MANIPULATING SOFT PERFORMANCE INDICATORS IN PUBLIC PROCUREMENT

Federico Dini and Giancarlo Spagnolo*

ABSTRACT. Recent empirical evidence shows that in several e-procurement platforms vendors' attempt to manipulate past performance indicators to increase future business. Vendors can easily manipulate such indicators when these are based on *soft* information. In public procurement manipulations may affect key "Soft Performance Indicators" (SPI) that public administrations frequently use for incentive and selection purpose, such as customer satisfaction surveys and their digitalized version of online feedback systems. After surveying the results of the main theoretical and empirical economic literature of online feedback manipulation, we present some experiments showing how it is easy and cheap to collect false feedback on eBay. We then discuss possible implications of manipulations, drawing specific indications for the design of SPI in public procurement.

INTRODUCTION

Monitoring and assessing the contractors' performance through customer satisfaction indicators is believed important to stimulate current and future performance and to ensure effective procurement, especially in the presence of important quality dimensions that hard to specify in a formal contract.[1] Public and private procurers often use past performance

---

* *Federico Dini, M.sc. in Economics, is young economist of the Research Unit of Consip and Ph.D. candidate in economics at the University of Rome "Tor Vergata". His research interests are in (e-)procurement, auction theory and industrial organization and banking. Giancarlo Spagnolo, Ph.D., is Head of the Research Unit of Consip and Associate Professor at the Stockholm School of Economics. He is also affiliated to the Center of Economic Policy Research, London. His teaching and research interests are in procurement strategies, contracting, game and auction theory, industrial organization and competition policy.*

indicators for incentive purposes, among which assigning price bonuses, renewing the contract or inflicting monetary penalties. In many circumstances "soft" performance information as customer satisfaction, are included in the selection criteria of future procurement contests.

In the U.S, for instance, the new Federal Acquisition Regulation (FAR 42.1501, 2005) establishes that *past performance information is relevant information, for future source selection purposes, regarding a contractor's actions under previously awarded contracts. It includes, for example, the contractor's record of conforming to contract requirements and to standards of good workmanship; the contractor's record of forecasting and controlling costs; the contractor's adherence to contract schedules, including the administrative aspects of performance; the contractor's history of reasonable and cooperative behavior and commitment to customer satisfaction; and generally, the contractor's business-like concern for the interest of the customer.* [2]

The example of the FAR indicates that past performance indicators may contain both *hard* and *soft* information, namely information that is *verifiable* in front of a court of justice (e.g., the fulfillment of specific contract requirement, as time delivery or product standards) and information that is not, for example customer satisfaction or its digitalized version of online feedback mechanisms. We call Soft Performance Indicators (SPI) those indicators relying on soft/subjective performance information.

Customer satisfaction surveys (CSS) are one important SPI in private and public procurement. They aim at measuring the supplier's ability to provide valuable contribution on those dimensions of the supply that are less (or not) enforceable by the contract.[3] However, despite well designed CSS can effectively achieve this goal, it is worth noticing that they are potentially sensitive to *manipulations*. Hard information is not modifiable, it cannot be mis-reported, at most it can be concealed. Soft information, such as satisfaction reports of customers, may be instead manipulated, and thus can be *over* or *under* reported.

The idea that manipulations can arise within performance evaluation process is supported by the U4 Utstein Anti-Corruption Resource Centre.[4] The U4 points out that in public procurement contracting, supervisors (agencies or individuals) can be "unduly influenced to alter

the contents of their reports so changes in quality, performance, equipment and characteristics go unnoticed …" and that "…contractor's claims can be false or inaccurate and protected by those in charge of revising them. [5]

In public procurement the contractor may agree with the final end-user(s) to exchange a good report against a favor or money (bribe). If the number of end-users is not very large, the contractor may convince them to provide good assessment, regardless of the quality of the product/service provided.[6] One practical example in which corruption may arise in public procurement is when monetary bonuses are conditioned to "customer satisfaction" results. Since end-users do not pay for the procured good/service, and sometimes they are "far away" from its payer,[7] then they might be more inclined to give a good report in exchange of a favor or money.[8] In e-platforms as eBay or Amazon, the buyer-payer purchase for himself and thus he has much less interest in being corrupted for providing a good report. He is only interested in receiving what promised at the agreed price. In general, the vendor may only revise its price/quality schedule to encourage positive feedback. However, we will see ahead that on eBay there are reasons inducing people to pay for positive feedback and that the feedback mechanisms itself facilitates such behaviors.

Manipulations of customer satisfaction reports are more likely to arise when there is at least a partial mismatch between the group of people providing the report and the one that will use it. For instance, the contractor' incentive to corrupt the end-users are lower when the CSS are done by a public administration for her own purposes (e.g., to decide on a bonus or on a contract renewal) than when they are also done in the interest of other administrations. In the latter case reports are used by many administrations other than the ones who produced them, so the contractor has much more to gain (or to lose) from collecting positive (negative) reports.[9]

The U.S. FAR invite public agencies to share with other agencies past performance information records so to help the whole Administration selecting the best contractors.[10] In this case, good reports are more valuable for the suppliers since performance does not affect their "reputation" only with the specific evaluating public administration but also with whole Government. Moreover, notice that end-users may be less inclined to provide truthful reports since they do not use today

and will not use that information tomorrow. The information is used by the administration's executives.

Problems of information manipulation can potentially harm any other mechanism producing and transferring soft information. In supervision, rating, auditing contexts the agent (the supervised, ratee, auditee, etc.) may collude with the principal (supervisor, rater, customer, auditor) to get a good assessment. The type of manipulation harming customer satisfaction reports we outlined above is nothing else that a collusive agreement between a rater/end-user and the contractor/ratee. Indeed, one context in which soft information manipulation is becoming a critical issue is online e-procurement platforms. It is well known that marketplaces as eBay, Amazon or Yahoo! make use of *feedback mechanisms* or "reputation mechanisms" to foster cooperation and to mitigate the trading risks arising among anonymous trading partners.[11] Feedback mechanisms are systems able to inform the market about past agents' behavior in trade. Information is based on the "subjective feedback" about the counterpart's performance that buyers are invited to post at the end of any transaction. For instance, eBay allows vendor and buyer to rate one another by posting positive (+1), neutral (0) or negative (-1) feedback. Feedback are essentially very simple, individual-based, customer satisfaction reports. They are used by eBay to create a SPI, the *feedbacks score*, that is disclosed in the user's web page.

