the mid-eighties influenced market makers' behaviour and induced non-competitive practices.

A few days after the publication by the Wall Street Journal of a paper presenting the findings of Christie and Schultz (1994), four prominent NASDAQ stocks previously quoted only in even eighths, suddenly began to be quoted in both even and odd eighths (Smith, Selway and McCornick, 1998). In 1996, the publication of the US SEC and DOJ investigation reports put an end to the price convention and other non-competitive practices. The conclusions of these reports brought about two major reforms of the NASDAQ market organisation.

Firstly, the Rudman Commission (SEC, 1996) recommended more separation between the regulatory objectives of the NASD and the organisation/competitive objectives of the NASDAQ. A new subsidiary, NASD regulation, Inc., was founded and began operating in February of 1996 in order to promote fair representativity within the NASDAQ market's board of directors. At the

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<sup>14</sup> The balance between selfish and unselfish motivations is also presented as a particular trade-off between competitive and cooperative behaviours within industrial districts, networks or communities (Piore and Sabel, 1984; Bernstein, 1992; Gulati et al. 1999).

<sup>15</sup> Sociological studies on financial markets shed light on the role of the network (Baker, 1984), the role of the exchange organisation (Abolafia, 1984) or the role of local norms (Hassoun, 2000).

<sup>16</sup> A market maker admitted that in the absence of the price convention and in certain instances, he would have used odd-eighths quote increments (US SEC Report, 1996).

time, in 1994, the board of directors was in majority composed of representatives of market maker firms.

Secondly, the SEC adopted the "Order Handling Rules" (OHR) intended to change the way the NASDAQ operates. The first component of the OHR is the Limit Order Display Rule (SEC Rule 11Ac1-4). This rule stipulates, for all NASDAQ securities, that the public limit orders<sup>17</sup> should be reflected in the Best Bid and Offer disseminated by the market. The second component of OHR is new amendments to the Quote Rule prohibiting market makers from placing one quote in NASDAQ and a different one in an Electronic Communications Network (ECN). The OHR applies principles associated with agency auction markets to a quote-driven dealer market (Smith, 1998). It introduces competition between market maker quotes and public limit orders, and contributes to narrow spreads.

Today, although collusive practices have not completely disappeared because of the reforms, they nevertheless only affect a very low volume of transactions and few stocks. However, some "courtesy" practices such as "preference trading" remain. According to this practice, brokers and market makers are allowed to direct or "preference" an order to any market maker who agrees in advance to execute orders at the best-quoted prices, regardless of the price actually quoted by the market maker to whom the order is directed (Christie and Schultz 1994; Godek, 1996). Market makers may "*direct trades based on non-price considerations, such as established business relationships*" (Godek, 1996, p. 466)<sup>18</sup>.

As a final point, it is important to underline the fact that social structures do not only produce non-competitive practices. They may also generate social rules which represent important lubricants for the functioning of the market (Arrow, 1974). Although they are competitors, market makers frequently need to trade with one another. For instance, a market maker may call on another market maker's services in order to reduce the risk related to a short position. When a trader sells stocks that he does not own, he can ask another trader to sell him these stocks to balance his position. These social rules help to introduce more flexibility in market markers' operations without being detrimental to investors' interests. In fact, investors can buy or sell stocks without delay. Ultimately, the social structure improves the fluidity of the market's functioning.

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<sup>17</sup> Public Limit Orders are posted by the investors in an order-driven auction market and specify a price and a quantity.

<sup>18</sup> This kind of procedure is facilitated, *ceteris paribus*, by the specific NASDAQ organisation of exchanges (Revest, 2001). For example, unlike the NYSE, the NASDAQ and other dealer markets do not have time priority rules requiring market orders to be executed with the entity who first posted the current best quote (Grossman et al., 1997).

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### Evidence 1

Q: ...Would somebody making a Chinese market cause another market maker to get angered?

A: I believe that's possible.

Q: Under what circumstances?

A: ...I think Chinese markets, as they're called, were looked down upon, so are considered unethical. So by making a Chinese market, you're making yourself unethical and, therefore, I guess upsetting other market makers.

US Department of Justice, 1996: 21, <http://www.usdoj.gov/atr/cases/f0700/0739.htm>

### Evidence 2

Trader 1: Who trades CMCAF in your place without yelling it out?

Trader 2: ... Sammy

Trader 1: Sammy who?

Trader 2: It may be the foreign department...

Trader 1: What?

Trader 2: The foreign didn't realize they had to trade it.

Trade 1: Well, he's trading it in an eighth and he's embarrassing...

Trade 2: ... foreign department

Trader 1: He's trading it in eighths and he's embarrassing your firm.

Trader 2: I understand.

Trader 1: You know. I would tell him to straighten up his act and stop being a moron.

US Department of Justice, 1996: 24. <http://www.usdoj.gov/atr/cases/f0700/0739.htm>

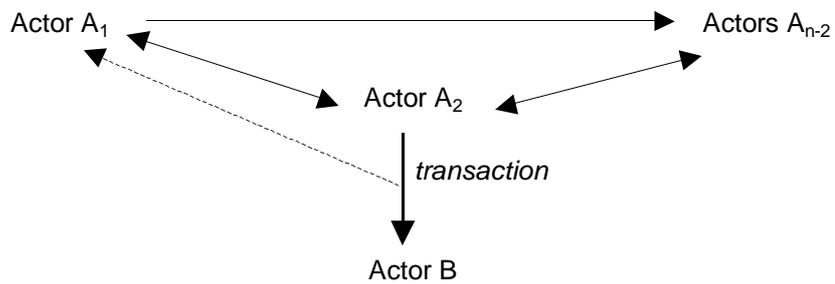


Figure 1. "Chain of trust" in a transaction between A<sub>2</sub> and B

