Preferences for Consistency

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Abstract

This paper studies how a "preference for consistency" can affect economic decision-making. We propose a three-period model of decision-making where people have a preference for consistency because consistent behavior allows them to signal personal and intellectual strength. This creates a trade-off between choosing according to their updated beliefs and reputational concerns. We then present three experiments that study main predictions and implications of the model. The first experiment is a simple principal-agent game that tests the basic logic of the model. In the main treatment agents solve an estimation task twice and are paid for accuracy. Principals observe the difference between the two estimates and select an agent for a third estimation task. Agents who are selected win a prize and engage in a third estimation task. In the control condition agents only solve the first two estimation tasks. In line with the model, principals select more consistent agents. Anticipating this, agents' estimates are much more consistent in the main compared to the control treatment. The second experiment studies the role of early commitment. In a simple estimation task we show that subjects disregard valuable information when they have committed to a first statement. Compared to a control condition without early commitment, subjects' estimates are further away from the correct value, implying lower earnings. The third experiment investigates consistency as a potential source of social influence. The decision context in this experiment is donations to charitable organizations. In the main condition subjects state hypothetically how much they would donate, prior to their actual decision. The hypothetical question is part of a survey. In the control condition subjects complete the same survey except for the hypothetical donation question. When asked hypothetically, participants give biased answers. We show that, in line with the model, this bias carries over to actual donation behavior due to participants' taste for consistency. The experiment suggests that preferences for consistency can be a powerful channel of social influence.

1 Introduction

A large body of evidence from social psychology shows that consistency is an important component of human decision-making. People want to be and appear consistent, and they prefer to be around people who behave consistently (for an overview, see Cialdini, 1984). As an illustration of how the taste for consistency can affect behavior, consider a study on volunteering (Sherman, 1980): Residents in

Bloomington, Indiana, were asked whether they would - hypothetically - be willing to spend three hours collecting money for the American Cancer Society. Most people responded that they would be willing to volunteer. Three days later, the same residents were actually called by the American Cancer Society and asked to volunteer. Actual willingness to volunteer was seven times higher among those who had been contacted in comparison to a control group. In this paper we study how preferences for consistency can affect economic decision-making. In a first step we develop a theoretical framework that conceptualizes preferences for consistency. In a second step we report results from three simple experiments that test main predictions and implications of the model.

Summarizing research on consistency in social psychology, Robert Cialdini has noted that "a high degree of consistency is normally associated with personal and intellectual strength." (Cialdini, 1984). Likewise, inconsistent behavior often signals lack of strength and is generally viewed as an undesirable personality trait (Allgeier, Byrne, Brooks and Revnes, 1979; Asch, 1956). It has been pointed out that inconsistent beliefs, words or deeds are often indicative of confusion and mental illness. Our model is built on this notion. It is a signaling model where consistent behavior signals positive traits such as personal and intellectual strength. In the model, decision-makers repeatedly face the same choice problem and are uncertain about their preferred outcome. They receive signals about their preferred outcome before they take a decision. Decision-makers differ with respect to the strength of signals they receive. The stronger the signals, the better they know their preferred outcome and the higher is their personal and intellectual strength. On the opposite, decision-makers with low personal and intellectual strength receive rather weak signals and thus have only a vague idea about their preferred outcome. Regarding behavior over time, high strength leads to consistent choices, whereas low strength results in arbitrariness. We assume that decision-makers' utility consists of two parts, a "standard" part reflecting material concerns; and a reputational part capturing the decision-makers' image concerns: they like to be perceived as having high personal and intellectual strength. This creates a trade-off between choosing according to their updated beliefs and reputational concerns. We show that in a fully separating perfect Bayesian equilibrium decision-makers display preferences for consistency because consistent behavior allows them to signal high personal and intellectual strength.

In the second part of the paper we report evidence from three decision experiments. The first experiment tests the basic logic of our model in a simple principal-agent framework. In the main treatment agents solve two estimation tasks and are paid for accuracy. The correct estimation result is the same in both tasks and both, agents and principals, know this. Principals are randomly matched with two agents. They observe the difference between the two estimates for both agents and select one of the two for a third estimation task. Principals are paid according to accuracy of the selected agent in the third estimation task. Therefore, they have an incentive to select the most able agent. Agents who are selected win a prize and engage in the third estimation task. Selection decisions of the principals tells us if they value consistent behavior. We also conduct a control treatment where agents only solve the first two estimation tasks. Comparing agents' behavior between the two treatments informs us about whether they anticipate the value of consistency and behave more consistently in the main treatment. The results support the model's predictions: Agents who estimate more consistently have a significantly higher chance of being selected by principals. Anticipating the value of consistency, agents estimations in the main treatment are much more consistent than in the control treatment.

The second experiment studies the role of early commitment for the preference for consistency. In-

tuitively, actively committing to an opinion, belief, intention or action is a precondition for observing consistent or inconsistent behavior. Without commitment, i.e., without taking a stand or an action, observers will not be able to detect possible inconsistencies. Therefore, a decision-maker is not constrained by reputational concerns and can maximize utility without taking potential reputational costs into account. We test this model prediction in a simple estimation context. In two treatments subjects have to perform an estimation task and receive helpful information about the task. In the main treatment, subjects commit to a first estimate prior to receiving the helpful information and without knowing that they will later receive it. After they have received the valuable information they are free to revise their first estimate. In the control treatment, no prior commitment is made. We predict that in the main treatment, subjects will want to act consistently with their prior commitment. Therefore they will respond less strongly to the valuable information in comparison to the control treatment. Our findings support this. The deviation of the final estimate from the valuable information is significantly higher in the main treatment than in the control treatment. Thus, the prior commitment makes subjects neglect valuable information.

In the third experiment we examine the role of consistency preferences as a means of social influence. The trick is to "tempt" a person to make a biased statement. In a second step he or she is confronted with a request related to that statement and the pressure to live up to it. Given that the first statement involves no or only low costs it is relatively easy to provoke biased statements. The preference for consistency will make the person want to live up to the biased statement and act against his or her actual interest. We test this prediction in the context of pro-social decision-making. Subjects decide on how much money they want to donate to some charity organization. We study two treatments: in the main treatment subjects are asked how much they would - hypothetically - donate if they were asked, prior to their donation decision. In the control treatment this question is not asked. The model predicts that due to the preference for consistency, biases in prior statements (how much would I donate?) should carry on to later choices because people feel obliged to act consistently with the biased statement. Our results confirm this hypothesis. Donations in the main treatment significantly differ from donations in the control treatment, demonstrating the role of consistency as a means of social influence.

Our work is based on a large literature in social psychology. The idea that people have a taste for consistency developed from cognitive dissonance theory. The first theoretical foundation of the concept is developed in Festinger, 1957, Heider, 1946 and Newcomb, 1953. Several interesting psychological experiments examine the consequences of consistency preferences for behavior. Famous examples are Freedman and Fraser, 1966 and Sherman, 1980 who analyze the effectiveness of the Foot in the Door technique in different experiments. Cialdini et al., 1978 examine how the taste for consistency can be used to influence behavior via another channel, the so-called "Low-Ball Procedure". All these studies stress the importance of the preference for consistency for behavior. In the economics literature Eyster, 2002 and Yariv, 2005 have put forward models of consistent choice. Different to our model, they assume that preferences for consistency are rooted in the desire to avoid cognitive dissonance. Ellingsen and Johanesson, 2004 refer to the taste for consistency as a possible reason for why people incur costs of lying. Regarding the modeling approach, our model is based on the model by Prendergast and Stole, 1996.

The remainder of the paper is organized as follows: In the next section we introduce our model. In section 3 we present the three experiments. Section 4 concludes.

2 The Model

2.1 Intuition

"... a high degree of consistency is normally associated with personal and intellectual strength." (Cialdini, 1984)

Suppose a decision-maker who repeatedly chooses from a choice set. He or she has a unique preferred outcome but is uncertain about it. Before every choice, he or she receives a signal on the preferred outcome, thus learning it over time. The choice problem the decision-maker faces could be essentially anything, e.g., a consumption choice or normative judgment. In this case, uncertainty about the preferred outcome would reflect the decision-maker's uncertainty about his or her true preferences. It could also be a task-related choice, for example, choosing the profit-maximizing business strategy as a manager or picking the correct answer in an IQ-test. In this case, uncertainty about the right choice reflects uncertainty about the true state of the world.

There are different types of decision-makers who differ in the strength of the signals they receive. Those who receive strong signals are types, who know their own preferences very well. When facing task-related choices, they are very certain about the true state of the world. Receiving strong signals has consequences for choice behavior over time. Types who receive strong signals behave very consistently in repeated choices, because their beliefs about their preferred outcome do not fluctuate much over time. Thus strong signals lead to consistent behavior. On the opposite, types who receive weak signals are very uncertain about their own preferences or about the true state of the world. This high uncertainty leads to large fluctuations in beliefs and subsequently to inconsistent behavior over time. Throughout the paper, we say that decision-makers who receive strong signals have high personal and intellectual strength. Consequently, those who receive weak signals have low personal and intellectual strength.

