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## How norms can generate conflict

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# JENA ECONOMIC RESEARCH PAPERS



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by

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# How norms can generate conflict

*approx. 8,727 words, 8 figures, 1 table*

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## Abstract

Norms play an important role in establishing social order. The current literature focuses on the emergence, maintenance and impact of norms with regard to coordination and cooperation. However, the issue of norm-related conflict deserves more attention. We develop a general theory of “normative conflict” by differentiating between two different kinds of conflict. The first results from distinct expectations of which means should be chosen to fulfil the norm, the second from distinct expectations of how strong the norm should restrain the self-interest. We demonstrate the empirical relevance of normative conflict in an experiment that applies the “strategy method” to the ultimatum game. Our data reveal normative conflict among different types of actors, in particular among egoistic, equity, equality and “cherry picker” types.

**JEL-Classification:** Z130, C91, D30

**Keywords:** Social norms, normative conflict, cooperation, ultimatum game, strategy method, equity

Many of our daily activities are governed by social norms, which set the rules of how we ought to behave. Often, we are not even aware of how societal rules influence the way we speak, greet, dress, eat, or express gratitude or love. By simplifying the complexity of social life, norms serve as a “lubricant” of social order and facilitate social interaction. It is quite remarkable, moreover, that normative restrictions and constraints can have the paradoxical effect of allowing more freedom of action. Social norms can enhance the welfare of a group by proscribing the contribution to collective goods such as a clean environment, a safe neighborhood, public infrastructure facilities, trust in business relationships, reciprocal social relations or conflict resolution in general.

The problem of norm emergence has garnered the lion’s share of attention (Ullmann-Margalit, 1977; Bicchieri, 1990; Coleman, 1990; Voss, 2001). The topical argument explains the emergence of social norms by means of the “shadow of the future”. The expectation of future interactions can outweigh the temptation of one-sided, singular exploitation (Taylor, 1987; Raub and Voss, 1986; Fudenberg and Maskin, 1986; Ellickson, 1991). In addition, other mechanisms have been proposed, such as reputation (Raub and Weesie, 1990), signaling (Spence, 1974; Molm et al., 2000) and altruistic punishment (Ostrom et al., 1992; Fehr and Gintis, 2007).

Our intention here is not to challenge the prominence of these contributions, but rather enrich the literature by demonstrating that all these routes to cooperation require a necessary precondition: Actors have to share equivalent social norms. The fulfilment of this requirement is not trivial, since there are numerous possible normative alternatives, which solve the same cooperation problem in different ways. Members of the same group can hold quite distinct behavioral expectations of how cooperation should be achieved. This phenomenon, referred to as “normative conflict”, does not generate cooperation, but conflict. If actors have internalized a different norm than their interaction partners, they can have the best intentions and do their best, but nevertheless, their behavior would be perceived as improper. They fall apart in conflict, despite both sides are convinced of having behaved in an adequate way.

In the following, we develop a classification of normative conflict. This classification identifies two sources of conflict. On the one hand, actors may adhere to mutually exclusive behavioral expectations of how one ought to behave. On the other hand, they may have distinct expectations concerning how strong a given norm should restrict the self-interest of the target actor. We call the first source of conflict the “normative content” and the second one “normative commitment”. Subsequently, we outline our theory of normative conflict and exemplify it for the case of bargaining norms with an ultimatum game. Further, we report the results from our experimental data and study the empirical magnitude and significance

of normative conflicts in the light of our theory.

## 1 A perspective of normative conflict

So far, we referred to social norms as a behavioral expectation regarding what ought to be or ought not to be done. For the establishment of our theory of normative conflict, we have to be more precise. First, let us refer to *norm-relevant situations* as situations in which social norms exist. In such situations, almost every member of a population believes that almost every other member has a certain behavioral expectation. These expectations are directed towards the so-called *target actors* of a norm, or shorter, *norm targets*. Moreover, norms are to the benefit of a certain group of actors, called *beneficiaries* of a norm.<sup>1</sup> We define *social norm* as a commonly known behavioral expectation among beneficiaries and target actors regarding how the target actors ought to behave, which is enforced by sanctions in case of violations.<sup>2</sup> Note that a norm target and a beneficiary can be the same person, but they can also belong to a different group of people.

For the purpose of specifying the concept of normative conflict, we can subdivide two elements that build the structure of social norms. These two elements specify the factors that generate the behavioral expectation. We term the first element the *normative content*. The *normative content* may be defined as the kind of behavior that is prescribed or proscribed in a norm-relevant situation. It can be understood as the method that ought to be considered by the norm targets to serve the beneficiaries' interests. The second element of norms considers that social norms imply obligations. The normative expectations commits the target actor to restrict her self-interest in favor of the beneficiaries' well-being. Consequently, we may define this *level of normative commitment* as the degree of how much the target actor ought to sacrifice her own interests. The level of normative commitment is, however, not fixed. While some norms may require strong restrictions, others are less demanding.

This distinction enables us to classify two different types of normative conflict, which we illustrate in the following with the social norm to signal trustworthiness. Often there exist group norms that prescribe their members to signal their trustworthiness (cf. Raub, 2004). These signaling devices should be costly so that untrustworthy actors, who seek only short-term benefits, can be sorted out. It

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<sup>1</sup>Note that the terms "target actor" and "beneficiary" stem from Coleman (1990, 247).

<sup>2</sup>For a discussion of different definitions of social norms see Opp (2001) and Elster (1989), for a current review on social norms see Rauhut and Krumpal (2008), for literature on the punishment aspect see Yamagishi (1986); Heckathorn (1989), and for a microscopic foundation of coordination norms see Helbing (1992) and also Young (1993).

is, however, imaginable that different normative contents are regarded as valid by different group members. One social group, for example, might demand the wearing of expensive suits from a certain brand, another group signifying piercings, and another tatoos. Thus, norms with different normative contents have the equal potential to achieve trust and cooperation; however, different actors may expect adherence to a different content, giving rise to normative conflict.

The second source for normative conflict can spark off if actors regard a different normative commitment as appropriate. Regarding the example to signal trustworthiness, the group members might be subject to severe restrictions, such as to place the tattoo on the face or the piercing in the lips. In contrast, the social norm could require less normative commitment, such as to mark the body at less visible and painful spots like the upper arm or the bum. Although an actor invested in a costly signal, it may be regarded as insufficient by others due to too little commitment. For example, group members who similarly chose the tattoo as the normative content to signal trustworthiness may nevertheless be in conflict as to whether it should mark restrictive places such as the face or less restrictive ones like the bum.

As revealed by the examples, actors can adhere to social norms, remain under the belief of behaving correctly and still have conflicts with each other. Consequently, we define *normative conflict* as the situation, in which the norm targets and the beneficiaries hold different behavioral expectations of how the targets ought to behave in a given norm-relevant situation. We can see from the examples above how normative conflict emerges due to the actors' adherence to different normative contents or levels of normative commitment.

We distinguish our theory of normative conflict from a theory of conventions (Lewis, 1969). While conventions are self-enforcing coordination rules, for example driving on the right side of the street, we regard social norms as the prescription to behave cooperatively in social dilemmas (cf. Voss, 2001). With respect to signaling trustworthiness, tatoos or wearing tailor-made suits require constant costs and efforts with the temptation to undercut the expected behavior. Further, our approach concentrates on informal social norms rather than legal norms.

## 2 Bargaining norms as an exemplification of normative conflict

Bargaining norms can serve as an illustration of both kinds of normative conflicts, the one resulting from adherence to different normative contents and the other one from different commitments. The distribution of work in the household (Lundberg and Pollak, 1996), relative wage differences (Fehr and Gächter, 2000), or the cri-

teria for the allocation of organ donations (Elster, 1992; Gross and Kriwy, 2008) are embedded in norm-relevant situations and thus prone to conflict. Conflict can arise, when a good is scarce and demand exceeds supply. In these situations, social norms shape the expectations of the distribution of these goods.

We focus on norms of distributional justice which are based on the principle of allocating resources according to the criteria of effort or equality.<sup>3</sup> These norms can be distinguished with respect to the content of the norm: *Equity norms* assert that the individual input is the only criterion which determines the output to a certain extent. Those who invest more effort shall be compensated more generously (Homans, 1961; Blau, 1964; Adams, 1965; Cook and Emerson, 1978). With effort, we understand individual contributions in terms of time, endeavor, energy or other costly individual resources to achieve a goal. Adams' (1965) classical definition of equity refers to the equivalence of the quotient of outcome and effort ( $O_i/E_i = O_j/E_j$ ) for all involved actors  $i, j$ . As Harris (1976) points out, this formulation of equity is rather simple, but it captures the relevant point.