These mechanisms induce vendors to perform well to acquire a an high score (i.e., a "good reputation") that will play a key role when interacting with prospect buyers. However, the essence of any feedback system is the reliability of information it produces: rating, feedback and the SPI they generate will improve efficiency of transactions only if they contain truthful information.

While in traditional (word-of-mouth) environments feedback are assumed to arise from reliable communication process,[12] feedback posted in online communities can be instead much less reliable. *Anonymity* and *publicity* are the elements characterizing the potential unreliability of online feedback with respect to word-of-mouth feedback. The absence of personal relationships between feedback providers and receivers, may reduce the incentives people have in providing truthful reports to the community. Moreover, while in word-of-mouth contexts feedback is in general private information since feedback is learned only by the direct receiver(s), it is instead public in online communities.[13] Feedback are

usually posted on the vendors' web pages and thus are observable and usable by prospect buyers. Publicity has two important but conflicting implications. On the one hand, the Internet allows e-markets to disseminate information on a very large scale so many traders can observe feedback. Thanks to scale, publicity makes feedback mechanisms potentially very powerful in mitigating vendor's opportunistic behaviors. On the other hand, publicity creates the scopes for manipulations: In order to appear reliable, vendors may manipulate the feedback mechanism (for instance with exchanges or reciprocity as we will see ahead).

In summary, *anonymity can make feedback untruthful and publicity can make them tradeable*. These elements may compromise the informativeness of online feedback mechanism with respect to traditional word-of-mouth mechanisms.

There are two main messages in this paper. The first is that as long as procurers use SPI to stimulate performance in current and future procurements, suppliers (but also the procurer in some cases) may attempt to manipulate them. The second message is that the experience of private e-procurement platforms, as eBay, suggests that manipulations of SPI can be a critical issue also for public procurement. Contractors may have the incentive to manipulate report/feedback any time these are based on soft information. Even though manipulations in public (e-)procurement contexts can be less severe than in private e-procurement platforms, they can affect some major soft performance indicators, as customer satisfaction surveys and online feedback systems.

As we will see in ahead this requires particular attention in the design and the management of these important performance indicators.

The paper is organized as follows. In the next section we survey the main results of the theoretical and empirical literature on soft information manipulations. Then, we illustrate some of the methods people actually adopt to manipulate SPI in private e-platforms contexts. We focus on the new and unexplored type of manipulation, *feedback purchase*, that is becoming quite common on eBay, and present some experiments illustrating how traders in practice boost their SPI by purchasing underlying feedback from other traders. We also debate how manipulations of SPI (as subjective feedback posted on eBay) are potentially able to compromise their informational value. We finally

propose some policy indications on SPI design that public procurers may follow to minimize the risk of manipulations.

MANIPULATING ONLINE FEEDBACK SYSTEMS: METHODS AND REVIEW

The issue of manipulations of SPI, and in particular online feedback mechanisms, has been analyzed only recently by the economic literature. The literature discusses several types of manipulations, harming different types of online communities (as online auction sites and discussion forums). One new type of manipulation, that has not been noticed yet is, *feedback purchase*. On eBay, for instance, users purchase low value items at the only scope to exchange positive feedback. To our knowledge this is the first paper discussing the problem and attempting to identify its possible implications.

Other forms of manipulations include the following. In *certification markets*, the audited firms may collude with auditor agency to receive a good report. In online discussion forums (as Epinions, Usenet, Citysearch) where people exchange information about products and services (as hotels, restaurants, etc.), vendors can enter as anonymous customers to send strategic false messages to the community and influence consumers' choices. This is a second type of manipulation: vendors invest resources in *fake promotions* to boost the reputation of their products at the expense of the one of competitors. Other well known forms of manipulations harming the feedback system of eBay are i) feedback *reciprocity*, when users post a reciprocal positive feedback at the end of the transaction to merely boost their feedback score; ii) collusion among users to send positive or negative *unfair ratings* and iii) *nick-name changes*. In what follows we will review the main discussions of the literature in each of these forms of manipulation.

Manipulations in Certification Markets

Certification intermediaries exists because firms cannot credibly transmit information (as financial solidity and balance sheets data) to the market. However, the research is growingly paying attention to the possibility of collusion between the certifying agency (auditor) and the certified firms (audited), since concerns for reputation not always turned out to be an effective mechanisms against it. In a recent paper, Pyerache and Quesada (2005) investigate the problem, and precisely the issue of

incentive to collude involving the auditor and auditee. Their theoretical model confirms the idea that when rating agencies are constrained to disclose the information object of evaluation, then collusion emerges as an equilibrium phenomenon. As we will see ahead, the feedback system of eBay, that has a commitment with users to disclose feedback, is experiencing collusion-based manipulations consistently with the previous theoretical result.

Fake Promotions

In recent years, online forums have been growing in popularity and have become an important component of portals. Examples of online forums are BBC Talking Point, CNET, Epinions and Citysearch and Amazon (Dellarocas, 2007). In these forums people exchange impressions and information about goods and services, and are today a key resource for both consumers and vendors. While the former can learn about the quality of new goods/services from previous consumers' recommendations, the latter can promote their products, reaping the benefits from effective interactivity among consumers. However, exploiting the anonymity enjoyed by participants of these online communities vendors can easily disguise their promotion as consumer recommendations.

Mayzlin (2006) investigates the effects of such manipulations. The point is that consumers are aware of the existence of anonymous promotion messages, that contaminates the overall informative value of recommendations, so they may be skeptic in using online advices. To analyze whether or not online advices remain persuasive, Mayzlin builds up a theoretical model where two competing vendors hold private information on the quality of their products. The vendors send recommendations to influence her consumers' purchasing decision. Previous consumers who have experience about products also leave online recommendations. The online discussions then result in a mixture of truthful recommendations from consumers as well as advertising activities from interested vendors, with the consumer being unable to distinguish biased from unbiased recommendations. Mayzlin's most important finding is that, if the ratio profits/cost of manipulations cost is high enough, there exists an equilibrium in which both types of vendor send fake messages, but overall, the online forum remains persuasive. Supported by the interactivity of discussions, consumers correctly follow

the advices, although the probability of making a wrong choice is higher than if there was no fake promotions.