Decision-makers are assumed to have image-concerns. They get utility from having a reputation for possessing high personal and intellectual strength. The channel decision-makers can use to signal personal and intellectual strength is via consistent behavior. Decision-makers with low strength can try to imitate those with high strength by behaving consistently over time. Therefore, decision-makers have a preference for consistency, because consistent behavior allows them to signal high personal and intellectual strength.

Our model allows for several interpretations. Depending on the context, personal and intellectual strength is associated with different personal characteristics. In task-related choices, similar solutions to similar problems signal high ability. In repeated social interactions personal and intellectual strength, reflected by consistent behavior, is related to predictability and reliabilty. These are important prerequisites for relationship formation. They also help solving coordination problems. High personal and intellectual strength is also related to personal identity. Identity is shaped by past actions or statements. Without continuity in actions or statements, the formation of a sense of self-identity is not possible. In that sense, high personal and intellectual strength (via consistent behavior over time) is a prerequisite for personal identity.

We assume decision-maker's reputational concern directly without modelling it.[1] Thus our model can be viewed as a reduced form that leaves open the nature of the reputational concern. It could be strategic

[1] This is similar to Bénabou and Tirole, 2006, Ellingsen and Johannesson, 2008, Andreoni and Bernheim, 2009.

in the sense that people expect benefits in future interactions. It could also be hedonic - people simply enjoy if other's think highly about them.

Our model also offers an interesting self-signaling interpretation. While the most straightforward direction of image concerns is towards others, decision-makers might also have self-image concerns (similar as in Bénabou and Tirole, 2006). Imagine that decision-makers engage in self-assessment regarding their personal and intellectual strength. Decision-makers receive a perfect signal about their personal and intellectual strength before every choice. Thus, when making their choice, they know their strength. However, for their self-assessment, this perfect signal is not available. The reason for this could for example be imperfect recall. Since actions are much easier to recall than signals, decision-makers use past actions for their self-assessment. Thus the model captures situations where people care about their self-image and build this self-image from past actions.

2.2 Baseline Model

Our model can be viewed as a modified version of Prendergast and Stole, 1996. There are three periods, $t = 0, 1, 2$. In periods 1 and 2, a decision-maker (D) chooses x_t from a choice set $X = (-\infty, \infty)$ in public. D has a unique preferred outcome $\mu \in X$, which he is uncertain about. In period 0, D and the public are holding an uninformative prior on μ.[2] In periods 1 and 2, before making his choice, D privately receives a signal about μ, $m_t = \mu + \epsilon_t$, $\epsilon_t \sim N(0, \sigma^2)$.

There are different types of decision-makers which differ in the strength of their signals σ. σ is D's private knowledge, but is commonly known to be drawn from a uniform distribution over $[\underline{\sigma}, \overline{\sigma}]$. Thus $[\underline{\sigma}, \overline{\sigma}]$ represents the type space in our model. σ stands for D's personal and intellectual strength. Decision-makers with a low σ possess high personal and intellectual strength and those with a high σ possess low personal and intellectual strength.

Upon receiving a signal m_t, D updates his or her beliefs about μ following Bayes' rule. Since the prior he or she holds in period 0 is uninformative, D's updated period 1 belief is completely based on the signal he received in period 1, m_1. Accordingly the updated expectation on μ in period 1 is $\widehat{\mu}_1 = E(\mu|m_1) = m_1$. The variance of D's updated period 1 belief is $Var(\mu|m_1) = \sigma^2$.

In period 2, D receives an additional signal m_2 and updates again. Since the signals in both periods are of equal strength, the updated period 2 expectation on μ is $\widehat{\mu}_2 = E(\mu|m_1, m_2) = \frac{1}{2}m_1 + \frac{1}{2}m_2$. The variance of D's updated period 2 belief is $Var(\mu|m_1, m_2) = \frac{1}{2}\sigma^2$.

In periods 1 and 2, the decision-maker chooses x_t in order to maximize utility. D's utility function has two components. The first is "standard" outcome-based utility. Decision-makers want to minimize the quadratic distance between x_t and μ

$$-(x_t - \mu)^2. \tag{1}$$

Thus, standard utility is always maximized by choosing $x_t = \mu$.

The decision-maker also cares about his or her reputation. He or she likes it, if the public perceives him or her as receiving strong signals, i.e., as having high personal and intellectual strength. This is captured by

[2] Technically we assume that the prior is normally distributed with variance τ^2, where $\tau \to \infty$.

$$-\alpha(E(\sigma\,|x_t, h_{t-1})). \tag{2}$$

$E(\sigma\,|x_t, h_{t-1})$ denotes the public's expectation of D's σ, conditional on D's choice x_t and the history of choices h_{t-1} if such a history exists. The parameter α specifies how much D cares about his reputation. While we do not model this explicitly, α might for example depend on the size of the public, the social distance between D and the public, or the strategic value of reputation.

Putting these two components together, the utility function is specified as

$$U_t = -(x_t - \mu)^2 - \alpha(E(\sigma\,|x_t, h_{t-1})). \tag{3}$$

Consequently, in periods 1 and 2, D solves the following maximization problem:

$$\max_{x_t} U_t = -(x_t - \widehat{\mu}_t)^2 - \alpha(E(\sigma\,|x_t, h_{t-1}))$$

Thus, D faces a trade-off between maximizing outcome-based utility and gaining reputation.

Notice that we assume that decision-makers consider both periods in isolation when choosing x_t. They do not take into account effects of current choices on future utility. This assumption is justified as many decision-makers, when making their period 1 choice, are unaware that a period 2 choice problem exists. However, we can show that results of our baseline model continue to hold, if decision-makers are fully aware of the existence of the period 2 choice problem.

2.3 Equilibrium

We are now ready to describe equilibrium behavior in our model. The problem we consider is a signal-extraction problem. In line with other models that have a similar signaling-game structure, we focus on separating equilibria (see for example Prendergast and Stole, 1996 or Bénabou and Tirole, 2006).

In periods 1 and 2, D receives a signal m_t, updates his beliefs $\widehat{\mu}_t$ and makes a choice x_t that maximizes (3). The public only observes D's actions x_t and subsequently builds beliefs about the decision-maker's type σ. Notice from (3) that D's optimal choice x_t directly only depends on his or her current belief $\widehat{\mu}_t$ and the history of actions h_{t-1}. From this it follows that in equilibrium, we necessarily have pooling of all types of decision-makers (type space $[\underline{\sigma}, \overline{\sigma}]$) that hold the same belief $\widehat{\mu}_t$ and share the same history h_{t-1}.

Therefore we transform our typespace. A type is now defined by the choice history h_{t-1} and the current belief $\widehat{\mu}_t$. For the new typespace, we can now state our definition of a fully separating Perfect Bayesian Nash Equilibrium (PBE).

Definition: $x_t^*(\widehat{\mu}_t, h_{t-1})$, $\widehat{\mu}_t^*(x_t, h_{t-1})$ (where $\widehat{\mu}_t^*$ is the public's (or own) belief about $\widehat{\mu}_t$) is a fully separating Perfect Bayesian Equilibrium iff $\forall h_{t-1}$,
$x_t^* \in argmax\left[-(x_t - \widehat{\mu}_t)^2 - \alpha(E(\sigma\,|\widehat{\mu}_t^*(x_t, h_{t-1}), h_{t-1}))\right]$ and $\widehat{\mu}_t^*$ is the inverse of x_t^* over $\widehat{\mu}_t$.

The equilibrium consists of two functions, $x_t^*(\widehat{\mu}_t, h_{t-1})$ and $\widehat{\mu}_t^*(x_t, h_{t-1})$. $x_t^*(\widehat{\mu}_t, h_{t-1})$ describes equilibrium behavior of the decision-maker conditional on the beliefs he holds, and $\widehat{\mu}_t^*(x_t, h_{t-1})$ denotes the public's beliefs about $\widehat{\mu}_t$, which will be correct in equilibrium. The equilibrium fully separates decision-makers with different beliefs, conditional on the choice history h_{t-1}. Thus, the public can build its expectations of D's σ directly from D's beliefs - $E(\sigma \mid \widehat{\mu}_t, \widehat{\mu}_{t-1})$.