In contrast, *equality norms* do not rely on individual effort as an element of the normative content. For equality norms, the material equality of outcomes is the only criterion that ought to be satisfied. Thus, we can write the share that an equality norm prescribes to offer to the beneficiary as  $1/n$ , with  $n$  denoting the number of group members among the good is shared.

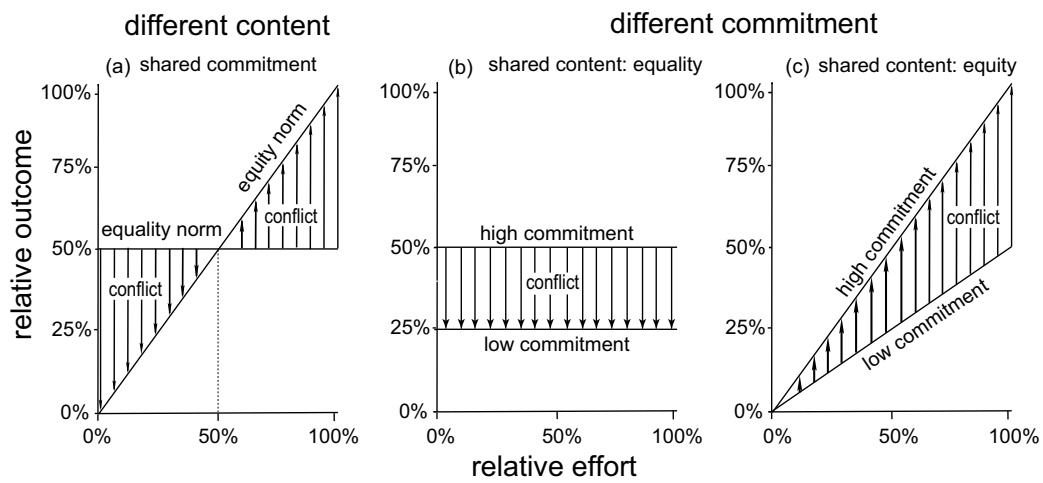
The second part of the norm is determined by the level of normative commitment, stating how much the individual input should be weighted with respect to the individual self-interest. We can speak of a pure equity norm, if there is full normative commitment, so that selfishness does not justify any deviance from the principle of effort. If the equality norm prescribes full normative commitment, it does not allow deviation from the equal split. Figure 1 gives an exemplary illustration of both norms with respect to the relative effort of two actors.

### 3 Previous empirical results

The empirical literature on bargaining norms supports that social groups are heterogeneous in their adherence to either equity or equality norms (Lissowski et al., 1991; Jasso and Wegener, 1999; Liebig and Verwiebe, 2000). Equality norms are frequently observed in bargaining experiments if players are homogenous. For instance the equal split is usually the modal outcome in the ultimatum game (Roth, 1995), and is also commonly observed in real world settings, such as among family

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<sup>3</sup>There is a variety of other norms of distributive justice, considering for example other criteria such as need or status; for reviews see Cook and Hegtvold (1983) or Deutsch (2000).



**Figure 1.** Illustration of normative conflict resulting from (a) adherence to different normative contents or (b and c) different normative commitments. In (a), the normative conflict between a holder of an equity norm and a holder of an equality norm is increasingly prevalent for actors who show increasingly different effort levels. In (b), actors adhere to the same normative content of an equality norm; however, increasingly different commitments trigger stronger conflict. In (c), actors adhere to the same normative content of an equity norm, but are prone to conflict for different levels of normative commitment.



members or friends (Morgan and Sawyer, 1967).

Equity norms are often found in survey and vignette studies in which the outcome of heterogenous work effort had to be evaluated (Konow, 1996). According to these studies, about two thirds of the respondents regarded it as fair if income was allocated according to the working time. This was confirmed with experimental studies, in which “earned” property rights, for instance buying in an auction the right to be the proposer in an ultimatum game (Güth and Tietz, 1986) or winning it in a quiz (Hoffman et al., 1994), dramatically increased the proportion of offers which took the effort into account.

Moreover, the plurality of norms was confirmed with a variation of effort in experiments. In early reward allocation experiments, the participants were often payed for commonly solving an experimental task. Afterwards, the common money could be divided by one of the players. Mikula (1972) and Mikula and Uray (1973) report two-person games, where the over-achieving player applied the equality norm to compensate the under-performing partner. However, the under-performing player usually honored the efficient player’s merits and allocated according to equity norms.<sup>4</sup> Thus, two norms were applied in the same situation; however, the experimental design was not suited to analyze normative conflict. Charness and Grosskopf (2001) experimentally tested the preferences of players regarding efficiency and equality. In their dictator-like experiment, norms of efficiency were often preferred to norms of equality. Their design let one person choose between two allocations, one dividing equally, the other dividing a larger amount of money unequally (usually in favor of the other person). Between 66 and 88 percent of dictators (N=61) chose the unequal allocation, sometimes even if they would have been better off with the equal but less efficient allocation. Finally, Gantner et al. (2001) experimentally identified different patterns of allocation norms, e.g. equality, equity and efficiency, but, as the previous studies, they did not explicitly investigate the consequences of competing norms and the emergence of normative conflict.

## 4 Method

### 4.1 Design

We conducted a variation of the ultimatum game experiment (Güth et al., 1982). In this game, one proposer and one responder bargain over a given amount of

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<sup>4</sup>The results might have been influenced by a “generosity bias” due to deception of the participants and due to the experimental design. See Konow (2003) for a discussion of this argument.

money (the *cake*). The proposer offers a share of the cake to the responder. If the responder accepts the offer, she receives the share and the proposer can keep the rest of the cake. If the responder rejects the offer, the cake is lost and nobody gets anything. This experiment is one of the most parsimonious methods for measuring normative behavior. A high offer may be regarded as adherence to a fairness norm and the rejection as a punishment for violating the norm.

Our first variation introduced a real effort task in the ultimatum game. Our effort task let the subjects invest their own time *prior* to the experiment. Thus, every subject could decide on her own as to invest spare time in order to earn more money later on. Five days before the experiment, the subjects received a seven page long text of a *Wikipedia* entry on the Westminster Palace via email.<sup>5</sup> An accompanying letter informed the subjects that their preparation of the text will influence their possible earnings in the experiment. We chose a rather specific topic to ensure that everybody actually had to learn the text and nobody could benefit from her respective field of studies (such as mathematics or paleontology). At the beginning of the laboratory experiment, the subjects had to answer twenty questions about Westminster Palace. There were five answer categories, one of which was correct. For each correct answer, subjects earned 1 Euro. Thus, the maximum earning was 20 Euro and purely random answers had an expectation value of 4 Euro. In the ultimatum bargaining part, the joint earnings of two randomly drawn players were pooled to form the cake. This procedure was designed to induce a feeling of personal effort and inherent monetary earnings. In particular, the effort was real in the sense that subjects could spend their own spare time. In contrast, previous experiments measured effort with the subjects' performance during a fixed time in the lab, which all subjects anyway decided to spend by accepting their participation in the experiment.<sup>6</sup>

Our second variation of the ultimatum game introduced an enhanced method for measuring normative behavior on the individual level, called the *strategy vector method* (Selten, 1967; Fischbacher et al., 2001; Falk and Fischbacher, 2002). A "simple" ultimatum game with efforts would ask a proposer to offer her responder a certain amount of money. The responder could accept or reject this particular offer, while both players knew both particular effort levels. This method would only allow to test offers and their acceptance for two particular effort levels. In contrast, our implementation of the strategy vector method allows for measuring the offer and the acceptance for every possible combination of effort levels. For

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<sup>5</sup>Wikipedia contributors, "Westminster Palace," Wikipedia: The Free Encyclopedia, <http://de.wikipedia.org/wiki/PalaceofWestminster> (accessed May 04,2008 14:40)

<sup>6</sup>For instance, Gächter and Riedl (2005) and Rauhut and Junker (2009) implemented a general knowledge quiz without the opportunity to prepare for it beforehand and Frohlich et al. (2004) let subjects proofread a text to correct spelling errors.

illustration, consider the following example. From the pool of all subjects, two subjects  $i$  and  $j$  were matched by the computer.<sup>7</sup> Player  $i$  was informed that she earned 10 Euro in the quiz but was not yet informed about player  $j$ 's effort level and her actual role. Instead, we asked her about all decisions for every possible effort level in both roles: In the first step, she was asked in the role of the proposer of how much she offers if her responder  $j$  contributed 0 Euro, 1 Euro, 2 Euro, ..., 19 Euro, 20 Euro. In a second step, the roles switched and player  $i$  was asked for the minimal offer she is willing to accept if her proposer  $j$  contributed 0 Euro, 1 Euro, 2 Euro, ..., 19 Euro, 20 Euro, which we refer to as the "acceptance threshold". Player  $i$  and player  $j$  similarly entered 21 decisions as a proposer and 21 decisions as a responder. As a next step, the computer calculated the joint cake size of player  $i$  and  $j$ . Suppose that player  $i$  contributed 10 and  $j$  15 Euro to the cake. Then, the computer compared whether the proposer's offer for the responder's effort of 15 was at least as high as the responder's acceptance threshold for a proposer's effort of 10. The money was paid, if the offer was as high or higher than the responder's acceptance threshold, otherwise the money was lost. Summing up, the strategy vector method has the advantage to return 21 decisions as a proposer and 21 decisions as a responder for each subject (compared to 1 decision in the "simple" ultimatum game).