Dellarocas (2007) extends Mayzlin (2006) finding the counterintuitive result that manipulations may either increase or decrease the informativeness of the forum.

Manipulations are beneficial when the number of users sending honest recommendations to the forum is small enough. The basic intuition is that since promotions are costly, they are more intensively undertaken by good vendor compared bad ones. This allows customers to better distinguish among good and bad products. However, vendors will invest in promotions as long as the number of honest customer in the forum is sufficiently low, because this ensures that promotions will dominate consumers' recommendations and will effectively influence their choices.

Feedback Reciprocity

Reciprocity occurs in "two-way" feedback mechanisms (as the one of eBay or Amazon) where vendors and buyers are allowed to rate one another. Thus they may an incentive to leave a reciprocal positive feedback to increase their score although they have not been (fully) comfortable with the partner. Sometime one party may induce in the mind of the other a moral obligation to reciprocate the positive by posting an "early" positive feedback (Resnick and Zeckhauser, 2002).[14] Reciprocity is different from feedback purchase in that it emerges as an outcome of a real (possibly inefficient) transaction that the parties decide to improve by exchanging the feedback. The empirical research highlight that reciprocity is a relevant phenomenon. See for instance Resnick and Zeckhauser (2002), Dellarocas and Wood (2004), Chwleos and Dhar (2005), Klein et. al. (2005) and Dini and Spagnolo (2006).

One possible and intuitive solution to problem of reciprocity is using a one-way feedback mechanisms (Dellarocas, Dini and Spagnolo, 2006).

Other Forms of Manipulation: Unfair Ratings and Name Changes

Another form of manipulation are *unfair ratings* posted by vendors to inflate the performance score of partners or to destroy the one of competitors. This is typically done on eBay by transacting with a group of vendors who post positive undeserved rating to a target vendor ("bullot staffing"). Symmetrically, a group of vendor can collude with

buyers to lower the performance score of competitors ("bad-mouthing").[15] Discussions on this topic and possible solutions, as fee/reward systems, are provided by Papaioannou and Stamoulis (2005), Miller et. al. (2005), Jurca and Faltings (2004), Dellarocas (2004, 2005) and Avery et. al. (1999).

Finally, manipulations can emerge in the less severe form of *name changes*. Online vendors and buyers usually operate through pseudonymous, therefore no one knows their true identity. Such an anonymity, coupled with the possibility to register with many different nicknames, facilitates vendors cheat buyers and then re-enter the community with a new identity and a clean feedback score (Dellarocas, 2005, Cheng and Friedman 2005, and Friedman and Resnick, 2001). On the one hand, the possibility to reset low feedback scores with a new identity at no (or very low) costs and without paying penalties may encourage mis-behaviors. On the other hand, re-entering the community with a new identity eliminates important information about dishonest/non-performing behaviors eventually occurred in previous transactions.

EXPERIENCE FROM EBAY

As shown by the empirical evidence, manipulations are becoming an important issue and a critical point for online marketplaces. The problem is also addressed by some online information resources as www.scams.flipshark.com, which underlines the existence of such manipulations (also called "scamming") on eBay, and alerts buyers when trading on the Internet. In this section we briefly describe some of the most harmful ways through which users actually cheat the eBay's feedback mechanism.

Auctioning the feedback. Vendors can transparently auction the feedback, saying "I sell positive feedback". Then the winning buyer gives the vendor positive feedback in exchange of a positive feedback from him. A more covert way to auction the feedback is listing the words "positive feedback" or "feedback exchange" in the title of the auctioned item. In so doing the vendor can disguise a feedback exchange with a real transaction. Item titles may also be of the type "free stickers for leaving positive feedback", "new recipe gets positive feedback from all", or "the most positive way to buy pre-written feedback". Titles always

contain the words “positive feedback” to signal that positive feedback can be freely obtained in that auction. The buyer then places his bid for the item, and both traders get positive feedback without completing the transaction. [16]

Buying and re-selling. Sometimes traders purchase and re-auction low-value digital goods purchased like recipes, e-books, screen savers, wholesale lists, free information and information booklets. For instance, you can buy on eBay an e-book titled “get 100% positive feedback quick” for no more than €1. The book circulates in pdf format and therefore can be quickly e-mailed to buyers at no cost. Any trader can buy and resell the book as many times as he desires to collect positives.

Creating multiple accounts. This is a very simple way to obtain positives quickly. Basically, you can set up multiple accounts on eBay and sell multiple items. Then you artificially purchase the items and leave yourself positive feedback. There is evidence that people even create more than 100 accounts.

One point worth emphasizing is that manipulations arise as long as traders consider the feedback score a good prediction of future performance. However, it is interesting to observe that on eBay manipulations are also encouraged by other factors. For instance, to list multiunit auction vendors need a reputation score of at least 30; to list a item as a “Featured Plus” listing (which gives particular visibility to the item) they need a score of at least 10; for “buy now” operations sellers need a score of 5. Finally, 25 subsequent positive feedbacks are necessary to push a negative comment off the front page of any traders’ feedback profile. Such constraints eBay puts on selling activities to some extent further encourage vendors to acquire quick positive feedback in order to accede to more sophisticated online trading instruments.