We now consider equilibrium behavior in periods 1 and 2 in more detail:

Period 1

In period 1, there exists no choice-history. Thus, in the equilibrium of period 1, the public can base its expectation of σ solely on $\widehat{\mu}_1$, which she infers from the observation of x_1. However, by only observing x_1 or $\widehat{\mu}_1$ respectively, the public gains no additional knowledge regarding the type of the decision-maker σ. Her prior, that σ is uniformly distributed on $[\underline{\sigma}, \overline{\sigma}]$, remains unchanged. In other words, we have

$$\frac{\partial E(\sigma \,|\widehat{\mu}_1)}{\partial \widehat{\mu}_1} = 0.$$

From the perspective of the decision-maker, this means that D cannot affect his reputation. As a consequence he only focuses on maximizing outcome-based utility by choosing $x_1^* = \widehat{\mu}_1$. The public observes D's choice and correctly infers the signal he or she received, i.e., $\widehat{\mu}_t^*(x_1) = \widehat{\mu}_1$.

Period 2

In period 2, things are more interesting. From observing D's period 2 choice, the public can now learn something about D's personal and intellectual strength. Thus D can affect his reputation via x_2. We will show that, in order to signal high strength, D will choose an x_2 consistent with his or her period 1 choice. In other words, he or she will pick a period 2 choice which, regarding outcome-based utility, is suboptimally close to his or her period 1 choice.

We start by looking at the updating process of the public regarding D's personal and intellectual strength. Remember that in our fully separating equilibria, the public will be able to infer the true beliefs $\widehat{\mu}_t$ D is holding from his choices. The public's expectation on σ in period 2 therefore depends on $\widehat{\mu}_1$ and $\widehat{\mu}_2$. For this expectation, we can show that the following Lemma holds.

Lemma 1: For the expectation of σ, the following holds: $\frac{\partial E(\sigma|\widehat{\mu}_1,\widehat{\mu}_2)}{\partial \widehat{\mu}_2} > (<) 0$ if $\widehat{\mu}_2 > (<) \widehat{\mu}_1$.

Thus, by Lemma 1, the public's belief about σ increases if the distance between D's beliefs in period 1 and period 2 increases, and it decreases if the distance between D's beliefs decreases. $\widehat{\mu}_1$ and $\widehat{\mu}_2$ being close to each other signals high personal and intellectual strength, $\widehat{\mu}_1$ and $\widehat{\mu}_2$ being far away from each other signals low personal and intellectual strength.

In equilibrium, D will try to signal high personal and intellectual strength by choosing x_2 close to x_1, i.e., by acting as if his or her beliefs in period 1 and period 2 were close to each other. This is stated formally in Proposition 1.

Proposition 1: If α is not "too large", i.e., $sup_{\widehat{\mu}_2}\alpha\frac{\partial^2 E(\sigma|\widehat{\mu}_2,\widehat{\mu}_1)}{\partial\widehat{\mu}_2^2} < \frac{1}{4}$, there exists a unique fully separating Perfect Bayesian Equilibrium in period 2, where $\widehat{\mu}_2 > x_2^* > \widehat{\mu}_1$ or $\widehat{\mu}_2 < x_2^* < \widehat{\mu}_1$.

Proposition 1 states the main result of our model, that decision-makers have a preference for consistent behavior. In period 2, decision-makers do not simply maximize standard outcome-based utility. Instead, they make a choice inbetween their period 2 belief and their period 1 choice. They behave more consistent with their period 1 choice, in order to signal high personal and intellectual strength. Thus, in equilibrium, they are willing to sacrifice outcome-based utility to increase their reputational utility.

The result of Proposition 1 is mainly driven by D's reputational concerns. The following Lemma states that D's preference for consistency is more pronounced, the larger D's reputational concern is.

Lemma 2: Consider the fully separating PBE for a given reputational concern α_1 and signals $\widehat{\mu}_{21}$ and $\widehat{\mu}_2$. Compare this with the fully separating PBE for $\alpha_2 > \alpha_1$ and the same signals $\widehat{\mu}_1$ and $\widehat{\mu}_2$. Then the following inequality holds: $\widehat{\mu}_2 > x_2^*(\alpha_1) > x_2^*(\alpha_2) > \widehat{\mu}_1$ or $\widehat{\mu}_2 < x_2^*(\alpha_1) < x_2^*(\alpha_2) < \widehat{\mu}_1$.

2.4 Reduced Version of the Model

In the following we develop a reduced and simplified version of the model, where we directly assume a taste for consistency. This model can be used to analyse the consequences of a taste for consistency in complex economic environments in a straightforward way. We derive hypotheses for our experiments from this model.

Again there are three periods, $t = 0, 1, 2$. In periods 1 and 2, the decision-maker chooses x_t from a choice set $X = (-\infty, \infty)$. D has a unique preferred outcome $\mu \in X$, which he or she is uncertain about. In period 0, D and the public are holding an uninformative prior on μ. In periods 1 and 2, before making his or her choice, D privately receives a signal on μ, $m_t = \mu + \epsilon_t$, $\epsilon_t \sim N(0, \sigma^2)$.

D updates beliefs following Bayes rule. Consequently, period 1 belief is $\widehat{\mu}_1 = E(\mu|m_1) = m_1$. In period 2, we have $\widehat{\mu}_2 = E(\mu|m_1, m_2) = \frac{1}{2}m_1 + \frac{1}{2}m_2$.

We directly assume a taste for consistency in D's utility function. If a choice history h_{t-1} exists, D wants to be consistent with this history. D solves the following maximization problem:

$$\max_{x_t} U_t = -(x_t - \widehat{\mu}_t)^2 - \alpha(x_t - h_{t-1}))^2.$$

α specifies how much D cares about reputation. Again, it might for example depend on the size of the public, the social distance between D and the public, or the strategic value of reputation.

If no choice history exists, D simply solves:

$$\max_{x_t} U_t = -(x_t - \widehat{\mu}_t)^2.$$

Given this simple setup, it is straightforward to derive behavior in periods 1 and 2. In period 1 there is no choice history. In the absence of past choices to be consistent with, D simply chooses $x_1^* = \widehat{\mu}_1$.

In period 2, D faces a trade-off between being consistent with the period 1 choice and following the updated period 2 beliefs. Consequently he or she will choose $\widehat{\mu}_2 > x_2^* > \widehat{\mu}_1$ or $\widehat{\mu}_2 < x_2^* < \widehat{\mu}_1$ respectively.

3 Experimental Evidence

In this section we present evidence from three experiments designed to test main predictions and implications of the model. In particular we address the following issues: First, we study the signal value of consistent behavior in the context of a simple principal agent game. We test whether principals reward consistent behavior and whether the value of consistency is anticipated by agents. In the second experiment we investigate the role of commitment. The idea is that without explicitly committing to some point of view, statement or intention, consistency is less important compared to a situation where such a commitment has been made. Our third experiment demonstrates the importance of consistency preferences for social influence and manipulation.

3.1 Experiment 1: The Value of Consistency

Design: The first experiment tests the basic logic of our model. The central assumption is that consistent behavior is viewed positively as it signals ability, personal strength or reliability. In the experiment the decision context involves a simple estimation task. We test whether principals infer higher ability from more consistent estimates and whether agents anticipate this.

We study two treatments. In the main treatment, upon arrival, subjects were randomly assigned to the roles of principals and agents.[3] In each session there were twice as many agents than principals. Subjects were seated in separate rooms according to their roles. The experiment involved two stages. All subjects were informed about both stages at the beginning. In the first stage, agents had to perform two estimation tasks. The task was to estimate how many times the letter "e" appeared in a text with 1966 letters. In both texts the number of e's was identical and agents and principals were informed about this. The correct number was 233.[4] Subjects saw the first text for 60 seconds on their computer screen. Then they had 60 seconds to state their estimate about the number of e's (first estimate). Without getting any feedback on the first task, agents then saw the second text for 60 seconds. Again they had 60 seconds to provide their estimate for the second text (second estimate). Subjects were paid for accuracy. For both estimates the following rule applied: The maximum profit for each estimate was five Euro, which the agent received if his or her estimate was less than 1 percent above or below the correct number. For every percentage point the estimate deviated from the correct number, 10 Cents were deducted. If the estimate was more than 50 percent above or below the true value, profits were zero. Negative earnings were not possible.

After all agents had made their two estimates, the second stage began. Two agents were randomly assigned to one principal. The decision of the principal was to select one of the two agents for a third estimation task, which was similar to the first two estimation tasks. The principal was paid according to the precision of the estimate in this third task. Thus principals had an incentive to select the agent who they thought is most able in the estimation task. For their decision, principals were informed about the absolute difference between the first and the second estimate for both agents assigned to them. This information was provided on an answer sheet.[5] On this sheet principals had to select "their" agent.

[3] In the experiment, we used a neutral framing, i.e., subjects were not called agents or principals but "participants A", and "participants B", respectively.

[4] The two texts are shown in Appendix A.