## 4.2 Procedure and participants

The experiment was conducted using the *z-Tree* software developed by Fischbacher (2007). At the beginning of each session, the subjects were randomly assigned to one of the computer terminals. Some general instructions regarding the procedure were given on paper. The subjects were informed about the knowledge quiz and it was once again pointed out that their preparation of the text has a strong influence on their performance in this quiz and respective monetary earnings. After completing the quiz, the subjects received the instructions for the ultimatum game experiment. Next, they had to respond to test questions regarding the rules of the game up to three times, allowing us to verify that the participants understood the rules. The experiment started when there were no further questions to the experimenter. Communication was prohibited from that point onwards. After completing the ultimatum game experiment, subjects were individually paid at their seats at the end of the session.

The subjects were 92 undergraduate students of the University of Leipzig, recruited from a wide range of academic disciplines. 47 subjects were male and 45

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<sup>7</sup>We matched two players from two separate rooms according to their results in the quiz. We implemented two mechanisms: The rule "best against best" enhances the variance in the stake size and the rule "best against worst" the variance between subjects.

female. The experiment was conducted in two separate computerized laboratories. The subjects were matched such that the proposers and responders were located in separate rooms. Three of our experimental sessions consisted of twenty subjects, one of eighteen and one of fourteen subjects.<sup>8</sup>

## 5 Hypotheses

In the following, we present six hypotheses on normative conflict and explain their theoretical derivation thereafter.

**Hypothesis 1** *The average offer and the average acceptance threshold is higher than zero.*

The measurement of normative conflict requires that the participants have to perceive the ultimatum game as a norm-relevant situation. Thus, almost everybody has to believe that almost every other participant has a “normative” expectation and not a selfish one. A selfish expectation would correspond with the game theoretical concept of subgame-perfect equilibria: The selfish responder accepts every positive offer because a little amount is still better than facing the consequences of rejection by receiving nothing at all. The proposer anticipates the responders’ choice, offers the smallest positive amount, which is accepted by the responder. While the subgame-perfect equilibrium is rather straightforward, players with “normative” expectations will behave differently: Empirical results demonstrate that offers below 20 % of the cake are frequently rejected. This punishment of selfish behavior can be regarded as a consequence of the violation of a fairness norm. Proposers anticipate the potential punishment and may in addition comply with the fairness norm themselves so that low offers are rare and close-to-equal splits are the most frequent outcome (Roth, 1995; Cameron, 1999; Hoffman et al., 1996; Oosterbeek et al., 2004; Güth et al., 2007).

**Hypothesis 2** *The higher the responder’s effort, the higher the responder’s acceptance threshold and the higher the proposer’s offer.*

The normative conflict over contents requires two applicable norms. The norm of equal splits is usually observed in ultimatum bargaining experiments, in which endowments are supposed to compensate the efforts of the participants, i.e. the time spent in the lab (for an overview see Güth, 1995). These efforts are usually the same for all participants, so that the straightforward allocation norm is to

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<sup>8</sup>In sessions 1 and 4, fewer subjects than expected showed up.

split the cake equally. Our method of generating different efforts to obtain the endowment introduces effort as an additional normative criterion. This triggers the behavioral expectation of an equity norm. Thus, as a precondition of normative conflict, effort should have at least for some subjects a significant impact on the fairness decisions in the ultimatum game.

**Hypothesis 3** *The population is heterogenous in either adhering to equity or equality norms.*

The normative conflict over contents requires heterogeneity of the population in their adherence to different normative contents. In our context, some subjects have to adhere to the equity norm while others to the equality norm. This heterogeneity can be measured if some subjects evaluate effort as important for their offer and acceptance decisions (the “equity players”), while others do not consider it as important (the “equality players”).

**Hypothesis 4** *Both populations, the followers of equity and equality norms, are heterogenous in their commitment to their respective norm.*

The normative conflict over commitments requires that some actors believe that the norm ought strongly restrict the pursuit of the self-interest, while others expect only mild restrictions. We suspect that different levels of normative commitment occur in situations, in which norm targets and beneficiaries have opposing interests. Such asymmetric situations are given if a worse off beneficiary claims that she ought to be compensated by a better off target actor. The ultimatum game is an ideal representation of such asymmetric situations. Equity players with a low commitment do not fully compensate opponent’s additional effort, nor do equality players with a low commitment insist on as much as the equal split.

**Hypothesis 5** *The stronger the effect of effort, the lower the subjects’ average offer and acceptance threshold for responders with little effort.*

Further evidence that the population is heterogenous in either adhering to equity or equality norms can be obtained by the following implication: We expect a negative correlation between the subject’s adherence to equity rather than equality norms and her offer and acceptance threshold for responders with little effort.

**Hypothesis 6** *The larger the differences between the efforts of proposer and responder, the higher the probability of normative conflict.*

If a holder of an equity norm interacts with a holder of an equality norm, they have similar normative expectations for the case of similar effort levels. Therefore, the probability of normative conflict over contents increases with increasingly different levels of effort.

## 6 Results

### 6.1 Heterogeneous normative behavior on the macro level

First, we test hypotheses 1-5 on a higher level of aggregation (sec. 6.1). We continue our analysis with a more detailed investigation on the individual level (sec. 6.2). Subsequently, we investigate hypothesis 6 and whether the findings confirm our perspective on normative conflict (sec. 6.3).

Our statistical estimation results are based on multilevel models. These models quantify the impact of effort on the proposer's offer and on the responder's acceptance threshold and, more importantly, the variance in the subjects' level of normative commitment in their consideration of effort. The multilevel structure takes the clustering of the 21 decisions per subject into account.<sup>9</sup>

**Result 1** *In average, proposers offer considerable amounts of money and low offers are frequently rejected.*

The participants do understand the game as a norm-relevant situation. There is significant evidence that most players are guided by social norms rather than by playing the subgame perfect Nash equilibrium of offering and accepting the smallest possible amount: The intercept of the proposer shows that even for the case that the responder contributed nothing, proposers offer 33 % of the cake on average. Furthermore, the responders' positive intercept of 31 % in the fixed-effects part of the model reveals that the responders are punishing norm violations at own costs, supporting that responders perceive the ultimatum game as norm-relevant.

**Result 2** *The higher the responders' effort the higher their least accepted offer and the higher the proposers' offer.*

Result 2 supports our claim that at least some subjects regard the criterion of effort as norm relevant. In addition to the proposers' and responders' intercepts, the relative contribution to the common pool significantly affects both, the offer and the acceptance threshold: If a responder contributed the full cake, she receives a 29 % higher offer and has a 15 % higher acceptance threshold than if the proposer contributed the full cake. The empirical relevance of effort, therefore, provides the precondition for heterogeneity of normative expectations.

The random effects suggest that our subjects are heterogenous in their level of normative commitments and contents. This argument is supported by three results.

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<sup>9</sup>For multilevel analysis see Snijders and Bosker (1999) and Rabe-Hesketh and Skrondal (2005).

**Table 1.** Linear multilevel models for the impact of the responder's relative efforts on the proposer's relative offers and on the responder's relative acceptance thresholds.

	Proposer's relative offer	Responder's relative threshold
Fixed effects N=1931 decisions		
Intercept	0.33*** (0.021)	0.31*** (0.025)
Responder's relative effort	0.29*** (0.041)	0.15*** (0.037)
Random effects J= 92 subjects		
Standard deviation intercept	0.20*** (0.015)	0.24*** (0.018)
Standard deviation responder's effort	0.39*** (0.030)	0.35*** (0.027)
Correlation (responder's effort/intercept)	-0.84*** (-0.090)	-0.60*** (-0.065)
Log-Likelihood	2478.7	2950.4
Observations	1931	1931

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Note:** Effort, offers and acceptance thresholds are normalized. This normalization expresses the efforts of the responders relative to the efforts of the proposers (scaling from 0-1). Further, the offers and acceptance thresholds are expressed in relation to the cake sizes (scaling from 0-1).

**Result 3** *The population is heterogenous in the subjects' effects of effort on offers and acceptance thresholds.*

Result 3 is supported by the large and significant standard deviation of the responder's effort in the random effects part of table 1.