MANIPULATING SPI: EXPERIMENTS OF FEEDBACK PURCHASE IN EBAY

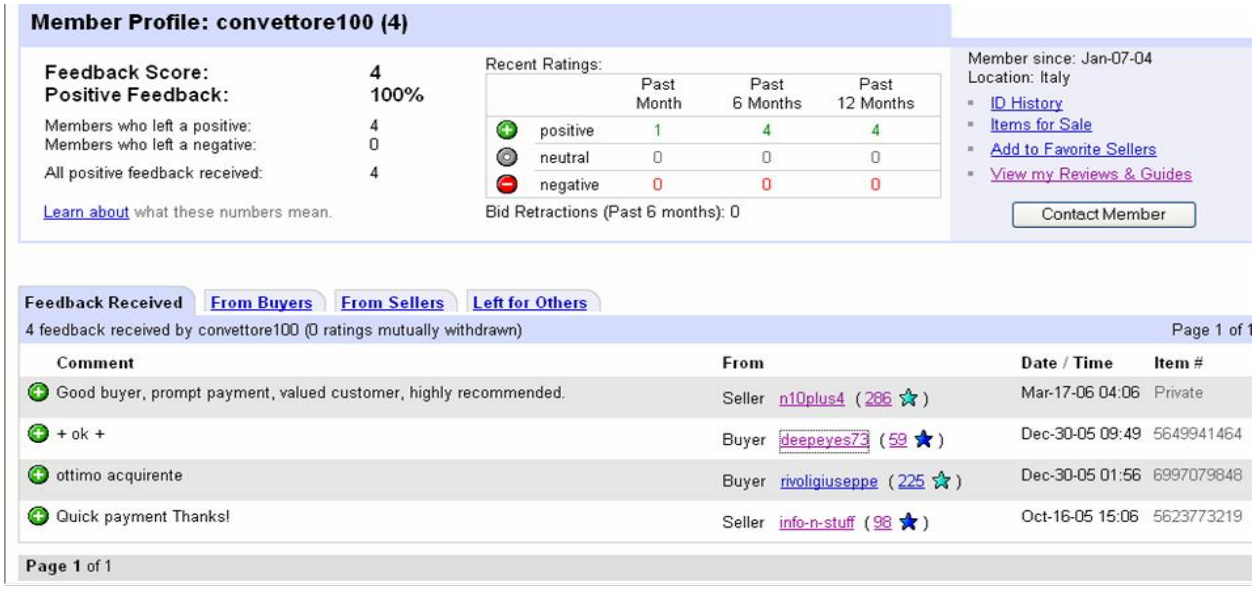
In this section we present some experiments showing how e-trader can easily collect artificial positive feedback eBay by selling or buying them. To run the experiments we proceeded as follow. First, we created an account on eBay with a username “convettore100” to perform purchase and sell operations. Second, with the eBay’s search engine we downloaded a list vendors selling low-value/fake items and listing items

with the title “positive feedback”. We realized the existence of many low-value items sold for about 1$, potentially hiding a feedback auction. From the list presented in the previous section, we selected two methods through which collecting the feedback: i) buying first-reselling later and ii) auctioning the feedback. Below we report the details and the results of these two experiments.

Buying and Re-Selling

On October 16th we bought on eBay the e-book *How to earn up to 100 Feedback* for a price of US $0,99. The very short book (just 2,5 pages!) tells why vendors should get feedback and it describes some effective methods to collect many feedback quickly and at a low cost. Some ours later we sent the money to the vendor and the he immediately gave us a positive feedback, leaving the comment “Quick payment, Thanks”. The last raw in Picture 1 reports positive feedback left by our partner “info-n-stuff” and his comment.

PICTURE 1
List of Purchase Feedback



Two days later we posted our positive feedback to the vendor leaving our good comments regarding fast shipment. Since the book was directly e-mailed to us, we were charged no additional shipping costs since. Therefore, the cost for collecting this positive feedback was just the price of the book: 0.99$.

On October 30th we re-auctioned off the book for the price of €1 (about 1.2$), but no bid was been placed.[17] However, another partner ("rivoligiuseppe") contacted us proposing to exchange a feedback without completing the transaction. We accepted the deal. He placed his bid and then we posted our positive feedback to him with the comment "All perfect, reliable eBayer". He returned the positive feedback on December 30th leaving the comment "ottimo acquitente", i.e., "great buyer". His positive feedback and comments are reported in Picture 1, in the second row of our feedback history.

This first experiment shows two things. First, it is quite easy to buy one positive feedback on eBay. Second, traders may agree to exchange the feedback without completing the transaction i.e., performing a physical exchange of money for the item. [18]

Auctioning the Feedback

In the same day of December 30th we collected another positive feedback through an auction. We contacted the same partner who accepted the feedback exchange on December 15th and proposed him another exchange. The partner accepted. He placed his bid with a different account, "deepeyes73". We closed the auction and awarded the item to him. Then we left our positive feedback with the comment "Fast and reliable". The partner returned his positive leaving the comment "+ok+" (see the Picture 1, second row of feedback history). The cost for this feedback was €0,1.

Summary of the Results

The results of our experiments are summarized in Table 1. The main message of Table 1 is that that traders can collect false feedback in several different ways at a very low cost.

Discussion

The previous experiments show how it can be easy and cheap to manipulate SPI, as the feedback score of eBay. In principle, when SPI

Table 1. Cost of collecting artificial feedback

Method		Auction Data		Cost Data		
		Reserve price	Awarding price	Fixed fees	Transaction fees	Total actual cost
Auction		0,1	0,51	0,10	0,02	**0,12**
Buy and resell	*Buy*	-	0,80	0,00	-	**0,80**
	(Re)sell	0,01	0,01	0,10	0,00	**0,10**

Structure Fee on eBay: fixed fee for listing items with a reserve price of less than 1.99 Euro are 0.1 Euro. An additional fee of 0.2 Euro is charged if the seller wants to insert more details on the object listed. Transaction fees are 4,5% up to 50 Euro.

are driven by information manipulation rather than "good behavior" they may poorly predict future performance and may then distort the decisions of unaware people using the reputation information (for instance when deciding whether to bid and what amount to bid in an eBay auction). However, understanding the impact of such manipulations it is not so easy and we need to account for some key factors.

We must try to answer the following questions: 1) Can buyers distinguish between fair and unfair reports/feedback on which SPI are based? 2) How can vendors build up high SPI? 3) What is the cost of high SPI? 4) Who is more interested in acquiring high SPI?

Also exploiting the experience of eBay, the discussions made below are a first attempt to identify the most relevant issues that influence the effectiveness of SPI in providing reliable information to the market.