[5] Information was given in an anonymous way, i.e., principals could not link information to actual subjects in the

The third task was to estimate how many times the letter "a" appears in a text of again 1966 letters. Principals were paid according to the accuracy of the selected agent's third estimate. The maximum payoff was ten Euro, which was paid if the agent's estimate was less than 1 percent above or below the correct number. For every percentage point the estimate deviated from the correct number, 20 Cents were deducted. If the estimate was more than 50 percent above or below the correct value, the principal's payoff was zero. Agents had an incentive to be selected and to estimate as precise as possible in the third task. For being selected they received a prize of 10 Euro. In addition, they were paid according to accuracy where payment was identical to the payment scheme in the first two estimates.

Principals' selection decisions inform us about the potential value of estimating consistently. However, to examine whether agents anticipate this and actually behave more consistently we need an additional treatment that eliminates (or reduces) the importance of the reputational concern for consistency. This is what we do in the control treatment. The control treatment is simply the first stage of the main treatment, i.e., agents estimate how many times the letter "e" appeared in the texts used in the main treatment. The payoff scheme for the two tasks was identical to that in the main treatment. Comparing behavior between the two treatments informs us whether agents anticipate the value of consistency and therefore behave more consistently in the main treatment.

Procedural Details: A total of 168 subjects participated in six sessions. In the main treatment, 64 subjects participated as agents and 32 as principals. 72 subjects participated in the control treatment. Subjects were mostly students from various fields at the University of Bonn. No subject participated in more than one session. The experiment was run using the experimental software z-Tree (Fischbacher, 2007). The principals made their choice on an answer sheet. Sessions lasted on average about 60 minutes in the main treatment and 45 minutes in the control treatment. Average earnings were 12.90 Euro for principals and 12.06 Euro for agents, including a show-up fee of eight Euro for principals and four Euro for agents.

Note that subjects were neither paid nor informed about the correct solution of the estimation task before all sessions had been concluded (main and control treatment). This was done to avoid the possibility that feedback concerning the correct result of the estimation tasks would spread and confound results. In order to receive their payments, subjects were asked to come to the experimenter's office.

Hypotheses: Predicting behavior in the experiment is straightforward. Given that there is a value of consistent behavior, agents who estimate more consistently (low absolute difference between estimates) should have a higher probability of being selected by principals. If agents anticipate this, estimates should be more consistent in the main treatment compared to the control treatment. Formally, the treatment variation of our experiment corresponds to a change in the reputational concern α. In their first estimate, subjects simply answer according to their beliefs, i.e., $x_1 = \widehat{\mu}_1$. For their second estimate, subjects face a trade-off between acting according to their updated belief or estimating more consistently with their first estimate. The solution to their maximization problem is simply

$$x_2 = \frac{1}{1+\alpha}\widehat{\mu}_2 + \frac{\alpha}{1+\alpha}x_1.$$

It immediately follows that an increase in α leads to more consistent behavior, i.e., the absolute deviation between x_2 and x_1 should be smaller in the main treatment, compared to the control treatment.

experiment.

Together with the assumption that consistent behavior signals ability we state our predictions as follows:

Hypothesis 1 (i) The likelihood that an agent is selected by a principal decreases in the absolute difference between first and second estimate. (ii) The absolute difference between first and second estimate is smaller in the main treatment compared to the control treatment.

Results: Our first result concerns the selection decisions of principals. In line with our hypothesis, a higher absolute difference between the two estimates decreases the likelihood of being selected. *Figure 1* shows that the likelihood of being selected is about 70 percent for differences between zero and five and decline for larger differences.[6] For differences larger than 31, e.g., the likelihood drops to about 22 percent. The decrease in likelihood is significant as a simple Probit regression shows. When we regress the probability of being selected on the absolute differences between the estimates we get a negative and significant coefficient (p-value <0.01). The marginal effect is -0.012, indicating that an increase in the absolute difference of one point decreases the likelihood of being selected by about 1.2 percent. Further evidence comes from the observation that among all principals 75 percent select the agent with the smaller absolute difference. A simple binomial test rejects the null hypothesis that principals randomized with equal probability (p-value <0.01).

We now turn to agents' behavior. The correct answer for both estimations was 233. Using all estimates (main and control treatment), the average first estimate was 220.57 while the average second estimate was 215.64. The variance in estimates was rather high. The standard deviation of all estimates in the first task was 83.29, in the second it was 74.39. At the end of the experiment, we asked agents in the control treatment to briefly describe their estimation strategy for the two estimation tasks.[7] Almost all decision-makers who answered the question described a similar procedure. First they counted the number of e's for a couple of rows. Then they counted the total amount of rows in the text and projected the total number of e's in the text.

Given principals' behavior and the fact that being selected was associated with a relatively large prize (10 Euro), we would expect that agents chose more consistently in the main compared to the control treatment. This is in fact what we find. *Figure 2* shows scatterplots of first and second estimates. The left panel displays observations from the control treatment, the right panel from the main treatment. While estimates are correlated in both treatments, it is obvious that the correlation is much tighter in the main treatment, i.e., that decisions are much more consistent. The correlation coefficients are 0.37 in the control treatment and 0.94 in the main treatment, respectively. *Figure 3* shows a histogram of absolute differences between the two estimates for both treatments. While about 70 percent of agents report an estimation difference below 15 in the main treatment the respective number is only 25 percent in the control treatment. More than 40 percent of agents in the control treatment indicated differences larger than 30 while less than 15 percent do so in the main treatment. The average absolute difference between estimates in the control treatment is 53.8 (std. dev. 70.5) while it is only 17.3 (std. dev. 23.2) in the main treatment. This difference is significant at any conventional level (p-value < 0.0001, using either Wilcoxon rank-sum test or simple OLS regression, regressing the absolute difference on a constant and a treatment dummy).

[6] All figures are shown in section 6.

[7] The question we asked was the following: "Please briefly describe how you proceeded in the two estimation tasks. How did you get to your estimation results?"

We summarize our main results as follows:

Result 1 The likelihood of being selected decreases in the absolute difference between the two estimates. Agents anticipate this. As a consequence, the absolute difference between first and second estimate is significantly lower in the main treatment, compared to the control treatment.

3.2 Experiment 2: The Role of Commitment

Our second experiment studies the role of early commitment in the reputation formation process. Intuitively, actively committing to an opinion, belief, intention or action is a precondition for observing consistent or inconsistent behaviors. Without commitment, i.e., without taking a stand or an action, observers will not be able to detect possible inconsistencies. Therefore, a decision-maker is not constrained by reputational concerns and can maximize utility without taking a reputational cost into account. In contrast, once we have committed to an opinion or belief, we cannot easily change our mind without revealing some inconsistency. We test this intuition and prediction of the model in the context of an estimation task and show how commitment to an opinion can make people disregard valuable information.

Design: To investigate the importance of commitment we study two treatments, one with commitment (main treatment) and one without (control treatment). The different steps of the experiment are illustrated in *Figure 4*. The main treatment is shown in the upper panel of *Figure 4*. First, subjects were explained the task: Subjects had to estimate the number of peas in a bowl. Subjects were paid according to the precision of their estimate. If their estimate was less than 5 percentage points above or below the true value of 3000, subjects earned 10 Euro. If their estimate was more than 5 percent but less than 10 percent above or below the true value, we deducted 50 Cents, i.e., subjects earned 9.50 Euro. For every 5 percentage points, the estimate deviated from the true value, we deducted 50 Cents. Thus, a subject whose estimate deviated 17 percent from the true value earned 8.50 Euro. Negative earnings from the estimation task were not possible.

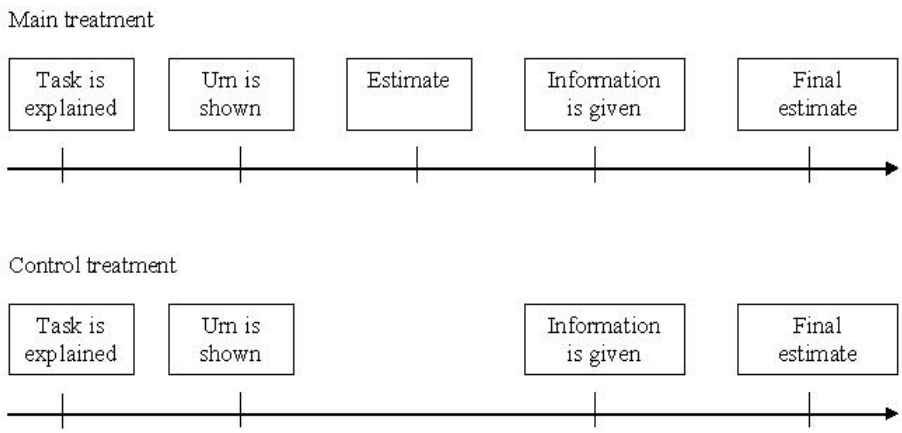
Subjects were seated around a table, which was placed in the middle of the lab.[8] After subjects knew about the task the bowl was shown (see Appendix A for a picture of the bowl). The bowl with peas was placed in the middle of the table. Subjects were told that they had as much time as they wanted to estimate the number of peas. They were asked to write down their estimate on an answer sheet that had been distributed at the beginning of the experiment. As soon as a subject indicated that he or she had written down an estimate, the experimenter came to the subject and wrote the subject's estimate in a table. This means that subjects had written down their first estimate and knew that the experimenter knew this estimate. At this point, subjects had commited to their first estimate. After all subjects had stated their estimate, the experimenter announced that he would now provide subjects with additional and "helpful" information regarding the estimation task. Each subject received an information sheet containing the following sentence. "In the past it has often been the case in various estimation tasks, that the average estimate of all participants is often relatively close to the true value. The estimation task you are facing has also been conducted with a different group of participants. They have also been paid according to precision of their estimates. The average estimate of the number of peas in the bowl of this group was 2615. If you want to, you can now revise your estimate." After they received the

[8] Subjects were seated sufficiently far away from each other, so that they could not see what other subjects were writing down.

information sheet, subjects had time to revise their information on their answer sheet. After all subjects had indicated that they had specified their final estimate, the experimenter collected their answer sheets and the estimation task ended.