**Result 4** *The population is heterogenous in the subjects' average offers and acceptance thresholds.*

Result 4 is supported by the large and significant standard deviation of the intercept in the random effects part of table 1.

**Result 5** *There is a significantly negative correlation between the subjects' effects of effort and their average offers and acceptance thresholds.*

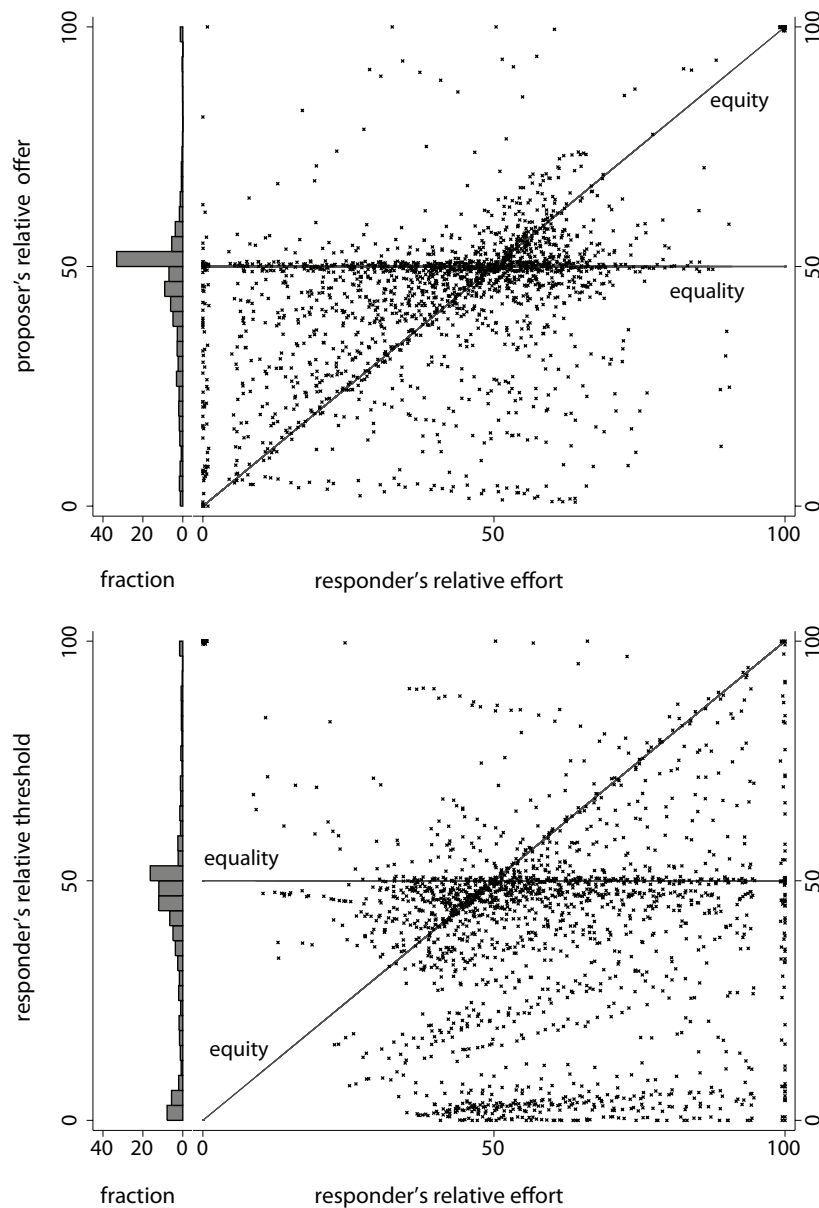
Result 5 is supported by the large and significant negative correlation between random slopes and intercepts in the random effects part of table 1.

Based on results 3 to 5, we conclude to the existence of three distinct types of normative behavior in our population: *Equality players* with high intercepts and low slopes, *equity players* with the inversed pattern of low intercepts and high slopes and *egoistic players* with low intercepts and low slopes. Moreover, the strong negative correlations between intercepts and slopes suggest that equality and equity players are more common than egoistic players.

In the following, we investigate the distinct types of normative behavior in more detail by exploring graphically all data points for the bivariate relation between effort and offer, and between effort and acceptance threshold. Figure 2 illustrates the proposers' offers (top) and responders' acceptance thresholds (bottom) for given responders' effort. In the top figure, it can be seen that most offers cluster around the two lines of equity norm and equality norm. We can regard the pure equity and equality norm as attractors or "focal points" in Schelling's sense. But not all proposers adhere to pure equity or equality norms. There are also a few "hyper-fair" offers (in the upper left corner). A large fraction of offers is located between the equity line and the equality line (lower left and upper right corner), or even below both lines (lower right corner). Thus, some proposers are biased by self-interest. Although some proposers enlarge their prospective share by giving moderately low offers, only a few play the subgame-perfect equilibrium solution and offer the minimal amount.

Among the responders, there are surprisingly many players who adhere to the equality norm and are willing to punish offers below 50 % with rejection. This is an unusual finding, as many previous studies report that offers of 40 % and above are almost always accepted. In contrast to the results for the proposers,





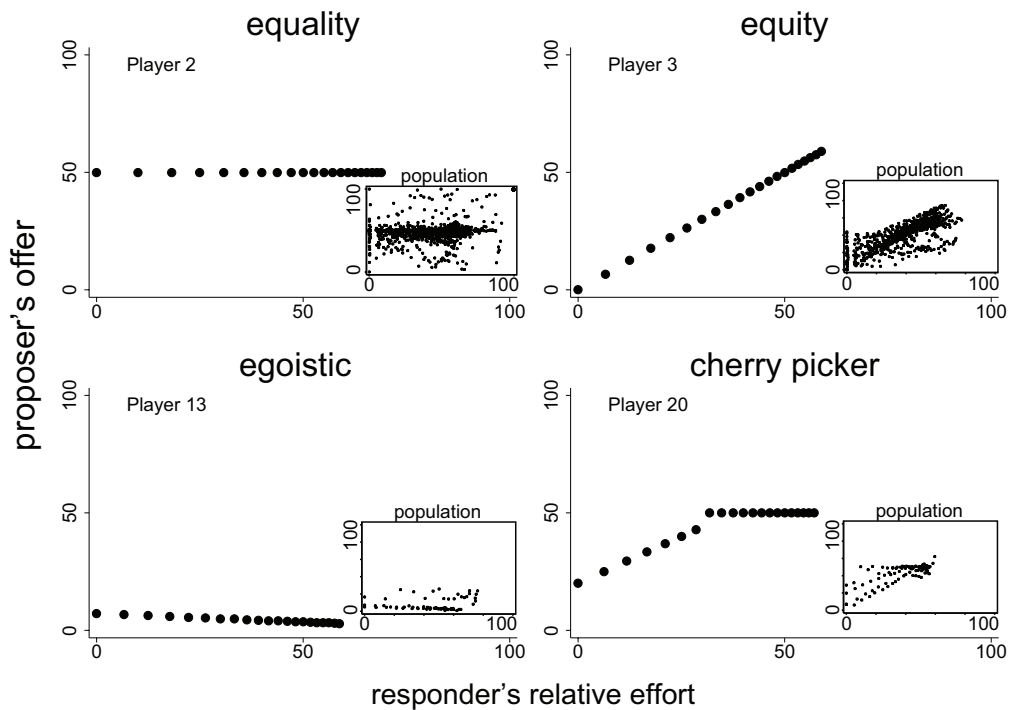
**Figure 2.** Proposer's relative offers as a function of the responder's relative effort (top) and responder's relative acceptance thresholds as a function of the responder's relative effort (bottom). The histograms on the left show the distribution of the relative height of offers and acceptance thresholds. The axis labels depict percentages. The distinct normative types are illustrated by additional lines for equality and equity norms. Most offers cluster around these lines, while there is considerable noise, too. Responders cluster less around the equity and equality lines. Responders show more risk-averse behavior than proposers, indicated by a third cluster of considerably low acceptance thresholds.<sup>15</sup>

the "attraction" to the pure equity and equality norm is not as strong for the responders. As a result, the variance in the responders' decisions is much higher. Further, the histogram on the left shows that 20 % of the acceptance thresholds are below 20 %. The respective players are willing to accept very low offers, sometimes even if they contributed much more than their proposer. We also find these patterns in the responders' scatter plot of figure 2, revealing a third cluster on the very bottom.