Can buyers distinguish between fair and unfair report?

Is it possible for buyers to distinguish between fair and unfair reports received by vendors? If this were possible at limited costs buyers may do a first screening among vendors. Although the buyer does not how the vendor will behave after achieving a high SPI, he may reduce the risk of unsuccessful transaction renouncing to bid upon observing that the SPI of the vendor, e.g. the feedback score in eBay, is determined by manipulations. On eBay, the vendor's feedback history provides detailed information about all the items he sold, as the awarding value, shipping costs, etc. so a buyer can easily check if and how frequently the vendor's high SPI is suspected to be driven by trade rather than good behavior. However, such detailed information is made available to the public only for 90 days. Therefore, buyers can the screen vendors only for a limited period of time. In general, e-procurement platforms disclosing detailed

information, in particular the value of transactions, provide buyers useful tools for a first screening of vendors.

How can vendors build up high SPI?

We identify three main ways through which vendors can build up high SPI. One is, of course, effort and good performance. Another is buying feedback/reports on the market as some vendors do in eBay. The last method is "buy first and sell later". Cabral and Hortacsu (2006) show that "buying first and selling later" is a widespread phenomenon on eBay. Since it is much easy to collect positive feedback after a purchase, some vendors purchase at the beginning and then switch to selling after acquiring a sufficiently high score.[19] The point worth noticing is that in either case, improving SPI is costly. In the first way, the vendor exerts costly effort, i.e., he delivers the promised good "renouncing" to deliver another inferior, but less costly good. In the second method, he does exert no effort, but he pays cash (although the unitary cost of feedback is low, the vendor needs to invest a minimal amount of money and time to collect the number of positive sufficient to generate some "reputation effect"). In the third method, the vendor fairly spends money to purchase low value items.

The vendor will opt for a acquiring feedback with the least cost method, thus comparing the three expected costs: collecting X artificial positive feedback, purchasing X (possibly low-value items), selling X items exerting effort. However, in the second method, the vendor will necessarily account for the risk of being punished by future buyers detecting her feedback being completely artificial (if observable).

At first glance we are tempted to think that purchasing feedback on eBay reduces the reliability of the SPI, because based on false/manipulated feedback. However, in *all* the three circumstances the vendor incurs a *cost* for building up and/or improving his SPI. At a more accurate look of the problem, we may draw a different conclusion. Whatever the SPI comes from, the vendor spends resources in order to appear performing to future buyers. What really matters for buyers probably it is not the way the vendor achieved high SPI, but whether he will maintain (or further improve) it or, instead, will exploit it to cheat other buyers. This is object of further discussion later when we address the issue of who wants high SPI.

What is the cost of high SPI?

Our experiments show that vendors incur a positive cost to purchase positive feedback. What if the cost of collecting such feedback is zero? Suppose for a moment that a vendor, say A, wants to quickly improve her SPI with "buy first and sell later". He may seek in eBay some other vendor, say B, selling low-value items and propose him to exchange the feedback without completing the transaction. If low-value items disguise a feedback trade, as shown in previous sections, there should be in principle no problem for B to accept such a deal.[20] Both A and B would gain from reciprocating positive feedback: B pays some minimum fixed fees to eBay, while A pays nothing. If A is able to do this with many other vendors, he can collect many positive incurring no costs.

What is the consequence of this behavior on the reliability of SPI? One first conclusion may be that if achieving high SPI costs nothing, or is extremely cheap, then positive feedback have no value. However, negative (or neutral feedback) still have value.

We can say even more. In this contexts only negative feedback have a good performance predictive value. In other words, while many positive reports alone say nothing about future performance, the absence of negative say much about it. Therefore, one first preliminary conclusion is that: *when positive feedback are costless only negative feedback matter*.

One point is worth emphasizing here. Several online feedback mechanisms allow rating in a positive scale and define SPI as the sum of average of those ratings. Example of this kind are Amazon or Yahoo!, in which users rater from 1-5 or 1-10 respectively, and the SPI is given by average of ratings. These metrics create two problems. First, they do not allow for strictly negative feedback, ad eBay instead correctly does, therefore preventing bad transactions to be effectively punished. Most importantly, with average-based SPI strictly negatives (or even weakly positives) are "blended with" positive, so the impact on the overall SPI of a single negative feedback is strongly limited. The eBay's feedback system appropriately separates negatives from positives. Although the SPI of a vendor is given by the sum of his ratings (positive minus negative), negative feedback are displayed on the vendor's web page and are kept *separately* from positives. Then, prospect buyers can learn important information about the vendor's non-performing transactions, if any (see Picture 1).

Who wants high SPI?

One important point is that vendors may want to "buy" a high SPI to either do profitable but fair business or profitable but unfair business with future buyers. What of these two situations is more likely to occur? This may depend on "who" wants high SPI, that is, whether good/honest or bad/dishonest vendor want high SPI. Before answering this question, note that SPI are essentially measures of "reputation". In other words, the level of SPI predicts how well the vendor is expected to perform in the future. If he performed well in the past, then he achieved an high SPI, i.e., a "reputation" for being always performing. Thus he is expected by prospect buyers to perform well also in the future. The link between SPI and reputation is important since the recent economic literature on reputation may say something about who is more interested in achieving high SPI. For simplicity of exposition and full compliance with the literature, in the rest of this subsection we will talk about reputation and firm in the place of SPI and vendor, respectively.

Mailath and Samuelson (2001) address the question of what type of firm (good/competent or bad/inept) is willing to buy what type of reputation (high or low). They conclude that high reputation attracts both good and bad firms – the former can easily maintain high reputation and the latter can immediately exploit it – while intermediate (or average) reputation only attracts good firms, since they can boost by exerting effort, while bad firms do not find it that valuable.[21] The level of reputation that is bought solely by good firms is average reputation.

Tadelis (1999) investigates a similar problem in a theoretical model analyzing the market for "brand names". He finds that there is no circumstance in which only one type of firms (good or bad) buys only one type of brand name (good or bad). In particular, good firms value good names more than bad firms since it is easier for them to maintain the name. However, it is more difficult for bad firms to build a name, thus they find names more valuable than good firms at the beginning. Tadelis (1999) shows that this second effect (start-up-effect) dominates the first effect (reputation maintenance effect).