The additional information we provided to subjects was based on a separate experiment we had conducted with 61 different subjects. They faced the same estimation task and were also paid according to the precision of their estimates. The average estimate of that group was 2615. In the results section we show that the additional information was in fact valuable to subjects.

Figure 4: Timing of the experiment



The only difference between the main treatment and the control treatment was that in the control treatment subjects did not state an estimate prior to receiving the valuable information (see lower panel of *Figure 4*). In the control treatment, subjects saw the bowl with peas for some time prior to receiving the information sheets. During this time subjects could form a belief about the correct number of peas. However, they did not write their estimate down, nor did the experimenter get to know this estimate. In this sense, no commitment was made. After subjects received the information sheets, they stated their estimate on an answer sheet. After all subjects had given their estimates, the experimenter collected the answer sheets and the estimation task ended.

Procedural Details: A total of 54 subjects participated in four sessions, 28 in the main treatment and 26 in the control treatment. Subjects were mostly students from various fields at the University of Bonn. No subject participated in more than one session. The experiment was conducted with paper and pencil. Sessions lasted on average about 45 minutes. Subjects earned on average 12.31 Euro, including a show-up fee of 5 Euro.

Subjects were neither paid nor informed about the correct solution of the estimation task before all sessions had been concluded (main and control treatment). This was done to avoid the possibility that feedback concerning the correct result of the estimation tasks would spread and confound results. In order to receive their payments, subjects were asked to come to the experimenter's office.

Hypotheses: In both treatments subjects see the bowl with peas and form a belief about the correct number of beans. In terms of the model, they receive a signal m_1, and form $\widehat{\mu}_1 = m_1$ accordingly. When asked to make a first statement, they will choose $x_1 = \widehat{\mu}_1$. Then subjects receive valuable information, an exogenous signal $m_I = \mu + \epsilon_I$, $\epsilon_I \sim N(0, \sigma_I^2)$. They update beliefs following Bayes' rule: $\widehat{\mu}_2 =$

$E(\mu|m_1, m_I) = \frac{\sigma_I^2}{\sigma_1^2+\sigma_I^2} m_1 + \frac{\sigma_1^2}{\sigma_1^2+\sigma_I^2} m_I$. For their final choice x_2, subjects now face the trade-off between being consistent with their prior commitment and stating their updated belief. They will choose $\widehat{\mu}_2 > x_2^* > \widehat{\mu}_1$ or $\widehat{\mu}_2 < x_2^* < \widehat{\mu}_1$ respectively, thereby partially neglecting valuable information. Compare this with a situation where subjects receive exactly the same signals, but do not commit to a first opinion. Then, when making their final choice x_2, there is no prior commitment to be consistent with, and subjects will decide according to their updated beliefs, i.e., $x_2 = \widehat{\mu}_2 = \frac{\sigma_I^2}{\sigma_1^2+\sigma_I^2} m_1 + \frac{\sigma_1^2}{\sigma_1^2+\sigma_I^2} m_I$. Thus, without a prior commitment, subjects are taking the valuable information completely into account when taking their final decision. Since the distribution of beliefs should be identical between treatments, we hypothesize that on average, final estimates in the main treatment will be further away from the valuable information than final estimates in the control treatment. In as much as information is actually valuable, final estimates will also be closer to the correct solution in the control treatment compared to the main treatment, implying higher earnings of subjects in the control treatment. We summarize our hypotheses as follows:

Hypothesis 2 The absolute difference between the final estimate and the information value of 2615 should be higher in the main treatment, compared to the control treatment. Since subjects in the main treatment disregard valuable information, it follows directly that the quality of estimates should be worse in the main treatment. Thus, on average, final estimates in the main treatment will be further away from the correct value of 3000 compared to the control treatment.

Results: Pooling data from both treatments the average (final) estimate was 2552.5 with a standard deviation of 1021.865. In a first step we show that the additional information was in fact valuable. We do so by simply counting the number of subjects in the main treatment whose estimate in the first estimation was closer to 3000 than 2615. It turns out that this holds for only 5 out of 28 subjects. This means that about 82 percent of subjects could improve their (first) estimate by simply choosing 2615.

We now turn to our main variable of interest, the absolute deviation between the final estimate and the information value of 2615. *Figure 5* shows a histogram of estimates in intervals around information value. In the control treatment about 54 percent of all estimates are in the interval +/-300 around the information value. In contrast only about 28 percent of all estimates in the main treatment lie within this interval. The figure also shows that extreme deviations from the information value are more frequent in the main compared to the control treatment. On average, the deviation in the main treatment is 464.13 points higher than in the control treatment. Related to the information value, this is a difference of about 18 percent. The difference in deviations from the information value is statistically significant (p-value < 0.07, using Wilcoxon rank-sum test or simple OLS regression, regressing the absolute difference on a constant and a treatment dummy (p-value < 0.02)).

Figure 6 suggests that the early commitment in the main treatment affects subjects' final estimate. It shows a scatterplot with subjects' first and final estimates together with a line indicating the information value 2615. The figure reveals that many subjects are either at or close to the 45-degree line indicating a strong resistance to take into account new and valuable information. It also shows that if subjects change, they change in the direction of 2615. The correlation between first and final estimate is 0.53.

The disregard of valuable information is associated with a decrease in the quality of estimates and earnings. On average, estimates in the main treatment are 512.46 points further away from the correct value than estimates in the control treatment. The effect is statistically significant using a Wilcoxon rank-sum test (p-value < 0.03).

We summarize our results as follows:

Result 2 Commitment is important: Subjects disregard valuable information when they previously commited to a first estimate.

3.3 Experiment 3: Social Influence

In our third experiment we address the issue of social influence. The idea is that given a preference for consistency it is possible to influence and manipulate people. The trick is to "tempt" a person to make a statement. In a second step, he or she is confronted with a request related to that statement and the pressure to live up to it. Given that the first statement typically involves no or only low costs, it is relatively easy to provoke statements that do not necessarily reflect a person's true preferences. As a result the person may end up acting against his or her actual interest.

Design: The decision context in this experiment is prosocial decision making. Subjects' decision is how much money to donate to some charitable fund. To study the potential of influence we conduct two treatments: in the main treatment subjects are asked how much they would donate if they were asked, prior to their donation decision. In the control treatment this question is not asked. Due to the preference for consistency, biases in prior statements (how much would I donate?) might carry on to later choices because people feel obliged to act consistently with the biased statement.

In both treatments, the experiment started with a survey. Subjects did not know that they were later asked to donate money. The survey consisted of 19 sub-questions and took about 10 minutes. The survey included a short version of the so-called "Big Five" inventory and the cognitive reflexion test (John et al., 1991, Frederick, 2005). The only difference between the main and the control treatment was that in the main treatment, we inserted one additional question, in between the "Big Five" and the cognitive refelxion test. We asked subjects how they would hypothetically decide if they were asked to donate money. The question reads as follows: "Imagine, in an experiment you received an amount of 15 Euro in addition to your show-up fee. You had to choose, which part of the 15 Euro you want to donate to a charitable organisation. You could choose between different organisations and could donate any amount from 0 to 15. How much would you donate? Please give an amount between 0 and 15." In the control treatment, we removed this question from the questionnaire. After all subjects had completed the survey, the donation experiment was announced.