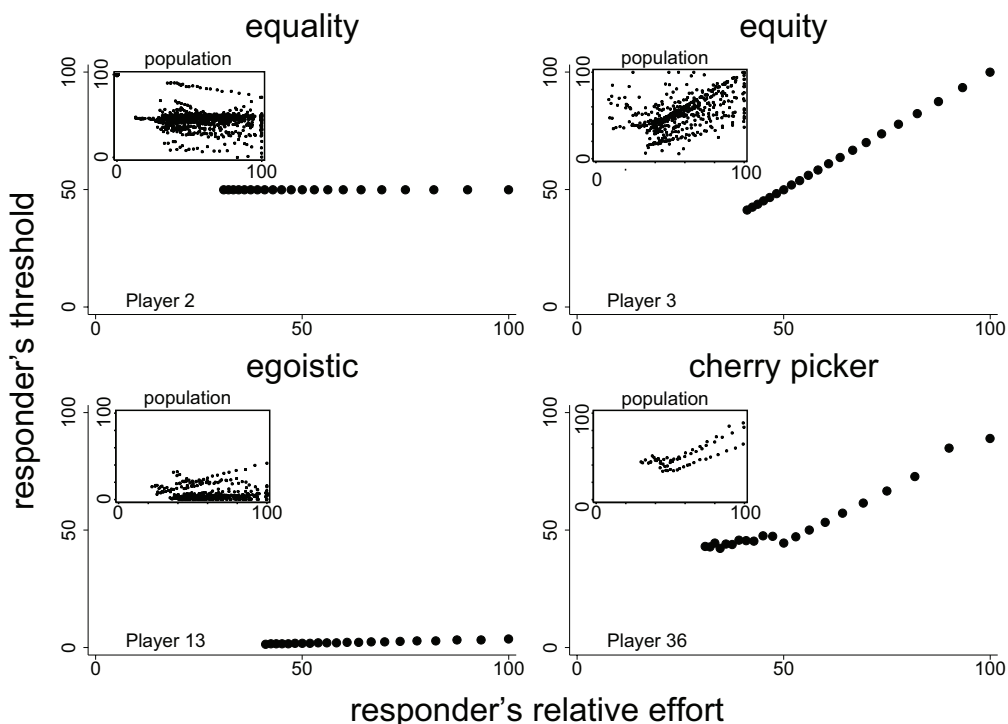
## 6.2 Distinct normative types on the micro-level

How can we understand the structures on the macro-level by micro-level behavior? We continue our evaluation of the necessary conditions of normative conflict by examining the individual decisions and find surprisingly clear patterns. Figure 3 depicts four characteristic proposer profiles and figure 4 four characteristic responder profiles. Player 2 (upper left) represents a pure equality player: In the role of the proposer (figure 3) and in the role of the responder (figure 4), player 2 offers and claims always 50 % of the pool, regardless of the differences in effort between proposer and responder. In the upper right part of figure 3 and 4, player 3 shows pure equity behavior. Player 3 offers always exactly as much as the responder's effort and always demands at least her effort as a responder. As a third type, we find players who play the subgame perfect Nash equilibrium. Player 13 (lower left) constantly offers and accepts the smallest possible positive unit of 0.50 Euro. Consequently, we call this player type the *egoist*. We found even another type, showing an interesting hybrid behavior between self-interest and norm-compliance. This fourth type plays according to the equity norm as long as she is a relatively high achiever, and switches to the equality norm if she is a relatively low achiever. See player 20 as a proposer and player 36 as a responder of this type on the lower right of figure 3 and 4. We call this players *cherry pickers*, as they seem to adhere to norms, but "pick" the particular norm, which serves their self-interest best.

Most of the players in our experiment followed consistently the pure characteristics of equity, equality, egoist or cherry picker, illustrated by the individual cases in figure 3 and 4. The player types have been categorized as follows. The offer function of an equality player is characterized by a slope between effort and offer of zero and intercepts the Y-axis at 50 %, the offer function of an equity player has a slope around 1 and intercepts the Y-axis at about 0 %. Egoists could be characterized by a slope as well as an intercept around zero, while cherry pickers have a low intercept and an intermediate slope, however the function is concave. In order to assign all subjects to the previously defined types, we developed a sorting algorithm based on OLS regressions. This approach classifies the individual strategies according to the respective intercept and slope. We categorized players



**Figure 3.** Offers of selected players. The larger figures depict individually observed strategies. We find 54% ( $n=50$ ) equality proposers (upper left), 39% ( $n=36$ ) equity proposers (upper right), 3% ( $n=3$ ) egoistic proposers (lower left) and 3% ( $n=3$ ) cherry picker proposers (lower right). The insets depict the superposition of all individual decisions in the population classified as belonging to the corresponding type.



**Figure 4.** Acceptance thresholds of selected players. We find 52 % (n=48) equality responder (upper left), 25% (n=23) equity responder (upper right), 20% (n=18) egoistic responder (lower left) and 3% (n=3) cherry picker (lower right). The insets depict the superposition of all individual decisions in the population classified as belonging to the corresponding type.

with a low slope and a high intercept as equality (see figure ?? in the appendix), with a low slope and a low intercept as egoist, with a high slope as equity and with a quadratic slope as cherry picker. We refer to the appendix for an extensive discussion of our sorting algorithm.

The insets in the figures 3 and 4 describe the resulting distribution of different proposer and responder types. More than half of the proposers adhere to equality norms and about 40 % to equity norms, while cherry pickers and egoistic proposers are the exception (3% each). Participants are more risk-averse if they are in the role of the responder: While 48 % adhere to the equality norm, the fraction of equity players is only 25 % and the fraction of egoistic responders reaches 20 %. The proportion of cherry pickers is again small (3 %) as a result of the strict definition.

### 6.3 The magnitude of normative conflicts

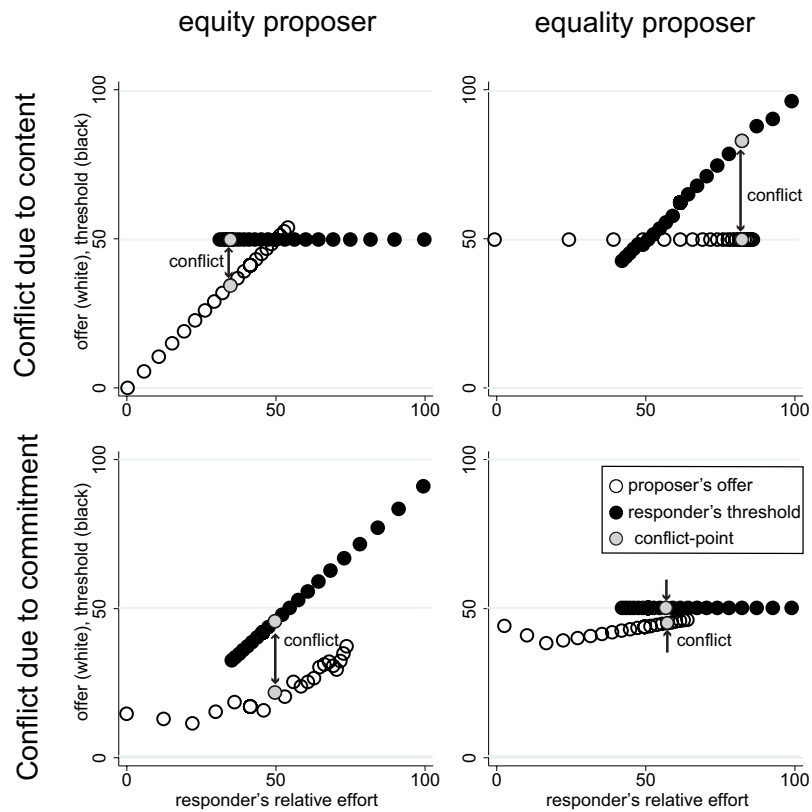
We will continue our analysis by illustrating how the previously shown heterogeneity on the micro-level fosters the emergence of normative conflict on the macro-level. Therefore, we will illustrate how normative conflict among players of different normative types is caused. The upper left and upper right panels of figure 5 reveal the existence of conflict over contents. The upper left panel pictures an equity proposer's offer and an equality responder's acceptance threshold. Conflict emerges because the proposer's adherence to the equity norm results in a lower offer than the equality responder is willing to accept. The same kind of conflict, though with reversed roles, is depicted in the upper right panel. Our second classification of normative conflicts results from different expectations regarding how strongly one ought to commit oneself to a norm, depicted in the lower panels of figure 5. The lower right panel describes the case of a proposer who commits herself only moderately to an equity norm, while her responder shows a strong commitment. The interaction results in conflict because the proposer's offer does not fulfill the responder's expectations. But already fairly small deviations from the norm can cause conflicts: In the lower right panel, two equality players interact. The conflict emerges because the proposer's offer is only slightly lower than one half, which was demanded by the responder.