As also Cabral and Hortacsu (2004) suggest, the existing literature does not have a clear prediction on who is more likely to buy good reputation. In fact, Tadelis (1999) shows that any reputation can be bought by any type of firms. Similar results are provided by Samuelson

and Mailath, although they identify one level of reputation, average reputation, that pushes only one type of firm (good) to buy it.

POLICY INDICATIONS FOR SPI DESIGN IN PUBLIC PROCUREMENT

Evidence and experiments from private e-procurement platforms suggests that SPI can be easily manipulated. This may also occur in public procurement where public administrations very often rely on important performance indicators, as customer satisfaction surveys and online feedback mechanisms, for selection and incentives purposes.

Being essential to evaluate contractors' performance, SPI designer should pay particular care to the risk of manipulations when designing and managing these indicators.

In private e-platforms, such as eBay, people can easily manipulate soft performance indicators. Although those kinds of agreements are in principle hard to enforce in eBay, as once the first party leaves a positive feedback the second may not, the *one-to-one* nature of trade in eBay makes manipulations rather easy and potentially cheap: A vendor needs only to collude with one buyer to collect one positive feedback. Public e-procurement contexts are clearly more complex than private online platforms. Very often the exchange is *one-to-may* (from one supplier to many end-users) and this represents one important difference with respect to private e-platforms: Suppliers in general incur higher costs in corrupting (or colluding with) many end-users to collect good reports.

We recall that in public procurement the issue of SPI manipulation arises in two circumstances: not only when the providers of the report are not those who pay for the procured good/service, but also when there is a mismatch between those who provide the reports and those who will use them. Provided we are in at least one of these two situations, the risk of manipulation of SPI is higher or lower depending on some important factors. Below, we discuss some possible indications for public procurement attempting to account for these factors.

Increasing the Cost of Bribing

In the case of CSS the contractor may incur high costs in bribing a large number of end-users involved in the survey. This may happen more likely in large administrations, as well as in centralized purchasing

systems when the central station collects customer satisfaction information from samples of administrations that have used frame-contract or frame-agreements for their purchasing needs. [22]

Suggested policy. *Extend CSS to as many end-users as possible to increase the costs the contractor will incur in bribing interviewed end-users. This may be done with larger sample and by randomizing the choice of end-users involved in the evaluation process.*

This solution does not come with no costs for the public procurer. Surveying many people is money consuming and requires much more effort in processing reports. In summary extending the sample imposes a clear trade-off: The larger the number of end-users involved in the survey, the lower the probability of corruption but the higher the costs of doing CSS.

Reducing the Number of Interactions Between the Contractor and Procurer/end-users.

In many procurements, such as services or goods including maintenance activities, the end-users and the contractor meet repeatedly. This increases the chances for collusive agreements to arise and to be enforced. When instead procurement involves standardized goods whose purchase can be fully supported by e-procurement tools, from ordering to billing, supplier and customers do not have the chanced to meet so frequently. This strongly limits their ability to corrupt or collude.

Suggested policy. *Whenever possible, reduce the number of potential physical interactions between contractor and procurer/end user. For instance, favor e-procurement over paper-based procurement for purchases of goods/services that can be fully supported online.*

Keeping Reports Anonymous

One basic problem is that if reports are not anonymous, the contractor who is evaluated can straightforwardly check whether or not bribed end-users actually reported what agreed.

Suggested policy. *Keep ratings/reports anonymous for the supplier so the can never be sure who rated her. This reduces the contactor's ability to enforce the exchange of a positive report against the bribe.*

Eliminating Conflicts of Interest

In so far we have discussed situations in which the contactor is the party major interested in manipulating SPI. This is not always the case. In some circumstances it is the public administration who has the primary incentive to misreport performance information.

This is the case of conflicts of interest that may arise in the procurement contract management. Conflicts of interest arise in particular when the person(s) assessing the contractor's performance is (are) the same who reward or penalize him on the basis of his performance (Albano, Calzolari, Dini, Iossa and Spagnolo, 2006). For instance, in granting a monetary bonus conditioned on SPI as customer satisfaction, the evaluator has incentives to never assess a good performance, thereby avoiding to pay the costly bonus. If the evaluator is also paying for the good/service procured, he will have incentives to always under report satisfaction to avoid paying the bonus, being confident that his report can never be proved to be untruthful within a legal dispute with the contractor.

This practice, however, damages efficient performing contractors and may compromise the procurement relationship.

Suggested policy. *Link customer satisfaction to in-kind bonuses instead of monetary bonuses, since it will always be in the interest of the public procurer to renew the contract to performing suppliers.*

CONCLUDING REMARKS

There is one major message in this paper. SPI manipulation is a relevant issue in procurement, having impact on some very important and commonly used performance indicators as customer satisfaction surveys and their digitalized version of online feedback systems. As a consequence, designing customer satisfaction surveys and in general any system collecting and disclosing SPI should be done with particular attention to the problem of manipulations. Although corruption and collusion are difficult to prevent and to detect, public procurers may implement specific strategies to reduce manipulations risks. For instance they may i) increase the sample and randomize the selection of end-users ii) reduce the number of potential interactions between suppliers and procurer/end-users iii) keep end-users' evaluations anonymous iii) grant

in-kind bonuses in the place of monetary bonuses and iv) emphasize the role of negative report in online SPI design.

NOTES

1. Such dimensions of quality are also known as *non-contractible quality*, since observable by the contracting parties but *not verifiable* by a court of justice. For detailed discussions and numerous examples on the role of non-contractible quality in procurement see *Procurement Contracting Strategies* in N. Dimitri, G. Piga and G. Spagnolo (Eds), "Handbook of Procurement" (Forthcoming 2006).

2. FAR 12.206 also establish that *past performance should be an important element of every evaluation and contract award for commercial items. Contracting officers should consider past performance data from a wide variety of sources both inside and outside the Federal Government in accordance with the policies and procedures contained in Subpart 9.1, 13.106, or Subpart 15.3, as applicable". "The less definitive the requirement, the more development work required, or the greater the performance risk, the more technical or past performance considerations may play a dominant role in source selection"*.

3. For example, in the procurement of software development services the end-user may be quite satisfied of the release since, for instance, the software is much more powerful and flexible than expected. Then customer satisfaction allows the end-users to evaluate and reward effort/abilities of the suppliers that may be hard to capture ex-ante in the contract but that are ex-post much valuable for the procurer.

4. The Utstein Group is composed of the United Kingdom, Norway, Sweden, The Netherlands, Germany and Canada, whose international development ministers have formed a partnership to co-ordinate development assistance policies. To strengthen cooperation, in 1999 they created the UTstein Group created U4, a web based resource centre with the goal to promote thinking and activities in the field of anti-corruption and share lessons and experiences with the outside world. See http://www.u4.no/about/main.cfm.

5. See http://www.u4.no/helpdesk/helpdesk/queries/query95.cfm#1 for more on this point an case studies on corruptions in public procurement contracting.

6. As noted by Mishra (2005), corruption is not the only problem. Extortion may also arise. In this case the end-user threats the contractor to provide a bad report if he does not accept the bribe.

7. The public administration pays the good/service for the end-user. In other circumstances the Government may contribute to finance the procurement of local authorities. A case in which end-users are far away from the administration-payer are for instance the local offices of big Ministries that are often widespread throughout the country. When the end-users are those who pay for the procured good/service the face with a conflict of interest in grating the monetary bonus. Although the contractor' performance has been satisfactory the procurer has no incentive to grant the bonus to save money. For a discussion on this problem see the section devoted to public procurement policy indications. For more on this and other related topics, see *Procurement Contracting Strategies* in N. Dimitri, G. Piga and G. Spagnolo (Eds.), "Handbook of Procurement" (Forthcoming 2006).

8. This is a typical agency problem arising in those relationships linking one agent (e.g., a contractor) to a principal (e.g. a procurer) to act in the best interests of the principal. If the agent has informational advantages over the principal on some key aspects of the relationship, then the agent may exploit it to purse his own interests rather than the ones of the principal. In the case of providing customer satisfaction reports, the principal, i.e. the public administration, asks the agent, i.e. the end-user, to report her level of satisfaction with respect to a given contractor performance. Since the end-user is clearly more informed on her satisfaction than the procurer, he may exploit such informational asymmetry to her advantage: By accepting the bribe from the contactor, the end-user provides an untruthful performance report to pursues his private interests (monetary profits) at the expense of the procurers' interests (learning the true contractor performance).

9. Here, another agency problem arises. The end-user/agent has not only one principal, namely the procurer they work for, but also other principal(s), namely the procurer(s)/end-users that will use her customer satisfaction reports in the future. In this case, the agency problem might be is even stronger since reports benefit more other end-users.

10. FAR 42.1502 (c) establishes that *Departments and agencies shall share past performance information with other departments and agencies when requested to support future award decisions. The information may be provided through interview and/or by sending the evaluation and comment documents to the requesting source selection official.*

11. We remind the reader that such risk is essentially due to the following factors: i) transactions are occasional, ii) there are no formal contracts, iii) partners are anonymous and geographically dispersed, iv) shipment occurs only after payment, so the buyer can check the quality the item "too late", when there is little to do in case of dissatisfaction. For a discussion on reputation systems and applications on public procurement see *Designing*

Reputation (Feedback) Mechanisms in N. Dimitri, G. Piga and G. Spagnolo (Eds), "Handbook of Procurement" (Forthcoming 2006).

12. Social relations linking people who exchange feedback are the major source of word-of-mouth communication. It is evident that a person will always care to provide a true information to friends or parents, for instance on a product to buy. It is also clear that similar incentives may disappear when feedback receivers are strangers. See Lippert and Spagnolo (2005) for more on the role of network relations.

13. Since feedback are public goods the typical concern of under provision is also a critical issue. See Avery et. al. (1999), Resnick and Zeckhauser (2002), Papaioannou and Stamoulis (2005) and Jurca and Faltings (2004) who discuss the problem and possible solutions.

14. See also Dini and Spagnolo (2004, 2005) and Dellarocas, Dini and Spagnolo (2006) for a discussion on reciprocation with special focus on and solutions for public e-procurement platforms.

15. Dellarocas (2000).

16. This means that there is no payment from the buyer to the vendor, although this pays to eBay the fixed fee of €0.1 for listing of the item.

17. Usually the items listed to disguise a feedback exchange are rarely sold-off for more than €1 or €2. However, we attempted to maintain the budget equilibrium.

18. However, the transaction was not completely "neutral" for us since we had to eBay a fixed listing fee of €0.1. In general, when one sells the feedback incur in a minimum fee of €0,1 for listing the items (see Table 1 for more details on the fee structure applied by eBay).

19. Authors estimate the "buy first, sell later" strategy on sales for different items. Results are the following: 38% of Beanie Baby, 22% of laptop sellers and 31% of gold coin vendors buy first and sell later. Moreover, on average, 81% of a vendor's last 20 transactions were sales, compared to 46% of the first 20 transactions.

20. It is no surprise that feedback trade are hidden behind low-cost sells, since the transaction fees vendors pay to eBay depend on the awarding value. For less than 50$ such the transaction fee is 4,5%. Therefore, awarding an item for 1$ means paying to eBay only 0,045$. Minimizing the cost of selling the feedback means minimizing the awarding value of the item. Notice that the minimum listing price (for an auction or a direct sell) accepted by eBay is 0,01$. In this case transaction fees are so low that they may be negligible and vendors may sell the feedback incurring in an extremely low cost.

21. See also Dini and Spagnolo (2006) for a discussion on "introductory feedback score" for new vendors in public e-procurement platforms.

22. Examples of centralized procurement agencies providing frame-contacts of frame-agreements in Europe are OGCBuying.Solutions (U.K), Consip (Italy), Hansel (Finland), SKI (Denmark), Satskontoret (Sweden). government. In the USA, several states (Such as Florida with My Florida Marketplace and North Carolina with NC E-Procurement@Your Service) implemented e-procurement platforms providing centralized state term contracts to all public administrations within the state. Similar approaches are becoming popular also in Latin America. See Dimitri, Dini and Piga (2006) and Carpineti, Piga, Zanza (2006) for more on this.