In the donation experiment, subjects received an endowment of 15 Euro and had to decide how much of the endowment to donate to a charity organisation, and how much to keep for themselves. They could donate any amount from 0 to 15. In case they wanted to donate a positive amount, subjects could choose their preferred charitable organizations: they could either choose from a list of 8 organizations, or could name a charity organisation of their own.[9]

Note that the only difference between the two treatments was the hypothetical donation question. Moreover, the question was not asked right before the actual experiment but was instead embedded in a survey. We also did not remind subjects about their answers to the question when presenting the experiment. We therefore think that we implemented a fairly subtle treatment. It is likely that the effects

[9]The list of organizations contains Brot für die Welt, Kindernothilfe, German Red Cross, Welthungerhilfe, BUND, Greenpeace, terre des hommes, Aktion Mensch.

reported below would become stronger if we had either asked the question right before the experiment or reminded subjects about their answers.

Procedural Details. A total of 64 subjects participated in four sessions, 32 in the main treatment and 32 in the control treatment. Subjects were mostly students from various fields at the University of Bonn. No subject participated in more than one session. The experiment was conducted paper and pencil. Sessions lasted on average about 40 minutes and subjects earned on average 13.50 Euro, including a show-up fee of 5 Euro.

Hypotheses: We hypothesized that subjects would give a biased answer when asked hypothetically how much to donate to a charitable organization. In fact we were expecting them to overstate their willingness to donate given that donating to charity is socially desired, and given that it was essentially costless to signal positive characteristics. Note, however, that from the viewpoint of the model it makes no difference whether they over- or understate their true willingness to donate. Any bias should carry over to actual donation behavior. As a consequence, donations will differ between main and control treatment.

To see this suppose a bias in the hypothetical choice in period 1. For example, subjects choose $x_1^* > \widehat{\mu}_1$. To focus on the role of the preference for consistency as a device for social influence, we assume that subjects use the correct belief $\widehat{\mu}_1$ for Bayesian updating.[10] In period 2, the actual donation decision, subjects face the following choice-problem:

$$\max_{x_2} U_2 = -(x_2 - \widehat{\mu}_2)^2 - \alpha(x_2 - x_1^*)^2$$

They will choose x_2, such that the following holds:

$$\widehat{\mu}_2 > x_2^* > \widehat{\mu}_1^* \text{ or } \widehat{\mu}_2 < x_2^* < \widehat{\mu}_1^*$$

From this it follows that $E(x_2^*) > E(x^*) = \mu$.

In the control treatment subjects only take one unbiased choice x^*. Subjects receive a signal m and choose $x^* = m$. It immediately follows that:

$$E(x_2^*) > E(x^*) = \mu$$

In the main treatment, subjects face a trade-off between acting consistently with their biased prior statement and acting according to their unbiased beliefs about their true preferences. Subjects solve this trade-off by choosing an actual donation level in between their biased statement and their unbiased beliefs. In the control treatment, subjects don't face such a trade-off and will simply choose according to their unbiased beliefs. Therefore, actual donations in the main treatment should be higher or lower than donations in the control treatment, depending on the respective bias. We summarize this prediction as follows:

[10] If subjects would use a biased belief this would contribute to an additional bias in subjects' period 2 choice. Thus, if subjects are unaware of the bias the consistency effect would become even larger.

Hypothesis 3 Subjects' actual donation decision in the main treatment will be biased in the direction of their hypothetical statement. As a consequence, they will donate more or less in the main than in the control treatment, depending on the direction of the bias.

Results: In a first step we check whether subjects gave a biased hypothetical statement about their willingness to donate. To do so we compare hypothetical donations in the main treatment with actual donations in the control treatment. It turns out there is a striking bias: While average hypothetical donations are 4.27 Euro actual donations in the control treatment are 7.63 Euro. Thus actual donations in the control treatment are almost 80 percent higher (!) than hypothetical donations. This difference is statistically significant at any conventional level (p-value < 0.001, Wilcoxon rank-sum test). The sign of the bias is quite surprising and unexpected. A possible explanation is that in the actual donation decision we presented a list of eight charitable organizations, which may have made donations more concrete and credible, triggering a higher willingness to donate.

Regardless of the sign of the bias, the interesting question is whether the bias carries over to the actual donation decision in the main treatment. Given that the bias is negative, the model predicts lower donations in the main compared to the control treatment. This is in fact the case. *Figure 7* shows a histogram of actual donations in both treatment conditions. 38 percent of donations in the main treatment are 3 Euro or lower, the corresponding fraction in the control treatment is only about 13 percent. Likewise the fraction of donations higher or equal 12 Euro is more than twice as high in the control compared to the main treatment. On average subjects donate 5.38 Euro in the main and 7.63 Euro in the control treatment, i.e., donations are about 42 percent lower in the main than the control condition. This difference is statistically significant using either a Wilcoxon rank-sum test (p-value $<$ 0.03) or simple OLS regression, regressing donations on a constant and a treatment dummy (p-value < 0.02)). Suggestive evidence for the importance of the consistency bias comes from the scatterplot shown in *Figure 8*. It shows that many subjects donated exactly the same amount as previously stated. The correlation coefficient between hypothetical and actual donations is 0.77 (p-value < 0.001). Those subjects who deviated typically increased their donation in line with the model's prediction. As a result actual donations are 1.11 Euro higher than hypothetical donations. We summarize our results as follows:

Result 3 Subjects' donations are influenced by a biased hypothetical first statement. The bias is negative, resulting in lower donations in the main treatment compared to the control treatment.

4 Concluding Remarks

We presented a model that conceptualizes the preference for consistency and allows the analysis of how it affects economic behavior. In the model, people have a preference for consistency, because consistent behavior allows them to signal high personal and intellectual strength.

We conducted three simple experiments to test main predictions and implications of our model. In the context of an estimation task, the first experiment shows that consistent behavior is viewed positively as a signal of ability and that agents anticipate this. The second experiment shows that commitment is key and that the preference for consistency can lead to a neglect of valuable information. The third experiment demonstrates the effectiveness of the preference of consistency as a means of social influence.

Notice that we consider situations, where decision-makers face the same choice problems repeatedly and where the preferred outcome remains constant over time. In such a stable environment, high personal and intellectual strength is reflected by consistent behavior. However, in changing environments, where for example the preferred outcome changes over time, high personal and intellectual strength could mean to adjust quickly to new environments.

5 References

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6 Figures

Figure 1:

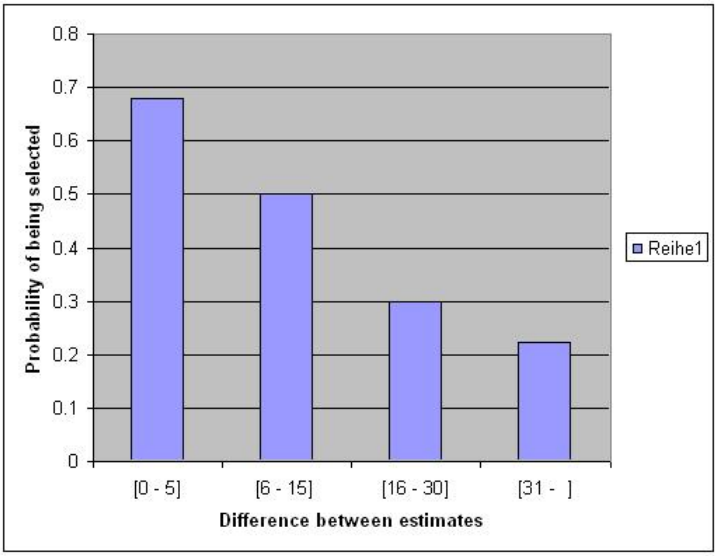


Figure 2:

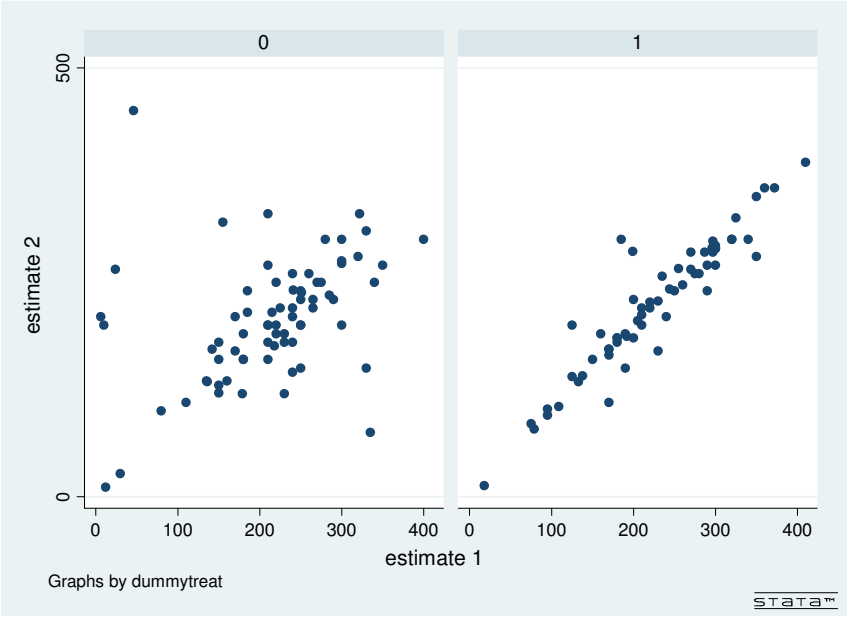


Figure 3:

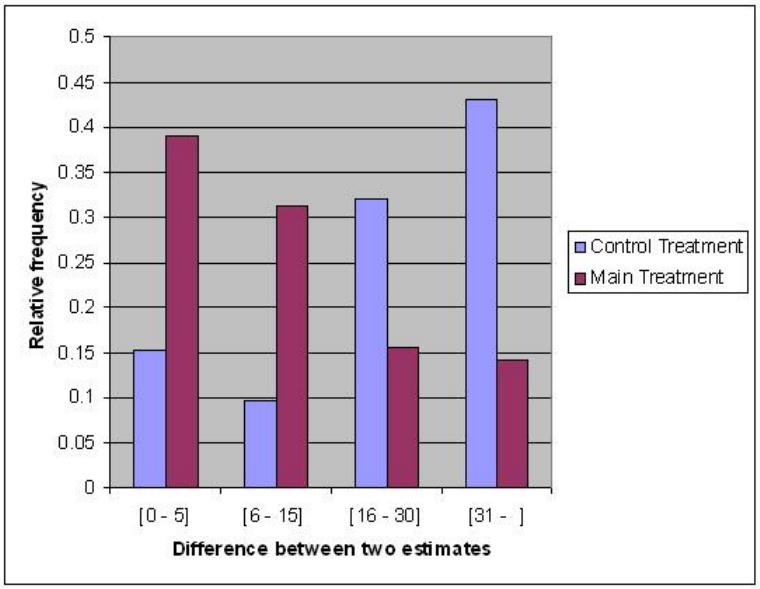


Figure 5:

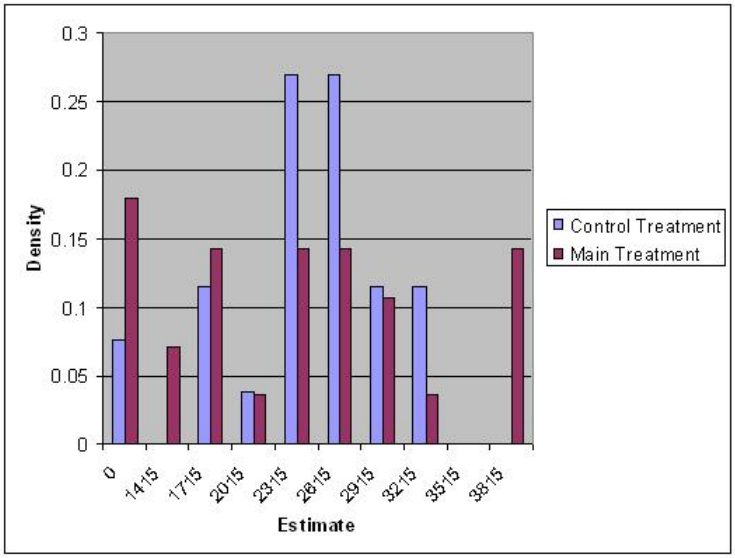


Figure 6:

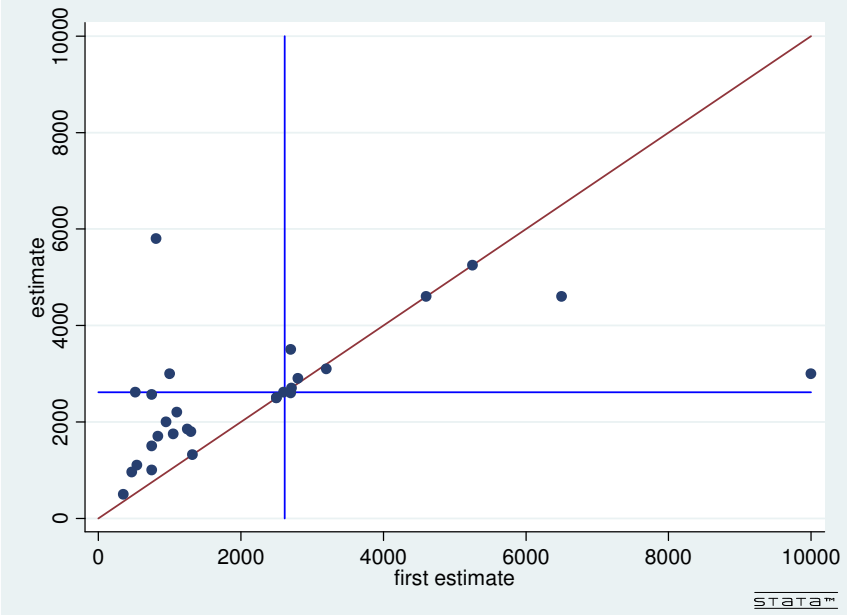


Figure 7:

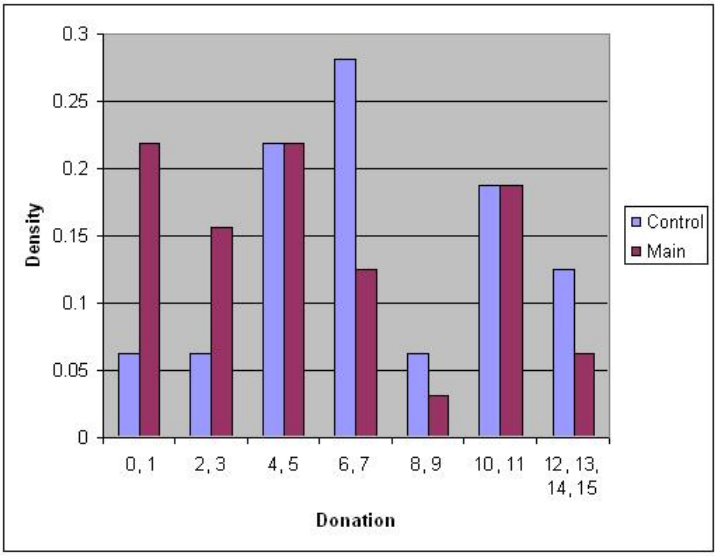
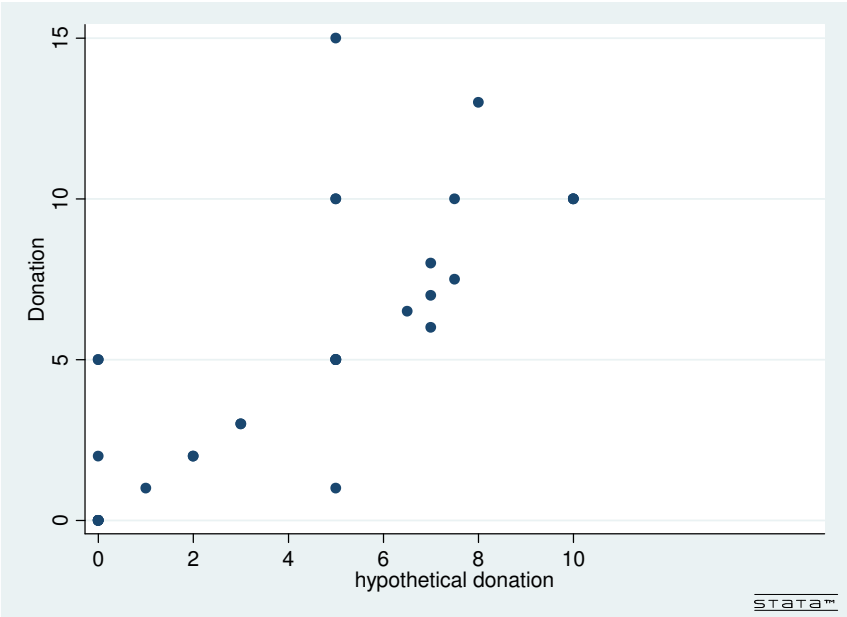
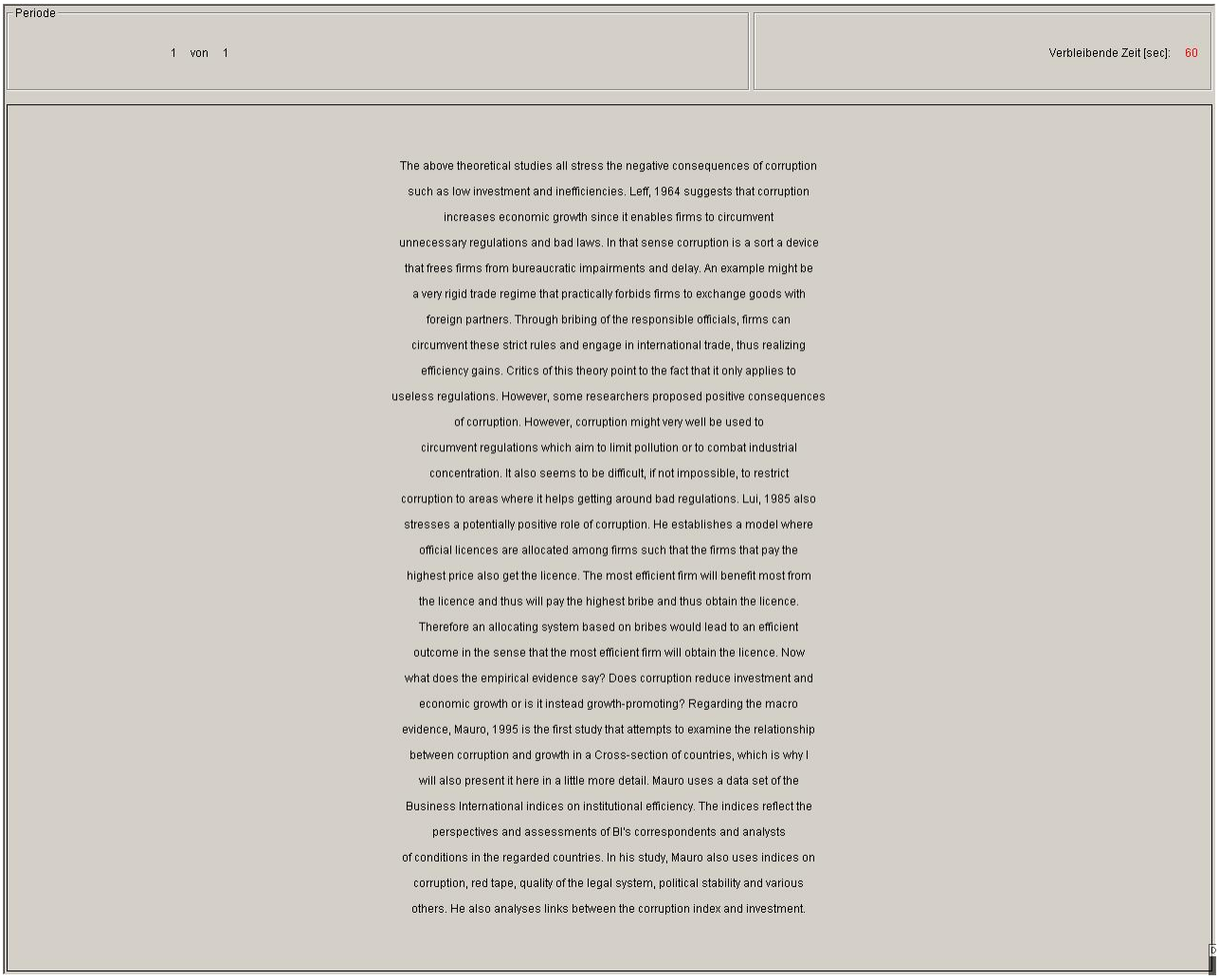