In the following, we apply our terminology of normative conflict to the empirical analysis of conflict between the different strategy types. From now on, we focus only on equity and equality types because these types are the most prevalent cases in our data.<sup>10</sup> In the following statistical analysis, we take all possible interactions into account and not only those pairs, which have actually been matched in the experiment. Note that this procedure does not bias our results because every subject had to respond as a proposer and as a responder *before* they were actually assigned to a role and matched with their opponent, i.e. no learning effects could occur.<sup>11</sup> Thus, we can base our estimation on 8190 interactions because each of the  $n = 91$  subjects can be matched as a proposer with each of the other subjects as a responder, resulting in  $\frac{n(n-1)}{2} = 4095$  interactions. Vice versa, each subject can be matched as a responder with each of the other subjects as a proposer, resulting in additional  $\frac{n(n-1)}{2} = 4095$  interactions. As this procedure implies that each subject met several decisions that are not independent, we correct for inflated standard

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<sup>10</sup>The other types are too rare for the analysis of conflict: We identify 3 proposers and 3 responders as cherry-picker types and 3 proposers and 18 responders as egoistic types.

<sup>11</sup>We exclude one subject as an influential outlier, because this subject contributed zero to the pool and showed very extreme behavior with offering everything as a proposer and demanding everything as a responder. The previously reported results yield no differences for exclusion of this case.

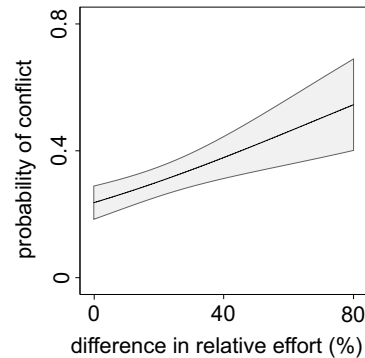


**Figure 5.** Representative empirical cases of normative conflict. The upper two figures illustrate typical cases of conflict due to different normative contents, where an equity proposer plays against an equality responder (upper left) or vice versa (upper right). The actual match (i.e. the “conflict point” determined by their relative efforts) is represented by the gray filling. The lower left figure illustrates the case of conflict due to different commitments between an equity proposer and an equity responder, the lower right figure between an equality proposer and an equality responder.

	conflict
intercept	-1.172*** (0.148)
difference in relative effort	0.017*** (0.005)
interactions	8190
clusters within subjects	91
Log-Likelihood	-4897.05

Standard errors in parentheses (clustered for subjects)

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



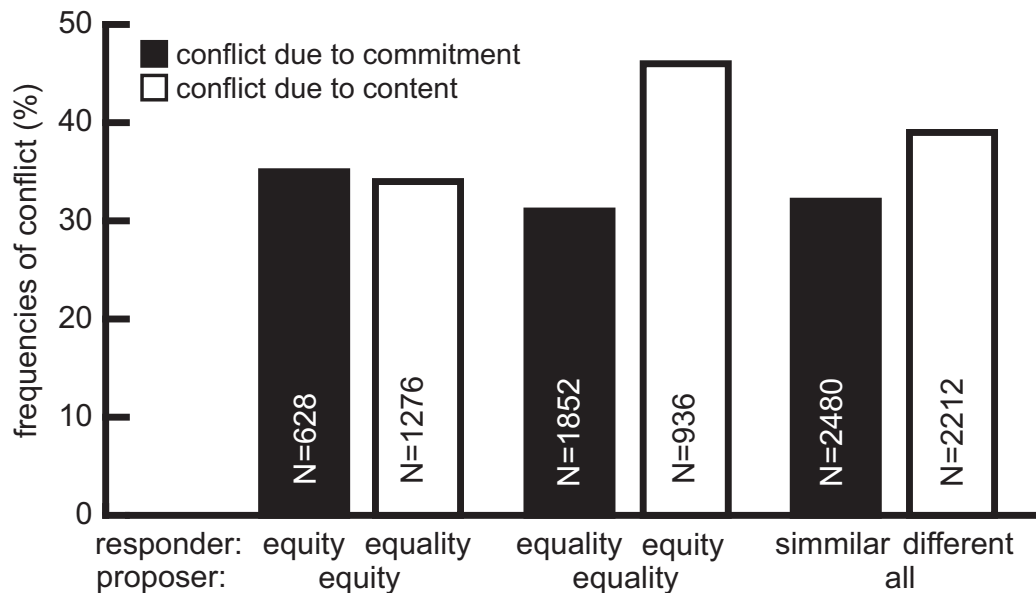
**Figure 6.** Logistic regression quantifying the impact of differential effort on conflict. The larger the differences in relative effort contributed to the common pool, the higher the probability of conflict. The table on the left reports logit estimates and standard errors, the figure on the right displays the corresponding changes in the probability of conflict. The grey area represents the 95 % confidence bounds for the logit coefficient “difference in relative effort”. Relative effort  $\epsilon_i$  is measured in percentages with the own contribution divided by the total contribution of the respective interaction between proposer  $i$  and responder  $j$ . We take absolute values of the differences in effort, i.e.  $|\epsilon_i - \epsilon_j|$ , and therefore do not differentiate whether the proposer or the responder contributed more. The number of interactions is calculated by all possible interactions between each subject in the role of the proposer and all other subjects in the role of the responder. Clustering of subjects in these interactions is taken into account by calculating robust standard errors.

errors with clustering for subjects. A comparable regression model that takes only actual matches into account yielded similar results, however, with larger standard errors.

So far, our analysis demonstrated the existence of heterogeneity in the population with regard to different norms of distributive justice. Subsequently, we identified distinct types of normative behavior on the micro-level and analyzed in which cases these types are prone to conflict. For identifying the probability of normative conflict among two players, we refer to hypothesis 6: As is illustrated in figure 1, the differences between the proposer’s and responder’s effort spark the conflict over the alternative norms. The normative conflict among an equality and an equity player increases with increasing differences in their levels of effort.

**Result 6** *The larger the differences between the proposer’s and responder’s efforts, the higher the probability of normative conflict, indicated by higher rejection rates.*

Result 6 is supported by figure 6 and the corresponding logistic regression



**Figure 7.** Frequency of conflict for the situation that the proposer and the responder adhere to different normative contents or different normative commitments. N denotes the absolute frequency of these respective situations. The y-axis denotes the relative frequency of the occurrence of conflict, measured by the rejection of the offer.

model. Note that the data refers to all potential interactions between all players in each role. The regression calculates the probability of conflict as a function of the difference in relative effort between proposer and responder.

Our findings confirm that normative conflict is significantly more likely for unequal effort levels. The probability plot on the left reveals that about 25 % of the subjects end up in conflict with similar efforts, while 55 % with dissimilar efforts, i.e. in which only one party contributed almost everything and the other almost nothing.

**Result 7** *The conflict due to different normative contents is more prevalent than the conflict due to different normative commitments.*

To support our result 7, we simulated the interactions of every proposer with every responder, using our empirical data. Figure 7 describes the relative frequencies of the different forms of normative conflict. Note that our concept of conflict over contents is the more prevalent source of conflict compared to the case of conflict due to different commitments. From 2212 interactions among holders



of different normative contents, 39 % (857 cases) end in rejection, while conflict emerges in only 32 % (782 out of 2480) of the interactions among holders of different levels of normative commitment. The percentage of content-related conflict is even higher if only equality proposers are considered (46 % or 426 out of 936 interactions), while the relative frequency of this type of conflict with an equality responder does not differ (31 % or 526 out of 1852). The picture is slightly different for equity proposers. Conflict arises in 217 out of 628 interactions (35 %) when the responder shares the proposer's norm, while 431 out of 1276 (34 %) fail if the responder adheres to a different normative content. Thus, the data supports our claim that the conflict due to different normative contents is quite an important notion in understanding the interrelation between social norms, cooperation and conflict.

## 7 Discussion

This paper outlines a new theoretical perspective on social norms, which considers conflict as an inherent element of norms. The heterogeneity of norms is a potential source of conflict, contrary to the largely discussed capability of norms to promote cooperation. Our empirical results are based on a strategy ultimatum game, in which actors apply different norms of distributional justice if they differ in their investments to a common project. A substantial fraction of our participants holds an equality norm and demands an equal share of the cake irrespective of their investments. Another, slightly smaller fraction holds an equity norm and demands the share that corresponds to their investment. We show the empirical relevance of normative conflict, when both players prefer to contribute to the common good of a "fair" share, but hold different norms regarding what they consider as fair. We explain this kind of disagreement by the adherence to different normative contents. Furthermore, our evidence demonstrates another source of normative conflict. Our empirical data reveal that the adherence to similar norms is by no means sufficient to achieve cooperation. In fact, people have to agree on the extend to which social norms should restrain their self-interests, i.e. people have to commit themselves towards a norm to a similar extend. Even though they might agree that, in principle, one should follow a specific norm, "undercutting" might be regarded as legitimate by some, while it displeases others. Thus, different degrees of normative commitment forms a second important source of normative conflict. Our experimental results show that the conflict due to different normative contents is more prevalent than conflict stemming from different normative commitments.

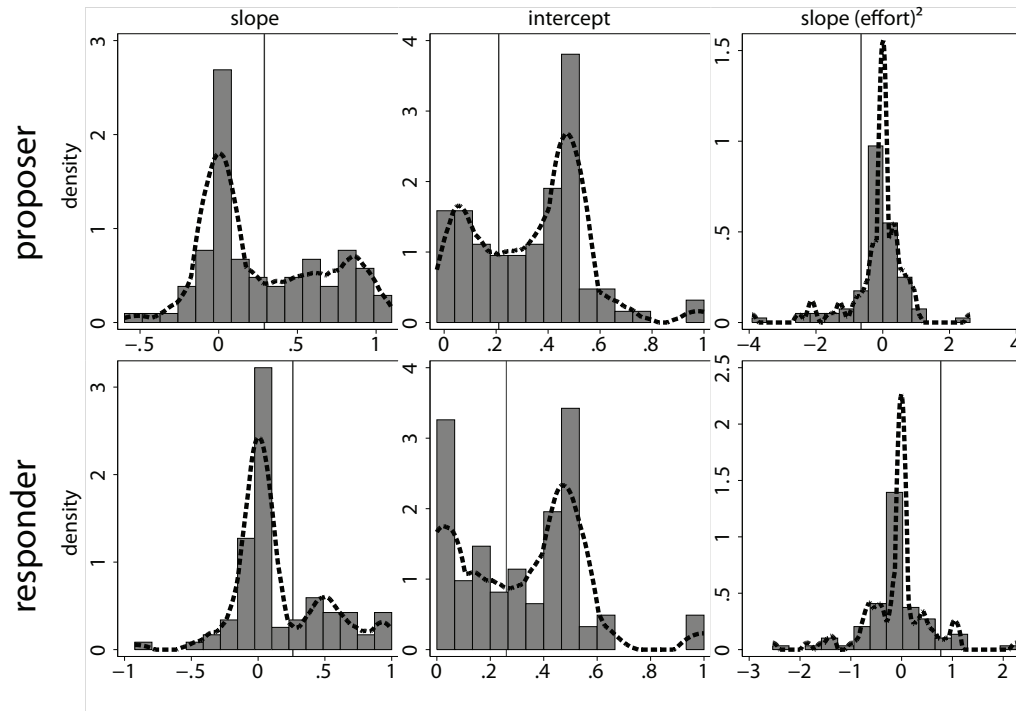
The "cultural diversity" of social norms is therefore remarkably ambivalent. On the one hand, the plurality of social norms can be enriching, refreshing and

may help the society to adjust to different situations and changing conditions. The recognition of alternatives to our habits and behavioral standards that are taken for granted opens our eyes for the arbitrariness of certain norms and for our often nonreflective tendency to follow traditional rules. This heterogeneity of normative behavior can stimulate creativity and innovation in society, triggering the increase of individual and public welfare. On the other hand, it is not sufficient for the accomplishment of cooperation, prosperity and social order that all members of society adhere to normative expectations. The coexistence of distinct norms can generate conflict despite cooperative intentions. Besides, power plays a crucial role in the determination of which behavioral expectations will last and prevail. There is a constant struggle in society to obtain the power to define those norms as valid that are most favorable for the own interests. This struggle is often accompanied with hypocritical rethorics to convince the disadvantaged to adhere to norms that promote seemingly great benefits. Due to the complexity of these social conflicts and cleavages, future research will have to address the relations between power, the internalization of norms and selfish behavior. Do, for instance, actors with higher incomes tend to pursue equity norms and actors with more power norms, holding exclusively for those with less power to benefit those with more? We need both, laboratory studies to test the theoretical relations on the micro-level, and surveys to evaluate the social structure of normative conflict. In conclusion, we believe that our new focus on normative conflict is fruitful in uncovering the double-edge of social norms in promoting cooperation on one side, but conflict on the other.

## Appendix

We have developed a sorting algorithm to assign each subject to a distinct strategy type of equity, equality, egoist or cherry picker. At first, we estimated two ordinary OLS regressions for each subject separately. The first univariate regression estimated the effect of each additional unit of relative effort on the proposer's offer (`slope`). Naturally, this regression as well returned a value for the intercept with the interpretation of the proposer's offer for the case that the responder contributed nothing (`intercept`). A second bivariate regression estimated the quadratic slope between effort and offer, adding the responders squared effort as an independent variable (`effort2`) A negative slope for `effort2` indicates cherry picker proposers, a positive slope of `effort2` cherry picker responders. Thus, all players can be categorized by the values of their `slope`, `intercept` and `effort2`.

In the next step, we define critical values to assign the subjects to distinct types. We estimated Epanechnikov kernel densities for the distribution of `slope`, `intercept` and `effort2` among all subjects. As can be seen in figure 8, the dis-



**Figure 8.** Kernel density estimations and histograms of the distribution of the individual regression parameters defining the critical values. The variables “slope” and “intercept” are determined using OLS regressions on the individual level (the player) with offer or acceptance threshold as dependent variable and responders relative effort as independent variable. The variable  $\text{effort}^2$  is determined using the same OLS regression and adding the squared effort as independent variable. The critical values are at the minimum density between the maxima of the bimodal distribution of “slope” and “intercept” and  $+1/-1$  standard deviation for responder/proposer for  $\text{effort}^2$ . The vertical lines describe the respective critical values.

tribution of `slope` and `intercept` is bimodal for responders and proposers. We define the critical values as the minimum between the two local maxima. The critical values for the proposers are `slope` = 0.29 and `intercept` = 0.21. The critical values for the responders are `slope` = 0.26 and `intercept` = 0.26. For most of the subjects, the additional quadratic term does not contribute explanatory power. This means that most subjects do not abandon their normative expectations, if stakes are raised. A straightforward method to choose the relevant critical value is to separate at one standard deviation above zero `effort`<sup>2</sup> = (0.77) for the responder and one standard deviation below zero `effort`<sup>2</sup> = (-0.65) for the proposer. By this, we assign only those subjects to the cherry picker type, who obviously play this strategy.

Consequently, subjects with the `slope` below the critical value and the `intercept` above the critical value will be called equality player. Those with the `slope` and the `intercept` below the critical value are egoistic types. If a proposer has a `slope` above the critical value and the player's `effort`<sup>2</sup> is above the critical value, the player is referred to as equity type. We call proposers who do not react on a squared effort (low slope of `effort`<sup>2</sup>) but show a strong reaction on additional effort of the responder (high `slope`) "cherry pickers". The definitions are the same for responders, but with two obvious minor adjustments: We call those players equity, who are *below* the `effort`<sup>2</sup> critical value, while players above this critical value are called "cherry pickers".

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## Authors contributions:

F.W. introduced the idea to study normative conflict and conducted the experiment. F.W. and H.R. elaborated the concept of normative conflict and the typology of inter- and intra-norm conflict, analyzed the data and wrote the manuscript. D.H. supervised the study, organized the scientific collaboration, edited the manuscript, improved the writing and contributed own ideas. All three authors developed the experimental design together.

## References

- Adams, J. Stacy. 1965. "Inequity in Social Exchange." *Advances in Experimental Social Psychology* 2:267–269.
- Bicchieri, Cristina. 1990. "Norms of Cooperation." *Ethics* 100:838–861.
- Blau, Peter M. 1964. *Exchange & Power in Social Life*. New Brunswick, London: Transaction Publishers.
- Cameron, Lisa A. 1999. "Raising the Stakes in the Ultimatum Game: Experimental Evidence from Indonesia." *Journal of Economic Inquiry* 37:47–59.
- Charness, Gary and Brit Grosskopf. 2001. "Relative payoffs and happiness: an experimental study." *Journal of Economic Behavior & Organization* 45:301 – 328.
- Coleman, James S. 1990. *Foundations of social theory*. Cambridge; London: The Belknap Press of Harvard University Press.
- Cook, Karen S. and Richard M. Emerson. 1978. "Power, Equity and Commitment in Exchange Networks." *American Sociological Review* 43:721–739.
- Cook, Karen S. and Karen A. Hegtvedt. 1983. "Distributive Justice, Equity, and Equality." *Annual Review of Sociology* 9:217–241.
- Deutsch, Morton. 2000. "Justice and conflict." In *The handbook of conflict resolution: theory and practice*, edited by Morton Deutsch, Peter T. Coleman, and Eric C. Magnus, pp. 43–68. Wiley, 2nd edition.
- Ellickson, Robert C. 1991. *Order without law*. Cambridge, Mass.: Harvard University Press.
- Elster, Jon. 1989. *The cement of society: A study of social order*. Studies in rationality and social change. Cambridge: Cambridge University Press. Jon Elster.
- Elster, Jon. 1992. *Local justice*. New York: Russell Sage Foundation.
- Falk, Armin and Urs Fischbacher. 2002. "'Crime' in the lab-detecting social interaction." *European Economic Review* 46:859–869.
- Fehr, Ernst and Simon Gächter. 2000. "Fairness and Retaliation: The Economics of Reciprocity." *Journal of Economic Perspectives* 14:159–181.

- Fehr, Ernst and Herbert Gintis. 2007. "Human Motivation and Social Cooperation: Experimental and Analytical Foundations." *Annual Review of Sociology* 33:43–64.
- Fischbacher, Urs. 2007. "Ztree- Zurich Toolbox for Ready-made Economic Experiments." *Experimental Economics* 10:334–352.
- Fischbacher, Urs, Simon Gächter, and Ernst Fehr. 2001. "Are people conditionally cooperative? Evidence from a public goods experiment." *Economics Letters* 71:397–404.
- Frohlich, Norman, Joe Oppenheimer, and Anja Kurki. 2004. "Modeling Other-Regarding Preferences and an Experimental Test." *Public Choice* 119:91–117.
- Fudenberg, Drew and Eric Maskin. 1986. "The folk theorem for repeated games with discounting and incomplete information." *Econometrica* 54:533–554.
- Gächter, Simon and Arno Riedl. 2005. "Moral Property Rights in Bargaining with Infeasible Claims." *Management Science* 51:249–263.
- Gantner, Anita, Werner Güth, and Manfred Königstein. 2001. "Equitable choices in bargaining games with joint production." *Journal of Economic Behavior & Organization* 46:209–225.
- Gross, Christiane and Peter Kriwy. 2008. "Fairness Judgements on the Allocation of Organ Donations - Results of a Factorial Survey." *Gesundheitswesen* 70:541–549.
- Güth, Werner. 1995. "On ultimatum bargaining experiments – A personal review." *Journal of Economic Behavior & Organization* 27:329–344.
- Güth, Werner, Carsten Schmidt, and Matthias Sutter. 2007. "Bargaining outside the lab - a newspaper experiment of a three-person ultimatum game." *The Economic Journal* 117:449–469.
- Güth, Werner, Rolf Schmittberger, and Bernd Schwarze. 1982. "An experimental analysis of ultimatum bargaining." *Journal of Economic Behavior & Organization* 3:367–388.
- Güth, Werner and Reinhard Tietz. 1986. "Auctioning Ultimatum Bargaining Positions - How to Act if Rational Decisions are Unacceptable." In *Current Issues in West German Decision Theory*, edited by R. W. Scholz. Frankfurt/M.: P. Lang.

- Harris, Richard J. 1976. "Handling negative inputs: On the plausible equity formulae." *Journal of Experimental Social Psychology* 12:194 – 209.
- Heckathorn, Douglas. 1989. "Collective Action and the Second-Order Free-Rider Problem." *Rationality and Society* 1:78–100.
- Helbing, Dirk. 1992. "Mathematical models for behavioral changes by pair interactions." In *Economic evolution and demographic change*, edited by G. Haag, U. Mueller, and K.G. Troitzsch, pp. 330–348. Springer.
- Hoffman, Elizabeth, Kevin McCabe, Keith Shachat, and Vernon Smith. 1994. "Preferences, Property Rights, and Anonymity in Bargaining Games." *Games and Economic Behavior* 7:346–380.
- Hoffman, Elizabeth, Kevin McCabe, and Vernon Smith. 1996. "On expectations and the monetary stakes in ultimatum games." *International Journal of Game Theory* 25:289–301.
- Homans, George Caspar. 1961. *Social behavior*. New York: Harcourt, Brace & World.
- Jasso, Guillermina and Bernd Wegener. 1999. "Gender and Country Differences in the Sense of Justice: Justice Evaluation, Gender Earnings Gap, and Earnings Functions in Thirteen Countries." *International Journal of Comparative Sociology* 40:94–115.
- Konow, James. 1996. "A positive theory of economic fairness." *Journal of Economic Behavior & Organization* 31:13 – 35.
- Konow, James. 2003. "Which Is the Fairest One of All? A Positive Analysis of Justice Theories." *Journal of Economic Literature* 41:1188–1239.
- Lewis, David. 1969. *Convention: A Philosophical Study*. Wiley-Blackwell.
- Liebig, Stefan and Roland Verwiebe. 2000. "Attitudes towards social inequality in East Germany: Argumentation for an expanded perspective." *Zeitschrift für Soziologie* 29:3–26.
- Lissowski, Grzegorz, Tadeusz Tyszka, and Włodzimierz Okrasa. 1991. "Principles of Distributive Justice: Experiments in Poland and America." *Journal of Conflict Resolution* 35:98–119.
- Lundberg, Shelly and Robert A. Pollak. 1996. "Bargaining and Distribution in Marriage." *Journal of Economic Perspectives* 10:139–158.

- Mikula, Gerold. 1972. "Gewinnaufteilungsverhalten in Dyaden bei variiertem Leistungsverhältnis." *Zeitschrift für Sozialpsychologie* 3:126–133.
- Mikula, Gerold and Hans Uray. 1973. "Die Vernachlässigung individueller Leistungen bei der Lohnaufteilung in Sozialsituationen." *Zeitschrift für Sozialpsychologie* 4:136–144.
- Molm, Linda D., Nobuyuki Takahashi, and Gretchen Peterson. 2000. "Risk and Trust in Social Exchange: An Experimental Test of a Classical Proposition." *The American Journal of Sociology* 105:1396–1427.
- Morgan, William and Jack Sawyer. 1967. "Bargaining Expectations and Preference for Equality over Equity." *Journal of Personality and Social Psychology* 6:139–149.
- Oosterbeek, Hessel, Randolph Sloof, and Gijs van de Kuilen. 2004. "Cultural Differences in Ultimatum Game Experiments: Evidence from a Meta-Analysis." *Experimental Economics* 7:171–188.
- Opp, Karl-Dieter. 2001. "Norms." In *International Encyclopedia of Social and Behavioral Sciences*, edited by Paul B. Baltes and Neil J Smelser, pp. 10714 – 10720. Amsterdam: Elsevier.
- Ostrom, Elinor, James Walker, and Roy Gardner. 1992. "Covenants With and Without a Sword: Self-Governance is Possible." *American Political Science Review* 86:404–417.
- Rabe-Hesketh, Sophia and Anders Skrondal. 2005. *Multilevel and Longitudinal Modeling Using Stata*. Stata Press.
- Raub, Werner. 2004. "Hostage Posting as a Mechanism of Trust: Binding, Compensation, and Signaling." *Rationality and Society* 16:319–365.
- Raub, Werner and Thomas Voss. 1986. "Die Sozialstruktur der Kooperation rationaler Egoisten. Zur utilitaristischen Erklärung sozialer Ordnung." *Zeitschrift für Soziologie* 15:309–323.
- Raub, Werner and Jeroen Weesie. 1990. "Reputation and Efficiency in Social Interactions: An Example of Network Effects." *The American Journal of Sociology* 96:626–654.
- Rauhut, Heiko and Marcel Junker. 2009. "Punishment Deters Crime Because Humans Are Bounded in Their Strategic Decision-Making." *Journal of Artificial Societies and Social Simulation* 12:1.



- Rauhut, Heiko and Ivar Krumpal. 2008. "Die Durchsetzung sozialer Normen in Low-Cost und High-Cost Situationen." *Zeitschrift für Soziologie* 5:380–402.
- Roth, Alvin E. 1995. "Bargaining experiments." In *The handbook of experimental economics*, edited by John H. Kagel and Alvin E. Roth, pp. 253–348. Princeton University Press.
- Selten, Reinhard. 1967. "Die Strategiemethode zur Erforschung des eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperimentes." In *Beiträge zur experimentellen Wirtschaftsforschung*, edited by Heinz Saueremann. Tübingen: J. C. B. Mohr (Paul Siebeck).
- Snijders, Thomas A. B. and Roel J. Bosker. 1999. *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*. London, Thousand Oaks, Calif.: Sage Publications.
- Spence, Andrew M. 1974. *Market signaling: Informational transfer in hiring and related screening processes*. Cambridge, Mass.: Harvard University Press.
- Taylor, Michael. 1987. *The possibility of cooperation*. Cambridge: Cambridge University Press.
- Ullmann-Margalit, Edna. 1977. *The Emergence of Norms*. Oxford: Clarendon.
- Voss, Thomas. 2001. "Game-Theoretical Perspectives on the Emergence of Social Norms." In *Social norms*, edited by Michael Hechter and Karl-Dieter Opp. New York: Russell Sage Foundation.
- Yamagishi, Toshio. 1986. "The Provision of a Sanctioning System as a Public Good." *Journal of Personality and Social Psychology* 51:110–116.
- Young, H. Peyton. 1993. "The Evolution of Conventions." *Econometrica* 61:57–84.