REFERENCES

Avery, C., P. Resnick and R. Zeckhauser. 1999. "The Market for Evaluations", *American Economic Review*, 89, 564-584.

Albano, G., G. Calzolari, F. Dini, E. Iossa and G. Spagnolo. Forthcoming 2006. *Procurement Contracting Strategies*, in N. Dimitri, G. Piga and G. Spagnolo (Eds.), "Handbook of Procurement", Cambridge University Press, Cambridge, N.Y.

Cabral, L. and P. Hortacsu 2006. "The Dynamics of Seller Reputation: Theory and Evidence from eBay", NBER Working Paper, No. 10363.

Carpineti, L, G. Piga and M. Zanza. Forthcoming 2006. *The Variety of Public Procurement Practices*, in N. Dimitri, G. Piga and G. Spagnolo (Eds.) "Handbook of Procurement". Cambridge University Press, Cambridge, N.Y.

Cheng, A. and Friedman, E. 2005. "Sybilproof Reputation Mechanisms". Proc. of the 3rd Workshop on the Economics of Peer-2-Peer Systems (P2PECON), Philadephia, PA.

Chwelos P, and T. Dhar. 2005. "Caveat Emptor: Differences in Online Reputation Mechanisms". Mimeo.

Dellarocas, C. 2000. "Immunizing Online Reputation Reporting Systems Against Unfair Ratings and Discriminatory behavior, Proceedings of the 2nd ACM Conference on Electronic Commerce". Association for Computing Machinery, Minneapolis, MN, 150-157.

Dellarocas, C. 2004. “Building Trust On-Line: The Design of Robust Reputation Mechanisms for Online Trading Communities”, G. Doukidis, N. Mylonopoulos, N. Pouloudi, eds. Social and Economic Transformation in the Digital Era. Idea Group Publishing, Hershey, PA.

Dellarocas, C. 2005. “Reputation Mechanism Design in Online Trading Environments with Pure Moral Hazard”, Information Systems Research, 16 (2).

Dellarocas, C. Forthcoming 2007. “Strategic Manipulation of Internet Opinion Forums: Implications for Consumers and Firms”, *Management Science*.

Dellarocas, C., F. Dini and G. Spagnolo. Forthcoming 2006. *Designing Reputation (Feedback) Mechanisms*, in N. Dimitri, G. Piga and G. Spagnolo (Eds.) “Handbook of Procurement”. Cambridge University Press, Cambridge, N.Y.

Dellarocas, C. and C.A. Wood. 2006. “The Sound of Silence in Online Feedback: Estimating Trading Risks in the Presence of Reporting Bias”. mimeo.

Dimitri, N., F. Dini and G. Piga. Forthcoming 2006. *When Should Procurement Be Centralized?*, in N. Dimitri, G. Piga and G. Spagnolo (ed.) “Handbook of Procurement”. Cambridge University Press, Cambridge, N.Y.

Dini, F. and G. Spagnolo. 2006. “Buying reputation on eBay”. *mimeo.*

Dini, F. and G. Spagnolo. 2005. `”Reputation Mechanisms and Electronic Markets: Economic Issues and Proposals for Public Procurement”, *Challenges in Public Procurement: an International Perspective,* ed. by K. V. Thai, A. Araujo, R. Y. Carter, G. Callender, D. Drabkin, R. Grimm, K. R. Ejlskov Jensen, R. E. Lloyd, C. P. McCue, and J. Telgen. Academic Press.

Dini, F. and G. Spagnolo. 2004. “Meccanismi Reputazionali e Mercati Elettronici: Problematiche Economiche e Possibili Soluzioni per il Public Procurement”. Quaderni Consip, No. II.

General Services Administration, Department of Defense and National Aeronautics and Space Administration, 2005. “Federal Acquisition Regulation”.

Friedman, E. and P. Resnick. 2001. The Social Cost of Cheap Pseudonyms. *Journal of Economics and Management Strategy*, 10 (1), 173-199.

Jurca, R. and B. Faltings. 2004 "Eliciting Honest Feedback without Independent Verification Authorities", Sixth International Workshop on Agent Mediated Electronic Commerce. (AMEC VI 2004), New York, USA, July 19 2004.

Klein, T.J., C. Lambertz, G. Spagnolo and K. O. Stahly. 2005. "Last Minute Feedback", mimeo.

Lippert, S. and G. Spagnolo. 2005. "Networks of Relations and Social Capital", *CEPR Discussion Paper Series*, No. 5078.

Miller, N., Resnick P. and R. Zeckhauser. 2005. "Eliciting Informative Feedback: The Peer-Prediction Method", *Management Science*, 51(9), pp. 1359-1373.

Mishra, A. 2005. Optimal Enforcement Policies Under the Threat of Collusion and Extortion, *mimeo*.

Mailath G.J e L. Samuelson. 2001. "Who Wants a Good Reputation? *Review of Economic Studies"*, 68, 415-441.

Mayzlin, D. 2006. "Promotional Chat on the Internet". Marketing Science, 25 (2), pp. 155–163.

Papaioannou, T. and G.D. Stamoulis. 2005. "An Incentives' Mechanism Promoting Truthful Feedback in Peer-to-Peer Systems". In Proc. of IEEE/ACM CCGRID (Workshop on Global P2P Computing).

Peyrache E. and L. Quesada. 2005. "Credibility of Auditors and Incentives to Collude", *Mimeo*.

Resnick, P. and R. Zeckhauser. 2002. "Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System", Michael R. Baye, Ed.. *The Economics of the Internet and E-Commerce* (Advances in Applied Microeconomics, Vol. 11). JAI Press.

Resnick, P., R. Zeckhauser, E. Friedman and K. Kuwabara. 2000. "Reputation Systems", *Communications ACM*, 43(12): 45-48.

Tadelis, S. 1999. "What's in a Name? Reputation as a Tradeable Asset", *American Economic Review*, 89, 548–563.