Figure 8:

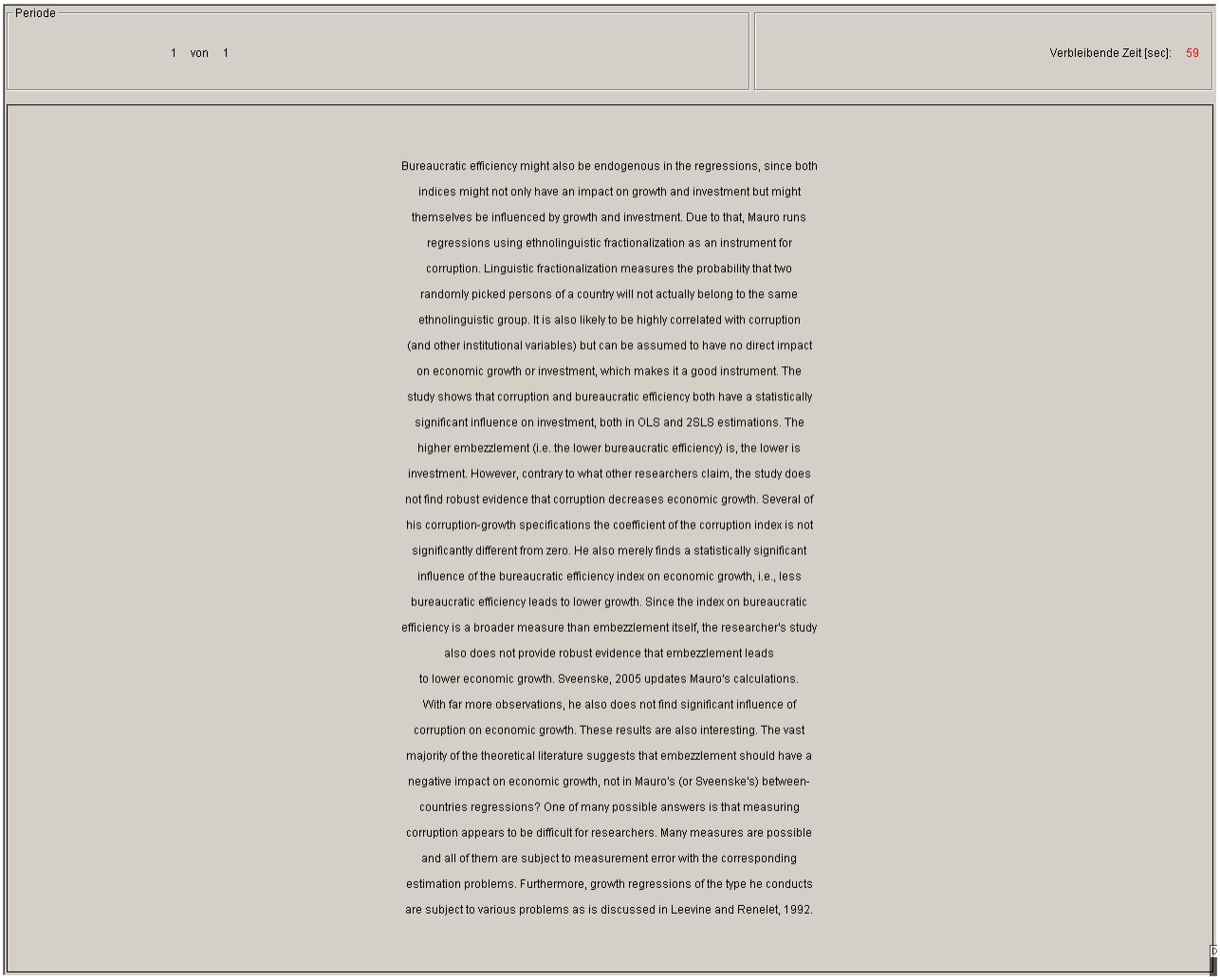


7 Appendix A

Text1:



Text2:


Periode
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Verbleibende Zeit [sec]: 59
Bureaucratic efficiency might also be endogenous in the regressions, since both indices might not only have an impact on growth and investment but might themselves be influenced by growth and investment. Due to that, Mauro runs regressions using ethnolinguistic fractionalization as an instrument for corruption. Linguistic fractionalization measures the probability that two randomly picked persons of a country will not actually belong to the same ethnolinguistic group. It is also likely to be highly correlated with corruption (and other institutional variables) but can be assumed to have no direct impact on economic growth or investment, which makes it a good instrument. The study shows that corruption and bureaucratic efficiency both have a statistically significant influence on investment, both in OLS and 2SLS estimations. The higher embezzlement (i.e. the lower bureaucratic efficiency) is, the lower is investment. However, contrary to what other researchers claim, the study does not find robust evidence that corruption decreases economic growth. Several of his corruption-growth specifications the coefficient of the corruption index is not significantly different from zero. He also merely finds a statistically significant influence of the bureaucratic efficiency index on economic growth, i.e., less bureaucratic efficiency leads to lower growth. Since the index on bureaucratic efficiency is a broader measure than embezzlement itself, the researcher's study also does not provide robust evidence that embezzlement leads to lower economic growth. Sveenske, 2005 updates Mauro's calculations. With far more observations, he also does not find significant influence of corruption on economic growth. These results are also interesting. The vast majority of the theoretical literature suggests that embezzlement should have a negative impact on economic growth, not in Mauro's (or Sveenske's) between-countries regressions? One of many possible answers is that measuring corruption appears to be difficult for researchers. Many measures are possible and all of them are subject to measurement error with the corresponding estimation problems. Furthermore, growth regressions of the type he conducts are subject to various problems as is discussed in Leevine and Renelet, 1992.

Picture of bowl with peas: