Strategic (Corporate) Social Responsibility

Inaugural Dissertation

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Chapter 1

Introduction

Corporate Social Responsibility (CSR) has become a common concern for many firms as well as their customers (Benn and Bolton, 2011, KPMG, 2017). The term refers to all social and environmentally friendly activities of a firm beyond its legal requirements (Kitzmueller and Shimshack, 2012). Different motives for CSR have been identified in the literature (see, e.g., Baron, 2001, Bénabou and Tirole, 2010, Garriga and Melé, 2004). Essentially, these can be divided into two major types of reasons for engaging in CSR: altruistic and strategic motives.

This dissertation deals with the strategic use of (corporate) social responsibility, whether and how it offers an advantage for its user, and the effects on other (market) participants and welfare. A large amount of literature deals with studies examining the relationship between CSR and firms' financial performance. The results of these analyses differ depending on the data set, the specific variables considered, the time horizon, and further aspects of the industry examined. For example, Eccles et al. (2014), Jo and Harjoto (2011), and Flammer (2015a) find a positive effect of CSR on profitability, whereas López et al. (2007) find a negative effect and meta-analyses suggest a neutral effect (Margolis et al., 2009, Margolis and Walsh, 2003). Nonetheless, the huge interest in this topic and answers to big surveys on the use of CSR (KPMG, 2017, PwC, 2016) suggest that many firms use CSR for strategic purposes and hope that this investment will pay off.

Different possibilities of how CSR can be used strategically to gain an advantage exist. In this dissertation, I focus on two common approaches to explaining strategic CSR in the literature: CSR as a commitment to a higher output in competition with other firms and CSR as a means for product differentiation.[1]

Several studies have modeled CSR as a weight on consumer surplus in firms' objective function (e.g., Fanti and Buccella, 2017c, Goering, 2008a, Kopel, 2015, Kopel and Brand, 2012, Leal et al., 2019). In many of those, whether or to what extend a firm engages in CSR is exogenously given (which may imply altruistic motives among the firms' owners or managers). A strategic choice of CSR and its level by all firms is not modeled. In other models, the choice of being a CSR firm is endogenous or evolutionary while the level of CSR is still exogenously given (Kopel and Lamantia, 2016, Kopel et al., 2014).

[1] Other models interpret CSR as the private provision of a public good (e.g., Bagnoli and Watts, 2003, Kotchen, 2006), a commitment to an environmentally friendly production technology (Goering, 2010) or taking workers (as one stakeholder group) into account (Becchetti et al., 2016).

However, Kopel and Brand (2012) show that a CSR firm in Cournot competition with a competitor which sticks to maximizing its profit can gain a competitive advantage and there exists a CSR level that maximizes the CSR firm's profit. The main intuition behind this is that a firm that commits itself to taking consumer surplus into account thereby commits to producing a higher quantity. As quantities are strategic substitutes, the firm's competitors will react by reducing their output and thus the CSR firm can gain a higher profit. A firm can thus strategically choose a CSR level, i.e., a weight on consumer surplus in its objective function, that maximizes its profit. This type of strategic CSR does not depend on consumers' willingness to pay for responsibly produced products.

These results rely on the fact that some firms do not strategically use CSR. However, since CSR promises higher profits, in principle an incentive to engage in CSR exists for all firms.[2] The pharmaceutical firm GlaxoSmithKline had decided to engage in CSR by selling higher quantities of their products at smaller prices in the least developed countries, making medicine more easily available to many people and hoping to gain a competitive advantage from this strategy. Other firms became aware of the opportunities of such a strategy and followed GlaxoSmithKline's example.[3] The articles presented in Chapters 2 to 4[4] of this dissertation thus consider a free choice of the CSR level of all firms in a given market. These articles are joint work with Marco Sahm. In Chapters 2 to 4, the decisions of all firms are based on the following general objective function:

$$V_i = \pi_i + \theta_i \cdot CS = (1 - \gamma \sum_{j=1}^{n} q_j - c_i)q_i - F - K_i + \frac{1}{2}\theta_i(\sum_{j=1}^{n} q_j)^2, \tag{1.1}$$

where π_i is the profit of firm i, θ_i is the CSR level of firm i (the share of consumer surplus taken into account), CS is consumer surplus, γ is the parameter measuring the substitutability/complementarity of goods, n is the number of firms, q_i is the quantity of firm i, c_i is the per-unit cost of production of firm i, F is the fixed cost of production, and K_i is the fixed cost of engaging in CSR. The general decision structure is the same in all three chapters. A firm first chooses the CSR level θ_i which maximizes its profit and then it (or its manager) maximizes the resulting objective function in order to choose the firm's quantity. We solve by backward induction.

In the article "Strategic Corporate Social Responsibility, Imperfect Competition, and Market Concentration" in Chapter 2, we initially assume that $\gamma = 1$, $c_i = 0$, $F = 0$ and $K_i = 0$. We thus consider symmetric firms in Cournot competition with homogeneous goods. We find that firms will choose a positive CSR level for any number of active firms n, but the level decreases as the number of firms rises. As all firms engage in CSR, all firms increase their quantity and thus the price drops. The equilibrium profits are thus smaller than in an equilibrium where all firms abstain from CSR. The individual incentive to use strategic CSR thus leads to a prisoner's dilemma situation. If we assume

[2]For an example, where this is taken into account, see Fanti and Buccella (2018).

[3]For more information, see http://uk.reuters.com/article/uk-glaxosmithkline-africa-idUKBRE8720A020120803 or http://www.fiercepharma.com/pharma/gsk-tries-volume-goodwill-over-margins-africa.

[4]Note that Chapters 2 to 4 correspond to already published articles. They have been adapated for this dissertation by updating the literature to new versions of articles and harmonizing the use of terms.

positive values of F and consider the long-run implications of all firms adopting CSR, we can show that the number of active firms will not exceed the number of firms that would be in the market if firms did not engage in CSR. Rather, there even exist values of F, for which the adoption of CSR leads to negative profits and some firms have to leave the market. In such a case, CSR eventually lowers aggregate output and raises profits of the remaining firms. Consumer surplus decreases and total surplus net of fixed costs rises under this market consolidation.

We also consider a Cournot duopoly with heterogeneous goods with $-1 \leq \gamma \leq 1$, $c_i = 0$, $F = 0$ and $K_i = 0$. We find that the CSR level increases in the level of substitutability and complementarity of the goods. It is zero if markets are independent and, therefore, firms cannot gain a competitive advantage. Under substitutability, profits are lower when firms adopt CSR than if they do not because CSR further intensifies competition (as with homogeneous goods). Under complementarity, however, the adoption of CSR helps to internalize the positive mutual externalities on demand and, therefore, increases profits. In Bertrand competition, firms will not engage in CSR as it would imply a commitment to lower prices which is not desirable.

While, in general, a commitment to a higher quantity is not beneficial for a monopolist, it may be useful if the monopoly is threatened by the potential entry of another firm. In such a case, a monopolistic incumbent can profitably use CSR to deter entry. The commitment to a higher production quantity decreases the entrant's potential profits and thus keeps the entrant from incurring the entry costs. The effect on consumer surplus depends on the level of entry costs. If entry is accommodated, both firms engage in CSR and consumer surplus rises. Also if entry is deterred, but the entry costs are rather low, consumer surplus increases since the monopolist has to exert very high CSR effort. For higher entry costs and entry deterrence, consumer surplus decreases as the positive effect of CSR on output is outweighed by the negative effect of increasing market concentration. As the entrant may also use CSR, this threat increases the threshold of entry costs for which entry is blockaded. For the range of entry costs, for which the incumbent also has to deter entry due to the entrant's threat to use CSR, consumer surplus thus also rises. This is because, under blockaded entry, the monopolist does not engage in CSR.

Chapter 3 consists of the article "Strategic CSR in Asymmetric Cournot Duopoly." We assume that $n = 2$, $\gamma = 1$, and $F = 0$. Also, $K_i = 0$ is assumed in the first part of the calculation. For the per-unit cost it holds that $c_1 = 0$ for firm 1 and $c_2 = c$ with $0 \leq c \leq 1$ for firm 2. For this asymmetric duopoly, we find that in equilibrium the more efficient firm chooses a higher CSR level than the other firm and earns a higher profit. More specifically, the higher the cost differential, the higher the optimal θ_1^* of the efficient firm and the lower θ_2^* of the inefficient firm. If the cost differential is too high, the less efficient firm will leave the market. In the next part of the calculation, we additionally assume that there exist fixed costs of engaging in CSR, $K_i = Z$, which only accrue if a firm chooses a positive level of CSR. This may be the case if, e.g., the firm has expenses for obtaining a CSR label or issuing a CSR report. We can show that in the presence of fixed CSR costs, different equilibria may exist depending on the level of Z and c. Next to equilibria in which both firms or neither firm engages in CSR, we also find equilibria in which only the efficient or only the inefficient firm chooses a positive CSR level. In

the latter equlibria, one of the firms "takes the lead" and commits to a high quantity via CSR making the costly CSR investment unattractive for the other firm. Our finding contributes to explaining why markets with coexisting CSR and non-CSR firms exist, although generally there is an incentive to engage in CSR for all firms in a market.

In Chapter 4, we show in the article "Why Firms Should Care for All Consumers" that firms prefer strategic CSR also to another corporate culture. We compare CSR to customer orientation (CO), which implicates taking the wishes and needs of a firm's own customers into account. The respective objective function of a CO firm is given by

$$V_i^C = \pi_i + \theta_i^C \cdot C_i, \tag{1.2}$$

where θ_i^C is the level of customer orientation and $C_i = \frac{1}{2} \cdot q_i^2$ is the surplus of firm i's customers. A CSR firm's objective function is still given by equation (1.1) with $\gamma = 1$, $c_i = 0$, $F = 0$ and $K_i = 0$. The firms, here, first choose the corporate culture maximizing their profits. Afterwards they choose the level of the respective corporate culture that maximizes their profits and, thereafter, the quantity maximizing their objective function. Solving by backward induction, we consider the three possible resulting cases, i.e., a duopoly with two CSR firms, with two CO firms, or one CSR and one CO firm. We show that, in the first stage, both firms prefer to choose CSR as their corporate culture. CSR levels are strategic substitutes whereas CO levels are strategic complements and thus CSR firms act less aggressive towards each other leaving each of them higher profits. If we consider the choice of the corporate culture and its level as a single choice instead, we find three further equilibria with two CO firms or one CSR and one CO firm. The pure CSR equilibrium, however, Pareto-dominates the pure CO-equilibrium and in the asymmetric equilibria the CSR firm earns a higher profit than the CO firm. CSR thus outperforms CO, providing another explanation for the growing prevalence of Corporate Social Responsibility.

Another approach to strategic CSR is to consider it a type of product differentiation. In the literature several studies exist which model CSR as a property of the good produced by the socially responsible firm, which (some) consumers prefer to the other variations of the good offered in the market or are willing to pay more for than for the other product variants (e.g., Baron, 2009, García-Gallego and Georgantzís, 2009, Liu et al., 2015, Manasakis et al., 2013). In addition, experimental markets with socially responsible sellers have been analyzed with mixed evidence on whether consumers are willing to pay more for these sellers' products which are connected to a donation (Etilé and Teyssier, 2016, Feicht et al., 2016). To put these findings more generally, strategic CSR activities often build on the premise that these are desired by opposing parties. The user of CSR thus hopes to gain an advantage. In Chapter 5, I consider the strategic use of social responsibility in a bargaining experiment in the article "Strategic Social Responsibility in Three-Party Ultimatum Games." Participants took part in one of three treatments. One treatment consists of a regular ultimatum game (Baseline treatment). A proposer chooses a division of a given amount of points between herself and a responder. The responder decides whether to accept the division in which case the chosen allocation is paid out or to reject in which case both receive zero points. In the other two treatments,

participants play a three-party ultimatum game. The proposer chooses a division between herself, the responder, and a third party, which is an NGO (NGO treatment) or a third person in the lab (TP treatment). If the responder accepts, the proposed allocation is paid out. If the responder rejects, all three receive zero points. In all treatments, the subgame-perfect equilibrium with payoff-maximizing players and common knowledge about this would suggest that the proposer offers the smallest possible positive amount to the responder and that the responder accepts this.[5] For the third party, the proposer should offer zero because the third party has no bargaining power.

Experiments on (three-person) ultimatum games, however, show that responders frequently receive higher amounts and frequently reject if they deem offers too low. Also third persons often receive positive and sometimes even substantial amounts. This leads to my hypothesis that proposers may use offers for the third party as a strategic, socially responsible action if they believe that responders approve of it and are thus less likely to reject the proposal. As the set-up of this experiment is rather general and not explicitly connected to a market situation, I call this behavior social responsibility without the prefix "corporate." However, the experiment sheds light on behavior in similar bargaining situations in reality, such as wage bargaining between a (proposing) employer which could be a firm and a (responding) future employee.

I find that proposers in the TP treatment try to use social responsibility strategically. Their offers imply similar shares for themselves as in the Baseline treatment while they propose substantial shares for the third person and smaller shares for the responders than in the other treatments. While proposers in the NGO treatment propose smaller shares for themselves the stronger their social preferences, proposers in all treatments increase their proposed shares over time. I can also show that, while responders' probability to accept an offer depends positively on their own share, it also positively depends on the offer for the third party in both three-party treatments, but to a smaller extend. Social responsibility is thus not as efficient as increasing the responder's share if the proposer wants the responder to accept. In the TP treatment, where offers to the third party are especially high, rejection rates are highest. Proposers in both three-party treatments earn lower payoffs than proposers in the Baseline treatment. However, proposers in the TP treatment succeed in earning higher relative payoffs, measured by the difference between the proposer's and the responder's share, than proposers in the other treatments. Strategic social responsibility thus proves to be useful in this respect.

In this dissertation I consider the use of strategic (corporate) social responsibility in many different scenarios. Chapters 2 to 4 show that if CSR acts as a commitment to a higher quantity, there is an incentive to use CSR strategically for all firms in many different competitive environments where firms compete in quantities and also if the alternative corporate strategy of customer orientation is available. This explains the growing number of firms engaging in CSR. However, in an asymmetric duopoly in the presence of fixed costs, we may also observe equilibria in which only one firm adopts CSR, which may explain why we also observe markets in which CSR and non-CSR firms coexist. In a bargaining environment, where the usefulness of CSR depends on the

[5] Another subgame-perfect equilibrium entails the proposer suggesting zero and the responder accepting this offer.

opponent's approval of socially responsible behavior, proposers strategically engage in socially responsible offers for the third person. Responders also indeed appreciate this socially responsible behavior, though the size of their own share is more important.

Consequently, engagement in CSR does not necessarily lead to higher profits. In the modelling context of Chapters 2 to 4, a firm profits from CSR if it induces a higher market concentration by driving firms out of the market (in the long run or due to high differences in efficiency) or keeping them from entering (via entry deterrence) and if CSR helps to internalize the positive mutual externalities on demand of complementary goods. Strategic CSR also leads to higher profits than the strategic use of CO. In the experimental ultimatum game of Chapter 5, the usefulness of strategic social responsibility is limited. In the TP treatment, rejections rates are rather high such that proposers cannot gain higher absolute payoffs by strategically using CSR than proposers in the Baseline treatment. However, proposers in the TP treatment earn higher relative profits compared to responders than proposers in the other treatments. Just as in the asymmetric duopoly, strategic social responsibility can thus be used to increase one's relative advantage.

Strategic CSR can also influence market concentration. In oligopoly, firms are driven out of the market if CSR as a commitment to a higher output leads to smaller prices and firms can no longer pay their fixed costs. In asymmetric duopoly, we show that the less efficient firm may be driven out of the market, i.e., we experience market consolidation. A monopolist can defend its market position deterring entry via strategic CSR. This raises the question of how welfare is affected. Generally, taking a share of consumer surplus into account clearly raises consumer surplus compared to a market with non-CSR firms. However, we find that consumer surplus can also be negatively affected if market concentration rises under oligopoly or entry deterrence (depending on the entry costs) and CSR thus has a different effect than promised. By contrast, welfare net of fixed or entry costs is influenced positively in these cases. In the ultimatum game experiment, the use of strategic social responsibility also influences the distribution of payoffs. In the TP treatment, proposers distribute substantial shares to third persons at the expense of responders. Furthermore, the possibility of strategic donations to the third party increases uncertainty about the strategically optimal proposal. In the worst case, welfare can be completely destroyed if the bargainers do not come to an agreement and the responder rejects the proposal.

This dissertation shows that strategic (corporate) social responsibility can have undesired effects. These are, however, rather dependent on, e.g., the market and cost structure or individual's willingness to accept in the presence of strategic social responsibility. This may also explain why empirical studies find opposing effects of CSR on firms' financial performance. Governments planning to promote CSR[6] should thus gain more information on the markets which they wish to target in order to be sure that this is really in the interest of the public.

[6]For example, the European Commission promotes the adoption of CSR by companies in the EU, see, e.g., European Commission (2011).

Chapter 2

Strategic Corporate Social Responsibility, Imperfect Competition, and Market Concentration

Lisa Planer-Friedrich and Marco Sahm

Abstract

We examine the strategic use of Corporate Social Responsibility (CSR) in imperfectly competitive markets. Before firms decide upon supply, they choose a level of CSR which determines the weight they put on consumer surplus in their objective function. First, we consider Cournot competition and show that the endogenous level of CSR is positive for any given number of firms. However, positive CSR levels imply smaller equilibrium profits. Second, we find that an incumbent monopolist can use CSR as an entry deterrent. Both results indicate that CSR may increase market concentration. Finally, we show that CSR levels decrease as the degree of product heterogeneity increases in Cournot competition and are zero in Bertrand Competition.

Keywords: Corporate Social Responsibility, Cournot Competition, Market Concentration, Entry Deterrence, Strategic Delegation, Bertrand Competition

JEL classification: D42, D43, L12, L13, L21, L22

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2.1 Introduction

Corporate Social Responsibility (CSR) has become a major concern for many firms, particularly large ones (Benn and Bolton, 2011, KPMG, 2015). It refers to all social and environmentally friendly activities of a firm beyond its legal requirements (Kitzmueller and Shimshack, 2012). Among the various motives for CSR, its strategic use in markets with imperfect competition plays an important role (Baron, 2001, Bénabou and Tirole, 2010, Garriga and Melé, 2004). The basic idea is that even pure profit-maximizing firms engage in CSR because it may serve as a commitment device for their strategy choices in oligopolistic environments. Based on this notion, this chapter investigates the interplay between the market structure and the level of firms' social concern. We find a mutual impact: On the one hand, higher market concentration leads to higher levels of CSR. On the other hand, the strategic use of CSR increases market concentration.

We employ a simple model of a market for some homogeneous good with linear demand and constant marginal costs. Competition between the intrinsically profit-maximizing firms is modeled as a two-stage game. In the first stage, firms strategically choose their level of CSR determining the weight with which consumer surplus enters their objective function in addition to profits. In the second stage, the (managers of the) firms decide upon supply in order to maximize their objective function. We examine two different scenarios.

In the first scenario, we consider Cournot competition between symmetric firms and characterize the subgame-perfect equilibrium (SPE). We find that the equilibrium level of CSR is positive for any given number of active firms, but decreases as this number rises. Moreover, for any given number of firms, the equilibrium profits will, in the short run, be smaller than in the regular Cournot model without CSR. In the presence of fixed costs, this leads to the conclusion that, in the long run, the strategic use of CSR may reduce the number of active firms and foster market concentration.

These findings imply opposing long run effects on consumer surplus and welfare. On the one hand, the lower number of active firms, ceteris paribus, reduces overall output. On the other hand, the positive CSR levels, ceteris paribus, increase output. Moreover, the lower number of active firms reduces aggregate fixed costs and mitigates the problem of excessive market entry (Amir et al., 2014, Mankiw and Whinston, 1986). Thus there is no general answer to the question whether strategic CSR is socially desirable or may even be anticompetitive.

In the second scenario, we consider a market with an incumbent monopolist and one potential entrant. Here, the first stage of the game is split into two sequences: First the incumbent chooses its CSR level, then the potential entrant decides whether to incur the entry cost and, if so, which CSR level to enter with. Finally, in the case of entry, the second stage of the game again consists in Cournot competition between the two firms.

We show that the strategic use of CSR yields a pattern that is well-known in models of entry deterrence (Dixit, 1980, Maskin, 1999, Spence, 1977): If entry costs are sufficiently high, entry will be blockaded and the incumbent will not engage in CSR because CSR is not profitable for a monopolist as such. However, for an intermediate range of entry costs, the incumbent finds it optimal to choose positive levels of CSR in order to deter

entry. This observation reinforces our conclusion that the strategic use of CSR increases market concentration. Finally, if entry costs are sufficiently low, the incumbent will prefer to accommodate entry. In this case, both the incumbent and the entrant choose positive CSR levels with the former as the leader setting a higher level than the latter as the follower.

In the model of entry deterrence, our results imply the same opposing welfare effects of CSR as in the model of Cournot competition. We must trade off the negative output effect of higher market concentration against the positive output effect of positive CSR levels and, with respect to total surplus, the positive effect of saved entry costs. A closer analysis shows that total surplus is always higher in the equilibrium with than without strategic CSR. In contrast to the existing literature (e.g. Belleflamme and Peitz, 2015, p. 429), though, consumer surplus depends non-monotonically on the level of entry costs.

Finally, we extend the model to heterogeneous goods which allows for a comparison between Cournot and Bertrand competition. We show that CSR levels decrease as the degree of product heterogeneity increases in Cournot competition and are zero in Bertrand Competition. A second extension shows that the strategic incentives to engage in CSR remain qualitatively unchanged under general demand functions.

This chapter contributes to the branch of the literature on CSR[1] which relies on the assumption that firms (may have a strategic incentive to) take the interest of a group of stakeholders into consideration and models CSR as an alternative objective that (partially) includes consumer surplus besides profits.[2]

Within this approach, a series of articles deals with mixed oligopolies. For example, Kopel (2015) and Kopel and Brand (2012) consider a mixed duopoly with one pure profit maximizer and one CSR firm. Other than in our analysis, the level of CSR is exogenously given. Kopel (2015) shows that the choice of the socially concerned firm between a quantity and a price contract as well as its profits crucially depend on the level of CSR. Kopel and Brand (2012) consider a model of quantity competition with the possibility of strategic delegation and find that CSR pays off as long as its level is not too high. This is in line with our result that Cournot competitors will choose a positive but finite level if the decision on CSR is endogenous.

Kopel et al. (2014) consider a (potentially mixed) Cournot oligopoly and adopt a dynamic approach in which the firms can choose to either adopt a positive level of CSR or act as a pure profit maximizer, and adjust this decision over time. Similarly, Kopel and Lamantia (2016) analyze the evolutionary survival of CSR in a Cournot oligopoly. In

[1] A second important branch relies on the assumption that (some) consumers have a higher willingness to pay for socially responsibly (Baron, 2009, García-Gallego and Georgantzís, 2009, Liu et al., 2015, Manasakis et al., 2013, 2014, Pecorino, 2016) or environmentally friendly (Arora and Gangopadhyay, 1995, Bansal and Gangopadhyay, 2003, Cremer and Thisse, 1999, Tian, 2003) produced goods and models CSR as a form of product differentiation.

[2] Lambertini (2013), Lambertini and Tampieri (2012, 2015), and Lambertini et al. (2016) include both consumer surplus and some environmental externality in the objective function of a socially responsible firm. Incorporating consumer surplus in the objective function of a firm is also a widely-used way of taking all kinds of non-profit motives into account (see, e.g., Goering, 2007, 2008b, Lien, 2002, Saha, 2014). Models of consumer cooperatives (Kopel and Marini, 2014, Marini and Zevi, 2011, Mikami, 2003) put full weight on consumer surplus and no weight on profits.

both set-ups, mixed industry outcomes prevail under certain conditions. These results, though, are due to the fact that the endogenous choice of CSR is, in contrast to our model, discrete in their framework.

This discrete choice assumption is also the distinguishing feature between our continuous choice framework and the baseline model proposed by Fanti and Buccella (2017a) who analyze strategic CSR in a static Cournot (Bertrand) duopoly with heterogeneous goods.[3] Under the assumption of homogeneous goods, we extend their result of positive CSR levels in Cournot equilibria to an arbitrary number of firms, and argue that the extended result also holds for heterogeneous goods. Planer-Friedrich and Sahm (2018) and Sharma (2018) also consider the strategic choice of CSR levels in a Cournot duopoly with homogeneous goods. While Planer-Friedrich and Sahm (2018) show that CSR outperforms customer orientation (modeled as a weight on the surplus of the firm's *own* customers only), Sharma (2018) illustrates that asymmetric fixed costs of CSR may result in a mixed market.

Whenever all firms choose positive CSR levels in the equilibria of the aforementioned models, often a kind of prisoner's dilemma arises in the sense that all firms make smaller profits compared to a situation in which they could coordinate to abstain from CSR. Other recent contributions, however, illustrate that the strategic choice of positive CSR levels may also enhance profits under certain circumstances, such as vertical relations (Brand and Grothe, 2015, Chen et al., 2016, Goering, 2012, 2014), managerial firms (Fanti and Buccella, 2017b), or network effects (Fanti and Buccella, 2018). This chapter contributes to this strand of the literature adding long-run market consolidation and entry deterrence as potential channels for the profit-enhancing effect of strategic CSR.

The strategic use of CSR as an entry deterrent has received little attention in the economic literature so far. In a similar framework, Fanti and Buccella (2017c) also analyze entry in the presence of CSR. In their model, however, the level of CSR is not an individual strategic choice but exogenous and identical for both firms (incumbent and entrant). Section 2.4.6 discusses the similarities and resulting differences in more detail. Tzavara (2008) and Graf and Wirl (2014) both model CSR as a mode of product differentiation and consider price competition à la Bertrand. In such an environment, CSR is usually not used as an entry deterrent but only as an optimal response to entry ensuring (maximum) differentiation. A related empirical paper by Boulouta and Pitelis (2014) shows that high CSR levels may constitute non-tariff barriers towards less responsible countries. The authors find that CSR has a stronger effect on countries with a low innovation level. They suspect that innovative countries already produce differentiated products and thus additional CSR-based differentiation will not have a strong impact.

In general, empirical evidence on the impact of firms' CSR activities on their financial performance is mixed. For example, Eccles et al. (2014), Jo and Harjoto (2011) and Flammer (2015a) find a positive effect, whereas López et al. (2007) find a negative effect. Meta-analyses (Margolis et al., 2009, Margolis and Walsh, 2003) and studies including further variables such as R&D (McWilliams and Siegel, 2000) suggest a neutral effect. In

[3] In an extension to their baseline model, Fanti and Buccella (2017a, Supplement) also allow for a continuous decision on CSR levels which, however, leads to a different game structure and the possibility of asymmetric equilibria. In Section 2.5.1, we discuss the similarities and differences in more detail.

line with our theoretical predictions, however, there is a tendency towards negative effects (prisoner's dilemma) in the short run (López et al., 2007) and positive effects (market consolidation) in the long run (Eccles et al., 2014).

The remainder of this chapter is organized as follows. Section 2.2 introduces the basic model. In Section 2.3, we analyze the strategic use of CSR in Cournot competition. In Section 2.4, we consider CSR as a means of entry deterrence. Section 2.5 extends the model to heterogeneous goods and general demand functions. Section 2.6 concludes. Longer proofs are relegated to the appendix.

2.2 The model

We consider competition between $n \in \mathbb{N}$ profit-maximizing firms on the market for some homogeneous good with (normalized) linear inverse demand[4]

$$p = 1 - \sum_{i=1}^{n} q_i, \tag{2.1}$$

where p denotes the price of the good and q_i denotes the output of firm $i \in \{1, \ldots, n\}$. Marginal costs of production are assumed to be constant and identical for all firms. For simplicity, we normalize them to zero.[5]

Competition between firms is modeled as a two-stage game. In the first stage of the game, each firm $i \in \{1, \ldots, n\}$ publicly commits to a certain objective function V_i. In particular, firm i chooses its level of CSR, i.e., the weight $\theta_i \geq 0$ it puts on consumer surplus CS in addition to profits π_i:

$$V_i = \pi_i + \theta_i \cdot CS = (1 - \sum_{j=1}^{n} q_j)q_i + \frac{1}{2} \cdot \theta_i \cdot (\sum_{j=1}^{n} q_j)^2. \tag{2.2}$$

Such a commitment to an objective function can be thought of as signing an appropriate corporate charter or hiring a manager known to have appropriate preferences.

In the second stage of the game, firms decide simultaneously on their output levels $q_i \geq 0$ in order to maximize their objective functions V_i. Below we consider two different scenarios and solve each specification of the game for its subgame perfect equilibrium (SPE).[6]

[4]Section 2.5.1 extends the model to heterogeneous goods. Section 2.5.2 illustrates that, under rather mild conditions, the strategic incentives remain unchanged for a general inverse demand function $p(q)$ with $dp/dq < 0$.

[5]In fact, constant marginal costs do not influence the equilibrium level of CSR as long as they are symmetric.

[6]This two-stage game may be understood as a model of strategic delegation (Fershtman and Judd, 1987, Sklivas, 1987, Vickers, 1985) offering a commitment to CSR (Baron, 2008, Kopel and Brand, 2012, Kopel and Lamantia, 2016, Manasakis et al., 2014). Alternatively, it may be interpreted as an indirect evolutionary game (Güth and Yaari, 1992, Königstein and Müller, 2001) in which the most profitable CSR levels prevail.

2.3 Strategic CSR in Cournot Competition

In the first scenario, $n \in \mathbb{N} \setminus \{1\}$ symmetric firms simultaneously choose their level of CSR at the first stage of the game.

2.3.1 Short-run effects

We first consider a time horizon in which the number of active firms is fixed. Solving the game by backward induction, we start by examining the second stage decisions. For any given vector of CSR levels $(\theta_j)_{j=1}^n$, firm $i \in \{1, \ldots, n\}$ chooses its output q_i in order to maximize its objective function V_i as given by (2.2). From the first-order condition

$$\frac{\partial V_i}{\partial q_i} = 1 - \sum_{j=1}^{n} q_j - q_i + \theta_i \cdot \sum_{j=1}^{n} q_j = 0 \tag{2.3}$$

we derive firm i's best response:

$$q_i = \frac{1 - (1 - \theta_i) \cdot \sum_{j \neq i} q_j}{(2 - \theta_i)}. \tag{2.4}$$

Summing up over all n first order conditions (2.3) and using (2.1), we derive the total quantity $Q := \sum_{i=1}^n q_i$ and the price p:

$$\begin{aligned} Q &= \frac{n}{n + 1 - \sum_{i=1}^n \theta_i}, \\ p &= \frac{1 - \sum_{i=1}^n \theta_i}{n + 1 - \sum_{i=1}^n \theta_i}. \end{aligned} \tag{2.5}$$

Inserting Q into (2.4) and rearranging terms yields:

$$q_i = \frac{1 - \sum_{j=1}^n \theta_j + n \cdot \theta_i}{n + 1 - \sum_{j=1}^n \theta_j}. \tag{2.6}$$

In the first stage of the game, each firm i anticipates the price and quantities and chooses the CSR level θ_i in order to maximize its profit which, by (2.5) and (2.6), equals

$$\begin{aligned} \pi_i = p \cdot q_i &= \frac{(1 - \sum_{j=1}^n \theta_j)(1 - \sum_{j=1}^n \theta_j + n\theta_i)}{(n + 1 - \sum_{j=1}^n \theta_j)^2} \\ &= \frac{(1 - \theta_{-i})^2 + (1 - \theta_{-i})(n-2)\theta_i - (n-1)\theta_i^2}{(n + 1 - \theta_{-i} - \theta_i)^2}, \end{aligned} \tag{2.7}$$

where $\theta_{-i} := \sum_{j \neq i} \theta_j$. The first order condition $\dfrac{\partial \pi_i}{\partial \theta_i} = 0$ yields

$$\begin{aligned} &[(1 - \theta_{-i})(n-2) - 2(n-1)\theta_i](n + 1 - \theta_{-i} - \theta_i) \\ &+2[(1 - \theta_{-i})^2 + (1 - \theta_{-i})(n-2)\theta_i - (n-1)\theta_i^2] \quad = \quad 0. \end{aligned} \tag{2.8}$$

Symmetry implies that in equilibrium $\theta_i = \theta_j = \theta^*$ for all $i, j \in \{1, \ldots, n\}$, and thus $\theta_{-i} = (n-1)\theta^*$. Using this relation in equation (2.8) and solving for θ^* yields

$$\theta^* = \frac{n^2+n-1}{2n(n-1)} - \sqrt{\left(\frac{n^2+n-1}{2n(n-1)}\right)^2 - \frac{1}{n}}. \tag{2.9}$$

Proposition 1 *In the SPE of the two-stage game between $n \geq 2$ symmetric firms, the CSR level θ^* that is chosen by each individual firm*

(a) is positive for any given number n of active firms,

(b) decreases in the number n of active firms,

(c) converges to zero as the number n of active firms tends to infinity.

Proof. Part (a) follows immediately from equation (2.9). In order to show part (b), consider θ^* as a function of n. First note that $\theta^*(2) > \theta^*(3)$. Moreover, treating n as a continuous variable, straightforward calculations show that $\partial\theta/\partial n < 0$ for all $n \geq 3$. Using equation (2.9), it is straightforward to compute $\lim_{n\to\infty} \theta^* = 0$ which proves part (c).

□

Parts (b) and (c) of the proposition show that an increasing competitive pressure decreases the strategic incentives to engage in CSR. In particular, under perfect competition, there is no room for CSR. The intuition for positive equilibrium levels of CSR is essentially the same as in (other) models of strategic delegation (Fershtman and Judd, 1987) or in models of consumer orientation (Königstein and Müller, 2001). Firms engage in CSR in order to commit to higher output levels which, ceteris paribus, reduces the output chosen by their rivals because quantities are strategic substitutes in Cournot competition. As a result, however, they end up in a situation that is similar to a prisoner's dilemma. In fact, inserting (2.9) into equations (2.5), (2.6), and (2.7) yields the following

Corollary 1 *In the SPE of the two-stage game between $n \geq 2$ symmetric firms,*

(a) the output of each firm $q_i^* = \dfrac{1}{1+n(1-\theta^*)} > \dfrac{1}{1+n}$ is higher,

(b) the market price $p^* = \dfrac{1-n\theta^*}{1+n(1-\theta^*)} < \dfrac{1}{1+n}$ is lower,

(c) the profit of each firm $\pi_i^* = \dfrac{1-n\theta^*}{[1+n(1-\theta^*)]^2} < \dfrac{1}{(1+n)^2}$ is lower

than it would be if all firms abstained from CSR.

2.3.2 Long-run effects

So far, all considerations have been short-term taking the number of active firms n as given and neglecting any fixed cost. However, the fact that strategic CSR decreases

equilibrium profits in the short run may lead to some market consolidation and increase market concentration in the long run because firms with negative profits will leave the market. To be more specific, suppose that there is free market entry and all firms have identical quasi-fixed costs F. Then, Corollary 1 immediately implies

Corollary 2 *In the long run with free market entry and positive fixed costs $F > 0$, the number of firms that are active in the SPE of the two-stage game does not exceed the number of firms that would be active if all firms abstained from CSR.*

A number of empirical studies suggest a positive relationship between market competition and CSR (Fernández-Kranz and Santaló, 2010, Flammer, 2015b, Kemper et al., 2013, Zhang et al., 2010). While this finding is not compatible with our short run findings, it can be better explained by our result that firms may use CSR in highly competitive environments hoping to decrease competition and increase market concentration in the long run.

In order to explore the implications of the long run effect on welfare notice that, on the one hand, the increase in market concentration induced by CSR ceteris paribus reduces aggregate output and thus countervails the direct quantity-augmenting effect of CSR. On the other hand, the lower number of active firms also reduces aggregate fixed costs. In general, the impact of CSR on welfare is thus ambiguous. The following example illustrates the anticompetitive potential of CSR. To this end we refer to the long-run SPE of the two-stage game between $n \geq 2$ symmetric firms as CSR-equilibrium and asterisk the corresponding equilibrium values. By contrast, the situation in which all firms abstain from CSR is equivalent to the regular Cournot equilibrium with pure profit maximizers, and we indicate the corresponding equilibrium values by superscript C.

Example 1 *Compared to the regular Cournot equilibrium, for fixed costs* $0.034 \leq F < 0.04$ *the CSR equilibrium is characterized by*

(a) higher market concentration: $n^* = 2 < 4 = n^C$,

(b) higher individual and aggregate profits: $2(\pi_i^*(2) - F) \approx 2 \cdot (0.0856 - F) > 4 \cdot (0.0400 - F) \approx 4(\pi_i^C(4) - F)$,

(c) lower aggregate output: $2q_i^*(2) \approx 0.7806 < 0.8000 = 4q_i^C(4)$,

(d) lower consumer surplus and lower (gross) total surplus,

(e) higher total surplus net of aggregate fixed costs.

Proof. The results follow from straightforward calculations using equation (2.9) and Corollary 1.

□

The example also illustrates that CSR may serve as a substitute for second best regulation of markets with pure profit maximizers. Suppose that the regulator wants to maximize welfare, i.e., total surplus net of aggregate fixed costs, but cannot control production directly. She can only control the number of active firms, e.g., by issuing

a restricted number of production licences. As straightforward calculations show, for $0.034 \leq F < 0.04$ the regulator would then optimally limit the number of pure profit maximizers to $n = 2 < 4 = n^C$ in order to reduce aggregate fixed costs.[7] Under this kind of forced market consolidation, however, output and thus total surplus would still be lower than under the CSR equilibrium consolidation which leads to the same number $n = 2 = n^*$ of active firms.

There is a further insight provided by this example: While CSR decreases profits in the short run, it may well increase profits in the long run due to the associated market consolidation. This gives rise to the idea that (large) solvent firms may use CSR also as a strategy to induce exit and deter entry of (small) firms with tighter financial constraints.[8] In the next section, we elaborate on this idea examining the strategic use of CSR as an entry deterrent.

2.4 CSR as an Entry Deterrent

In this second scenario, we consider a market with an incumbent monopolist (firm 1) and one potential entrant (firm 2). Here, the first stage of the game is split into two sequences: First the incumbent chooses its CSR level θ_1. Given this decision, the potential entrant then decides whether to incur entry costs $e > 0$ and, if so, which CSR level θ_2 to enter with. In the case of entry, the second stage of the game again consists in Cournot competition[9] with each of the two firms $i \in \{1, 2\}$ choosing its output q_i in order to maximize its objective function

$$V_i = (1 - q_i - q_j)q_i + \frac{1}{2}\theta_i(q_i + q_j)^2.$$

If firm 2 does not enter, the monopoly will persist and firm 1 will choose q_1 in order to maximize its objective function

$$V_1^M = (1 - q_1)q_1 + \frac{1}{2}\theta_1 q_1^2.$$

In order to find out whether firm 1 can indeed deter entry by means of CSR and, if so, under which conditions deterrence is profitable, we proceed in three steps. First, we characterize the conditions for which entry is blockaded in the sense that the incumbent

[7] The following table contains the respective values of total surplus net of aggregate fixed costs in a market without CSR:

	$F = 0.040$	$F = 0.034$
$n = 1$	0.335	0.341
$n = 2$	0.364	0.376
$n = 3$	0.349	0.367

[8] This leads to the testable hypothesis that large firms engage more in CSR than small ones.

[9] The assumption of Cournot competition in the second stage of entry games is standard in a major part of the literature (see, e.g., Dixit, 1980, Fanti and Buccella, 2017c, Maskin, 1999) and modern textbooks (see, e.g., Belleflamme and Peitz, 2015) and allows for a close link to the analysis of Section 2.3. Assuming Stackelberg competition instead will increase (decrease) the range of blockaded/deterred entry if the incumbent is the leader (follower) but does not change the results qualitatively (Dixit, 1980).

can behave as an unconstrained monopolist who is not threatened by entry. Second, we determine the SPE for the case in which firm 1 accommodates entry of firm 2 and compute the firms' respective profits. Finally, this allows us to determine the minimum CSR level firm 1 must choose to deter entry as a function of entry costs. Comparing firm 1's profit made under entry deterrence with its profit made under entry accommodation, we can then determine the range of entry costs for which entry deterrence is profitable and discuss its impact on welfare.

2.4.1 Blockaded entry

It is straightforward to show that an unconstrained monopolist who is not threatened by entry will not engage in CSR, i.e., will choose $\theta_1^u = 0$. Entry will be blockaded if, given this choice, firm 2 will not find it profitable to enter the market. If firm 2 enters, there will be Cournot competition between the two firms. Solving the game by backward induction, the analysis of the second stage is identical to the second stage analysis in Section 2.3 with $n = 2$. We can therefore use equation (2.8) with $n = 2$, $\theta_{-i} = \theta_1$, and $\theta_i = \theta_2$ to compute firm 2's best response to firm 1's CSR level θ_1:

$$\theta_2 = \frac{(1-\theta_1)^2}{3-\theta_1}. \tag{2.10}$$

Thus for $\theta_1^u = 0$, the entrant chooses the CSR level $\theta_2 = 1/3$. Moreover, we can use equation (2.7) with $n = 2$, $\theta_{-i} = \theta_1 = 0$, and $\theta_i = \theta_2 = 1/3$ to compute the equilibrium profit of firm 2 conditional on entry:

$$\pi_2 = \frac{(1-\theta_1)^2 - \theta_2^2}{(3-\theta_1-\theta_2)^2} - e = \frac{1}{8} - e. \tag{2.11}$$

If firm 2's resulting profit is still negative, it will be better not to enter the market in the first place. Consequently, entry will be blockaded for all entry costs $e > e^+ := \frac{1}{8}$.

2.4.2 Entry accommodation

Now suppose that firm 1 will choose a CSR level θ_1 such that firm 2 finds it profitable to enter. Solving the game by backward induction, the analysis of the second stage is again identical to the second stage analysis in Section 2.3 with $n = 2$, and firm 2's best response to firm 1's CSR level θ_1 is given by equation (2.10). Moreover, we can use equation (2.7) with $n = 2$, $\theta_{-i} = \theta_2$, and $\theta_i = \theta_1$ to compute the equilibrium profit of firm 1 anticipating the entrant's best response as given by (2.10):

$$\pi_1 = \frac{\left[1 - \frac{(1-\theta_1)^2}{3-\theta_1}\right]^2 - \theta_1^2}{\left[3 - \left(\theta_1 + \frac{(1-\theta_1)^2}{3-\theta_1}\right)\right]^2} = \frac{1 + \theta_1 - 3\theta_1^2 + \theta_1^3}{(4-2\theta_1)^2}.$$

Firm 1 initially chooses θ_1 in order to maximize these profits. The first order condition for a maximum

$$\frac{\partial \pi_1}{\partial \theta_1} = \frac{(1 - 6\theta_1 + 3\theta_1^2)(4 - 2\theta_1) + 4(1 + \theta_1 - 3\theta_1^2 + \theta_1^3)}{(4 - 2\theta_1)^3} = 0$$

yields $\theta_1^A \approx 0.479$ as the optimal level of CSR for the purpose of entry accommodation. Further, this implies $\theta_2^A \approx 0.108$ as well as $\pi_1^A \approx 0.0972$ and $\pi_2^A \approx 0.0446 - e$ in the SPE with accommodated entry.

2.4.3 Entry deterrence

Using equations (2.11) and (2.10), the equilibrium profit of firm 2 conditional on entry equals

$$\pi_2 = \frac{(1 - \theta_1)^2 - \left[\frac{(1 - \theta_1)^2}{3 - \theta_1}\right]^2}{\left[3 - \left(\theta_1 + \frac{(1 - \theta_1)^2}{3 - \theta_1}\right)\right]^2} - e. \tag{2.12}$$

Since firm 2 enters only for positive profits, firm 1 is able to deter entry by choosing a CSR level of at least

$$\theta_1^D := 1 - 2e - 2\sqrt{e(1 + e)}$$

for which $\pi_2 = 0$ by equation (2.12). If firm 2 does not enter, firm 1 will stay a monopolist and choose q_1 in order to maximize V_1^M. The first order condition yields

$$\frac{\partial V_1}{\partial q_1} = 1 - 2q_1 + \theta_1^D q_1 = 0 \quad \Leftrightarrow \quad q_1 = \frac{1}{2 - \theta_1^D}. \tag{2.13}$$

The related profit equals

$$\pi_1^D = \frac{1 - \theta_1^D}{(2 - \theta_1^D)^2} = \frac{2e + 2\sqrt{e(1 + e)}}{\left(1 + 2e + 2\sqrt{e(1 + e)}\right)^2}.$$

2.4.4 Comparison

Entry deterrence will be more profitable than entry accommodation if $\pi_1^D \geq \pi_1^A$. This condition is equivalent to $e \geq e^*$, where the critical value of entry costs e^* is implicitly defined by[10]

$$2e^* + 2\sqrt{e^*(1 + e^*)} = \left(1 + 2e^* + 2\sqrt{e^*(1 + e^*)}\right)^2 \pi_1^A.$$

Our results yield a pattern that is well-known from other models of market entry (Dixit, 1980, Maskin, 1999, Spence, 1977), and are summarized in

Proposition 2 *The SPE of the two-stage game between one monopolistic incumbent and one potential entrant depends on the level of entry costs.*

[10] $e^* \approx 0.0034$

(a) For high entry costs $e > e^+$, entry is blockaded and the monopolist does not engage into CSR.

(b) For intermediate entry costs $e^* \leq e \leq e^+$, the incumbent deters entry by means of the positive CSR level $\theta_1^D = 1 - 2e - 2\sqrt{e(1+e)}$ which is decreasing in e.

(c) For low entry costs $e < e^*$, the incumbent accommodates entry and both firms choose positive CSR levels with $\theta_1^A > \theta_2^A$.

Note that in the case of entry accommodation the incumbent chooses its CSR level first. Since CSR levels are strategic substitutes, as implied by (2.10), this redounds to a first-mover advantage which results in a larger market share and higher profits for the incumbent. The case of entry deterrence reinforces the validity of Corollary 2 characterizing situations for which the strategic use of CSR increases the market concentration compared to the case in which firms abstain from CSR. Part (c) of Corollary 2 also suggests the testable hypothesis that well-established firms exhibit more CSR than market newcomers.

2.4.5 Welfare analysis

The results from our model of entry deterrence imply the same opposing welfare effects of strategic CSR as in the model of Cournot competition. We must trade off the negative output effect of higher market concentration against the positive output effect of positive CSR levels and, with respect to total surplus, the positive effect of saved entry costs.[11]

We first compare consumer surplus in the equilibria with and without entry deterrence by means of CSR. Since consumer surplus increases in total output, it suffices to compare the corresponding output levels. In the regular Cournot model without CSR, the output level of each firm equals 1/3 yielding gross profits of 1/9. Firm 2 will thus be active if entry costs do not exceed 1/9. In this case, total output equals 2/3. Otherwise, firm 1 produces the monopoly output 1/2.

For entry costs below e^* for which entry is accommodated in the model of entry deterrence by means of CSR, both firms apply positive levels of CSR which increases total output beyond the regular Cournot output 2/3. For entry costs between e^* and 1/9, entry is deterred and we have to confront the incumbent's output q_1^D given by equation (2.13) with the regular Cournot output 2/3. We compute that $q_1^D > 2/3$ for entry costs $e^* < e < \hat{e} := \frac{1}{24}$ and vice versa for entry costs $\hat{e} := \frac{1}{24} < e < \frac{1}{9}$. Intuitively, in order to deter entry, CSR levels must be the higher, the lower the entry costs. Thus the positive output effect of positive CSR levels outweighs the negative output effect of higher market concentration for low entry costs, and vice versa for intermediate entry costs. For entry costs between 1/9 and 1/8 entry would be blockaded if there was not the threat of firm 2 to enter with some positive level of CSR. This threat forces the incumbent to adopt positive CSR levels in order to deter entry even in this range of high entry costs, which

[11] This basic tradeoff will remain qualitatively unchanged if we assume Stackelberg competition instead of Cournot competition in the second stage of the entry game, whereas its exact solution obviously depends on the form of competition.

induces some output above the regular monopoly level 1/2. For entry costs above 1/8, entry is blockaded and the regular monopoly output 1/2 is produced. We summarize these results in

Corollary 3 *In the SPE of the two-stage game between one monopolistic incumbent and one potential entrant, the strategic use of CSR influences consumer surplus*

(a) positively for low entry costs $e < \hat{e}$,

(b) negatively for intermediate entry costs $\hat{e} \leq e \leq 1/9$,

(c) positively for high entry costs $1/9 < e < e^+$,

(d) not at all for prohibitive entry costs $e \geq e^+$

compared to a situation in which both firms abstain from CSR.

The finding that entry deterrence may increase consumer surplus even for high entry costs is particular for the strategic use of CSR as a commitment to larger quantities and a distinguishing feature of our model.

Unlike for consumer surplus, total surplus net of entry costs is always higher in the equilibrium with than without entry deterrence by means of CSR. To see this, notice that gross total surplus increases in total output, just as consumer surplus does. Since the saving of entry costs represents an additional surplus, we only have to check whether this additional surplus outweighs the reduction of gross total surplus in the range of entry costs for which $\hat{e} \leq e \leq 1/9$. In the absence of CSR, total welfare in the regular Cournot equilibrium equals $4/9 - e$. If entry is deterred by means of CSR, total welfare in the SPE equals $(1 - \frac{1}{2}q_1^D)q_1^D$, where q_1^D is given by equation (2.13). Simple calculations show that the former is always smaller than the latter.

Corollary 4 *In the SPE of the two-stage game between one monopolistic incumbent and one potential entrant, the strategic use of CSR increases net total surplus compared to a situation in which both firms abstain from CSR for all non-prohibitive entry costs* $e < e^+$.

2.4.6 Discussion

In a similar model, Fanti and Buccella (2017c) also analyze the effects of CSR on entry. Unlike us, they do not allow for an endogenous, strategic choice but assume that the level of CSR is exogenous and identical for both firms, the incumbent and the entrant. Our analysis illustrates that this assumption is, in general, not compatible with an endogenous choice of CSR levels (see part (c) of Proposition 2). Nevertheless, they also find that the lower the entry costs the higher the CSR level must be in order to deter entry (see part (b) of Proposition 2). Moreover, in their welfare analysis, Fanti and Buccella (2017c) consider net total surplus for any combination of exogenous CSR levels θ and entry costs e and identify regions of this θ-e-space in which entry is accommodated (deterred) although deterrence (accommodation) would be efficient. Corollary 4 shows that such inefficient outcomes will not arise if firms make a strategic decision choosing CSR levels endogenously.

2.5 Extensions

In this section, we extend the baseline model of Section 2.2 to heterogeneous goods and general demand functions. For the sake of analytical tractability, we focus on the duopoly case $n = 2$.

2.5.1 Strategic CSR in Cournot and Bertrand competition with heterogeneous goods

To study the impact of heterogeneous goods on strategic CSR, we modify the baseline model of Section 2.2 assuming that inverse demand for good $i, j \in \{1, 2\}$, $i \neq j$, is given by[12]

$$p_i = 1 - q_i - \gamma q_j \tag{2.14}$$

with $0 < |\gamma| < 1$. For positive (negative) values of γ, goods are substitutes (complements), and $|\gamma|$ represents the degree of substitutability (complementarity).

To analyze the strategic decision on CSR in Cournot competition with heterogeneous goods, we replicate the analysis of Section 2.3 under the modified assumptions (see Appendix 2.A) and derive the following results.

Proposition 3 *In the SPE of the two-stage game with Cournot competition between two symmetric firms and heterogeneous goods, the CSR level $\theta_C^*(\gamma)$ that is chosen by each individual firm*

(a) is positive for any given degree of substitutability (complementarity), i.e., whenever $0 < |\gamma| < 1$,

(b) increases in the degree of substitutability (complementarity), i.e., $sign\left(\frac{d\theta_C^*(\gamma)}{d\gamma}\right) = sign(\gamma)$.

Intuitively, in the case of imperfect substitutes, the strategic incentive to commit to larger quantities by means of CSR is qualitatively the same as in the baseline model with perfect substitutes ($\gamma = 1$) but weakens as the substitutability decreases. In fact, if markets are independent ($\gamma = 0$), firms will have no strategic incentive to engage in CSR. By contrast, in the case of complementary goods, quantities are strategic complements (see equation (2.16) in Appendix 2.A) and exert positive mutual externalities on demand. While firms fail to internalize these effects in regular Cournot competition, committing to larger quantities by means of CSR[13] helps to remedy this failure which is the more severe the stronger the complementarity.

In light of these differing rationales it becomes obvious that strategic CSR has also differing effects on profits depending on whether goods are substitutes or complements.

[12] The inverse demand functions result as the solution to the problem of a representative household maximizing quadratic utility $U = q_1 + q_2 - \frac{1}{2}(q_1^2 + 2\gamma q_1 q_2 + q_2^2)$; see, e.g., Singh and Vives (1984) or Häckner (2000).

[13] Notice that an increase in the CSR-level always implies an upward-shift of the reaction function (2.16) because $\frac{dq_i}{d\theta_i} = \frac{1+\gamma q_j}{(2-\theta_i)^2} > 0$ for all $0 < |\gamma| < 1$ and $i \neq j$.

Corollary 5 *In the SPE of the two-stage game with Cournot competition between two symmetric firms and heterogeneous goods, the profit of each firm will be lower (higher) than in a situation in which both firms abstain from CSR if their products are substitutes (complements).*

With a similar intuition as in the case of network industries (Fanti and Buccella, 2018), the case of complementary goods thus characterizes another instance in which strategic CSR increases profits as compared to the regular Cournot equilibrium. In combination with larger outputs and, hence, larger consumer surplus, higher profits even constitute a Pareto improvement. This observation is in line with the result by Marini and Zevi (2011) who show that, in a mixed oligopoly, the presence of consumer-owned firms (besides profit-maximizing firms) increases output and welfare, particularly when goods are complements. While the consumer-owned firm's objective to maximize consumer surplus is exogenously given in their model, our analysis shows that welfare enhancing weights on consumer surplus may endogenously arise for strategic reasons.

On markets with price competition, however, the strategic use of CSR as a commitment to increase output is of no avail. The intuition is that a commitment to higher outputs will be understood as a commitment to lower prices where instead some commitment to higher prices would be needed (Fershtman and Judd, 1987). Indeed, in Appendix 2.B we show that both prices and profits decrease in the level of CSR and firms will not engage in CSR under Bertrand competition.[14]

Proposition 4 *In the SPE of the two-stage game with Bertrand competition between two symmetric firms and heterogeneous goods, both firms choose a CSR level of* $\theta_B^*(\gamma) = 0$*, irrespective of the degree of substitutability (complementarity).*

Our model of strategic CSR in duopolies with heterogeneous goods is similar to the one proposed by Fanti and Buccella (2017a). Unlike us, however, they consider a discrete decision between socially responsible behavior and profit-maximization (PM) in the first stage of the game, i.e., firm $i \in \{1, 2\}$ has only two alternatives, either $\theta_i = 0$ or $\theta_i = k$ for an exogenously given parameter $k > 0$ which is identical for both firms. In line with Proposition 4, they find that firms will never engage in CSR under Bertrand competition. Under Cournot competition, by contrast, different types of equilibria may arise in their discrete choice model: Depending on the parameters γ and k, either both or none or only one of the two firms will engage in CSR.[15] Moreover, in a supplement to their article, Fanti and Buccella (2017a) show that such asymmetric equilibria may arise also in an extended version of the game which allows firms to choose the CSR level from a continuous set (like in our model) but (implicitly) consists of three stages: In the first stage, firms make a discrete choice between CSR and PM, in the (additional) second stage, socially responsible firms (if any) choose the level of CSR, and in the third stage, firms decide

[14]Notice, however, that this negative result hinges on our assumption that a firm's demand does not depend directly on its level of CSR. Instead, if consumers have a preference for socially responsibly produced goods, CSR may be used strategically as a means of product differentiation and possibly reduce competition this way (Conrad, 2005, Liu et al., 2015).

[15]The reason is that a CSR level of zero will never be a best response if it can be freely adjusted but might be a better response (to 0 or k) than k.

on output.[16] The reason for the existence of asymmetric equilibria is that, unlike in our model, the first stage decision offers firms the opportunity to commit to profit-maximizing behavior (i.e., a CSR level of zero) *before* the rival firm (possibly) decides on its CSR level. By contrast, our analysis shows that if firms face a continuous decision on CSR and cannot commit to profit-maximizing behavior ex-ante, they will always choose a positive CSR level in Cournot competition.

2.5.2 Strategic CSR in Cournot competition with general demand functions

In this paragraph, we return to the case of homogeneous goods and consider the more general set-up of an ordinary good, i.e., a general inverse demand function $p(Q)$, with $\partial p/\partial Q < 0$. Assuming that a symmetric SPE in pure strategies exists, we characterize a sufficient condition under which, in Cournot competition, CSR has the same strategic impact as in the linear case, i.e., serves the firm as a commitment to increase its own output ($dq_i/d\theta_i > 0$) and induces rivals to reduce their output ($dq_j/d\theta_i < 0$).

Proposition 5 *In the SPE of the two-stage game with Cournot competition between two symmetric firms facing a general inverse demand function $p(Q)$ for some homogeneous good, an increase in the CSR level of a firm imposes a commitment to a higher quantity and simultaneously induces a quantity reduction by the competitor, i.e., $dq_i/d\theta_i > 0$ and $dq_j/d\theta_i < 0$, if and only if $(1-\theta)p'(Q) + (1-2\theta)Qp''(Q) < 0$.*

The formal analysis which proves the Proposition can be found in Appendix 2.C. For equilibrium CSR levels $\theta \leq 1/2$, the relevant condition (2.38) is weaker than what Cornes and Itaya (2016) call Hahn's condition: $p'(Q) + Qp''(Q) < 0$ (Hahn, 1962).[17] Thus under rather mild conditions on a general demand function, in a Cournot duopoly the use of CSR underlies the same strategic incentives as with linear demand. Due to the fact that we consider an aggregative game, we conjecture that this is also true for $n > 2$ (cf. Cornes and Itaya, 2016).

2.6 Conclusion

We have examined the strategic use of Corporate Social Responsibility (CSR) in imperfectly competitive markets using a two-stage model, in which the level of CSR determines the weight a firm puts on consumer surplus in its objective function before it decides upon supply of a homogeneous good. First, we have shown that the endogenous level of CSR is positive for any given number of firms active in symmetric Cournot competition. Since positive CSR levels imply smaller equilibrium profits, however, consolidation of the market may result. Second, we have demonstrated that an incumbent monopolist can

[16] See Planer-Friedrich and Sahm (2018) for an explicit formulation of such a game structure in the context of CSR.

[17] Hahn's condition is known to be a sufficient condition for the strategic success of various kinds of manipulations of a firm's objective function, while often it imposes a stricter condition than necessary (Cornes and Itaya, 2016).

profitably use CSR as an entry deterrent. Both results indicate that CSR may increase market concentration and possibly be anticompetitive. Indeed we have identified circumstances in which CSR decreases consumer surplus, but mitigates the problem of excessive entry thereby increasing total welfare.

Finally, we have shown that, qualitatively, the results also hold in Cournot competition with heterogeneous goods. The basic intuition is that the strategic use of CSR serves as a commitment to increase output. While this commitment leads to a kind of prisoner's dilemma in the case of substitutes, it helps to internalize the positive externalities in the case of complements. Such a commitment is, however, undesirable on markets with price competition because larger output implies lower prices. Consequently, firms will not engage in CSR if faced with Bertrand competition.

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Appendix

2.A Proof of Proposition 3 and Corollary 5

Given the inverse demands (2.14), consumer surplus can be written as follows:

$$CS = \frac{1}{2} \cdot \left[\gamma(q_1 + q_2)^2 + (1-\gamma)(q_1^2 + q_2^2)\right] = q_1^2 + q_2^2 + 2\gamma q_1 q_2. \tag{2.15}$$

In the second stage of the game, firm $i \in \{1,2\}$ chooses q_i in order to maximize $V_i = \pi_i + \theta_i CS$. For $i, j \in \{1,2\}$, $i \neq j$, the first-order conditions $\frac{\partial V_i}{\partial q_i} = 0$ imply the

reaction functions[18]

$$q_i = \frac{1-\gamma(1-\theta_i)q_j}{2-\theta_i}. \tag{2.16}$$

Solving the system of equations (2.16) yields

$$q_i = \frac{(1-\gamma)+(1-\theta_j)+\gamma\theta_i}{2+(2-\gamma^2)(1-\theta_j)-[1+(1-\gamma^2)(1-\theta_j)]\theta_i} \tag{2.17}$$

for $i, j \in \{1,2\}$, $i \neq j$. We now use (2.14) and (2.17) to compute the corresponding prices

$$p_i = \frac{(1-\gamma)+(1-\theta_j)-[1+(1-\gamma^2)(1-\theta_j)]\theta_i}{2+(2-\gamma^2)(1-\theta_j)-[1+(1-\gamma^2)(1-\theta_j)]\theta_i}. \tag{2.18}$$

In the first stage of the game, firm $i \in \{1,2\}$ chooses θ_i in order to maximize $\pi_i = p_i q_i$. Using (2.17) and (2.18), the first-order conditions $\frac{\partial \pi_i}{\partial \theta_i} = 0$ imply the reaction functions

$$\theta_i = \frac{\gamma^2(1-\theta_j)(2-\theta_j-\gamma)}{[2-\theta_j-(1-\theta_j)\gamma^2](2-\theta_j+\gamma)} \tag{2.19}$$

for $i, j \in \{1,2\}$, $i \neq j$. Solving the system of equations (2.19) for $i, j \in \{1,2\}$, $i \neq j$ yields a unique feasible solution:[19]

$$\theta_i = \frac{2(1+\gamma)+\gamma^2-\sqrt{[2(1+\gamma)]^2+\gamma^4}}{2(1+\gamma)} =: \theta_C^*(\gamma) > 0. \tag{2.20}$$

Using (2.20), it is straightforward to show that $\frac{d\theta_C^*(\gamma)}{d\gamma} > 0$ for $\gamma > 0$, and $\frac{d\theta_C^*(\gamma)}{d\gamma} < 0$ for $\gamma < 0$. This proves Proposition 3.

Finally, to prove Corollary 5, we use (2.20) and compute firm i's equilibrium profit

$$\pi_i^* = \frac{2\left(\sqrt{[2(1+\gamma)]^2+\gamma^4}-\gamma^2-2\gamma)\right)}{\left(\sqrt{[2(1+\gamma)]^2+\gamma^4}-\gamma^2+2\right)^2}$$

whereas the regular Cournot profit without strategic CSR ($\theta_1 = \theta_2 = 0$) equals $\pi_i^C = \frac{1}{(2+\gamma)^2}$. A comparison shows that, in the relevant range, $\pi_i^* > \pi_i^C$ if and only if $-1 < \gamma < 0$.

[18] Although the formal analysis (of the first stage of the game) is not tractable for an arbitrary number of firms ($n > 2$), the corresponding reaction function (in the second stage of the game) is then given by $q_i = \frac{1-\gamma(1-\theta_i)\sum_{j\neq i} q_j}{2-\theta_i}$ and illustrates that the subgames of the second stage are aggregative in the sense that a firm's output decision depends only on the sum of all other firms' outputs. Therefore, firm i's strategic incentives to commit to a certain reaction function by the choice of an appropriate CSR-level θ_i in stage 1 of the game are, qualitatively, the same as in the case with only one opponent (n=2).

[19] The system of equations (2.19) has three symmetric and two asymmetric real valued solutions, but only the symmetric solution in (2.20) is feasible in the sense that $0 \leq \theta_i \leq 1$ for all $0 < |\gamma| < 1$.

2.B Proof of Proposition 4

The inverse demand functions (2.14) imply the following direct demands

$$q_i = \frac{1 - \gamma - p_i + \gamma p_j}{1 - \gamma^2} \tag{2.21}$$

for $i, j \in \{1, 2\}$, $i \neq j$. Using (2.15) and (2.21), consumer surplus can be expressed in terms of prices:

$$CS = \frac{2(1-\gamma)(1-p_1-p_2) - 2\gamma p_1 p_2 + p_1^2 + p_2^2}{2(1-\gamma^2)}.$$

In the second stage of the game, firm $i \in \{1, 2\}$ chooses p_i in order to maximize $V_i = \pi_i + \theta_i CS$. For $i, j \in \{1, 2\}$, $i \neq j$, the first-order conditions $\frac{\partial V_i}{\partial p_i} = 0$ imply the reaction functions[20]

$$p_i = \frac{(1-\theta_i)(1-\gamma+\gamma p_j)}{2-\theta_i}. \tag{2.22}$$

Solving the system of equations (2.22) yields

$$p_i = \frac{(1-\gamma)(1-\theta_i)[2-\theta_j+\gamma(1-\theta_j)]}{(2-\theta_i)(2-\theta_j) - (1-\theta_i)(1-\theta_j)\gamma^2} \tag{2.23}$$

for $i, j \in \{1, 2\}$, $i \neq j$. We now use (2.21) and (2.23) to compute the corresponding profits

$$\pi_i = p_i q_i = \frac{(1-\gamma)(1-\theta_i)[2-\theta_j+\gamma(1-\theta_j)]^2}{(1+\gamma)[(2-\theta_i)(2-\theta_j) - (1-\theta_i)(1-\theta_j)\gamma^2]^2}. \tag{2.24}$$

In the first stage of the game, firm $i \in \{1, 2\}$ chooses θ_i in order to maximize π. Using (2.24), it is straightforward to show that for $i, j \in \{1, 2\}$, $i \neq j$

$$\frac{\partial \pi_i}{\partial \theta_i} = -\frac{(1-\gamma)[(2-\theta_j)\theta_i + (1-\theta_i)(1-\theta_j)\gamma^2][2-\theta_j+\gamma(1-\theta_j)]^2}{(1+\gamma)[(2-\theta_i)(2-\theta_j) - (1-\theta_i)(1-\theta_j)\gamma^2]^3} < 0 \tag{2.25}$$

for all $0 < |\gamma| < 1$. Consequently, each firm $i \in \{1, 2\}$ will choose the lowest CSR level possible, i.e., $\theta_i = 0 =: \theta_B^*(\gamma)$.

2.C Proof of Proposition 5

At the second stage, the objective functions of the two firms are given by

$$V_1 = p(q_1 + q_2)q_1 + \theta_1 CS(q_1 + q_2),$$
$$V_2 = p(q_1 + q_2)q_2 + \theta_2 CS(q_1 + q_2).$$

[20] Although the formal analysis (of the first stage of the game) is not tractable for an arbitrary number of firms ($n > 2$), the corresponding reaction function (in the second stage of the game) is then given by $p_i = \frac{(1-\theta_i)(1-\gamma+\gamma\sum_{j\neq i} p_j)}{(2-\theta_i)[1+(n-2)\gamma]}$ and illustrates that the subgames of the second stage are aggregative in the sense that a firm's price decision depends only on the sum of all other firms' prices. Therefore, firm i's strategic incentives to commit to a certain reaction function by the choice of an appropriate CSR level θ_i in stage 1 of the game are, qualitatively, the same as in the case with only one opponent (n=2).

The maximizing quantities satisfy the first-order conditions

$$\frac{\partial V_1}{\partial q_1} = p'(q_1+q_2)q_1 + p(q_1+q_2) + \theta_1 CS'(q_1+q_2) = 0, \tag{2.26}$$

$$\frac{\partial V_2}{\partial q_2} = p'(q_1+q_2)q_2 + p(q_1+q_2) + \theta_2 CS'(q_1+q_2) = 0 \tag{2.27}$$

as well as the second order conditions $\frac{\partial^2 V_i}{\partial q_i^2} < 0$. Using $CS(q_1+q_2) = \int_0^{q_1+q_2}[p(q) - p(q_1+q_2)]dq$ and thus $CS'(q_1+q_2) = -(q_1+q_2)p'(q_1+q_2)$, we rewrite equations (2.26) and (2.27):

$$[(1-\theta_1)q_1 - \theta_1 q_2]p'(q_1+q_2) + p(q_1+q_2) = 0, \tag{2.28}$$

$$[(1-\theta_2)q_2 - \theta_2 q_1]p'(q_1+q_2) + p(q_1+q_2) = 0. \tag{2.29}$$

Denote the left-hand side of equations (2.28) and (2.29) by $F_1(\theta_1, \theta_2, q_1, q_2)$ and $F_2(\theta_1, \theta_2, q_1, q_2)$, respectively.

First, we compute the sign of $dq_1/d\theta_1$. Treating θ_2 as fixed and applying the implicit function theorem yields

$$\frac{dq_1}{d\theta_1} = \frac{-\frac{\partial F_1}{\partial \theta_1}\frac{\partial F_2}{\partial q_2}}{\frac{\partial F_1}{\partial q_1}\frac{\partial F_2}{\partial q_2} - \frac{\partial F_1}{\partial q_2}\frac{\partial F_2}{\partial q_1}}. \tag{2.30}$$

Notice that $\partial F_1/\partial\theta_1 = -(q_1+q_2)p'(q_1+q_2) > 0$. Moreover, $\partial F_i/\partial q_i = \partial^2 V_i/\partial q_i^2 < 0$ for $i \in \{1,2\}$, as implied by the second order conditions on the solution of the maximization problem. Thus the numerator of (2.30) is positive. Taking the respective derivatives, using the symmetry $\theta_1 = \theta_2 = \theta$ in equilibrium, writing $q_1 + q_2 = Q$, and simplifying terms, we compute the denominator

$$\frac{\partial F_1}{\partial q_1}\frac{\partial F_2}{\partial q_2} - \frac{\partial F_1}{\partial q_2}\frac{\partial F_2}{\partial q_1} = p'(Q)[(3-2\theta)p'(Q) + (1-2\theta)Qp''(Q)]. \tag{2.31}$$

Due to $p'(Q) < 0$, an increase in a firm's CSR level will increase its output, i.e., $dq_1/d\theta_1 > 0$, if and only if

$$(3-2\theta)p'(Q) + (1-2\theta)Qp''(Q) < 0. \tag{2.32}$$

Next, we compute the sign of $dq_1/d\theta_2$. Treating θ_1 as fixed now and applying the implicit function theorem yields

$$\frac{dq_1}{d\theta_2} = \frac{\frac{\partial F_2}{\partial \theta_2}\frac{\partial F_1}{\partial q_2}}{\frac{\partial F_1}{\partial q_1}\frac{\partial F_2}{\partial q_2} - \frac{\partial F_1}{\partial q_2}\frac{\partial F_2}{\partial q_1}}. \tag{2.33}$$

The denominator of (2.33) equals that of (2.30). Again due to the symmetry in equilib-

rium, the numerator simplifies to

$$\frac{\partial F_2}{\partial \theta_2}\frac{\partial F_1}{\partial q_2} = -Qp'(Q)[(1-\theta)p'(Q) + (1-2\theta)Qp''(Q)]. \tag{2.34}$$

Due to $-Qp'(Q) > 0$, an increase in a firm's CSR level will decrease its rival's output, $dq_1/d\theta_2 < 0$, if and only if

$$(3-2\theta)p'(Q) + (1-2\theta)Qp''(Q) \tag{2.35}$$

and

$$(1-\theta)p'(Q) + (1-2\theta)Qp''(Q) \tag{2.36}$$

are either both positive or both negative, such that either the numerator of (2.33) is positive and the denominator of (2.33) is negative or vice versa. Note that (2.35)<(2.36) and thus we obtain the condition that $dq_1/d\theta_2 < 0$ if and only if either

$$(3-2\theta)p'(Q) + (1-2\theta)Qp''(Q) > 0 \tag{2.37}$$

or

$$(1-\theta)p'(Q) + (1-2\theta)Qp''(Q) < 0. \tag{2.38}$$

Finally, notice that (2.37) and (2.32) can never both be fulfilled at the same time and that (2.38) already implies (2.32).

Chapter 3

Strategic CSR in Asymmetric Cournot Duopoly

Lisa Planer-Friedrich and Marco Sahm

Abstract

We examine the strategic use of Corporate Social Responsibility (CSR) in Cournot competition between two firms that differ in their marginal costs of production. The level of CSR determines the weight a firm puts on consumer surplus in its objective function before it decides upon supply. We show that the more efficient firm chooses a higher CSR level, reinforcing its dominant position. If there are sufficiently large fixed costs of CSR, only the more efficient firm will engage in CSR.

Keywords: Corporate Social Responsibility, Cournot Duopoly, Asymmetric Costs, Heterogenous Firms

JEL classification: D43, L13, L21, L22

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3.1 Introduction

Corporate Social Responsibility (CSR) refers to all social and environmentally friendly activities of a firm beyond its legal requirements (Kitzmueller and Shimshack, 2012). In the past decades CSR has increasingly become a concern for many firms, particularly large and mid cap companies (Benn and Bolton, 2011, KPMG, 2017). Among the various motives for CSR, its strategic use in markets with imperfect competition plays an important role (Bénabou and Tirole, 2010, Garriga and Melé, 2004). The basic idea is that even pure profit-maximizing firms engage in CSR because it may serve as a commitment device for their strategy choices.

Although overall empirical evidence on the relation between firms' CSR activities and their financial performance is mixed, meta-analyses such as Aguinis and Glavas (2012) confirm a small positive relation. Indeed, many recent studies find a positive correlation (Eccles et al., 2014, Flammer, 2015a, Jo and Harjoto, 2011). This raises the question about causality: Does CSR boost profits or can more profitable firms afford more CSR?

We address this question within a simple model of Cournot competition between two firms that differ in their marginal costs of production. The level of CSR determines the weight a firm puts on consumer surplus in its objective function before it decides upon supply. We find a mutual causality: The more efficient firm chooses a higher CSR level, reinforcing its dominant position. If there are sufficiently large fixed costs of CSR, an equilibrium will arise in which only the more efficient firm chooses a positive level of CSR.

3.2 The Model

We consider Cournot competition between two profit-maximizing firms on the market for some homogeneous good with (normalized) linear inverse demand[1] $p = 1-(q_1+q_2)$, where p denotes the price of the good and q_i denotes the output of firm $i \in \{1,2\}$. Marginal costs of production are assumed to be constant with $c_1 = 0$ (normalization) and $c_2 = c$, where $0 \leq c \leq 1$, i.e., firm 1 is (possibly) more efficient than firm 2.

Competition between firms is modeled as a two-stage game. In the first stage of the game, the firms simultaneously choose their level of CSR. The CSR level of firm $i \in \{1,2\}$ is understood as the weight $\theta_i \geq 0$ on consumer surplus CS in addition to profits π_i in its objective function:[2]

$$V_i = \pi_i + \theta_i \cdot CS = (1 - q_i - q_j - c_i)q_i - K_i + \frac{1}{2}\theta_i(q_i + q_j)^2,$$

where K_i represents a quasi-fixed cost of CSR, i.e., $K_i = 0$ if $\theta_i = 0$ and $K_i = Z \geq 0$ if

[1] In the present framework, a large class of more general demand functions yields the same strategic incentives (Planer-Friedrich and Sahm, 2020).

[2] Incorporating consumer surplus into the firm's objective function is a standard way of modeling CSR (e.g., Fanti and Buccella, 2017b, Goering, 2008a, Kopel et al., 2014, Leal et al., 2019, Nakamura, 2018, Planer-Friedrich and Sahm, 2020, Wang, 2016, Zennyo, 2017). An alternative approach considers CSR as a means of vertical product differentiation (e.g., Arora and Gangopadhyay, 1995, Cremer and Thisse, 1999, García-Gallego and Georgantzís, 2009, Liu et al., 2015, Manasakis et al., 2013, 2014).

$\theta_i > 0$.[3] Such a commitment to an objective function can be thought of as signing an appropriate corporate charter or hiring a manager known to have appropriate preferences. Our framework may thus also be interpreted as a model of strategic delegation (Fershtman and Judd, 1987, Sklivas, 1987, Vickers, 1985).

In the second stage of the game, firms decide simultaneously on their output levels $q_i \geq 0$ in order to maximize their objective functions V_i.

3.3 Analysis

In this section, we abstract from costs of CSR ($Z = 0$) and solve the game by backward induction for its subgame perfect equilibria (SPE). We focus on potential SPE in which $\theta_i \in [0, 1]$ for $i \in \{1, 2\}$, i.e., no firm puts more weight on consumer surplus than on profits.

At the second stage of the game, the first-order conditions $\partial V_i / \partial q_i = 0$ imply the reaction functions

$$q_1(q_2) = \frac{1 - (1 - \theta_1)q_2}{2 - \theta_1},$$
$$q_2(q_1) = \frac{1 - c - (1 - \theta_2)q_1}{2 - \theta_2},$$

and thus the second stage quantity choices as functions of the CSR levels:

$$q_1 = \frac{1 - \theta_2 + \theta_1 + c(1 - \theta_1)}{3 - \theta_1 - \theta_2}, \tag{3.1}$$
$$q_2 = \frac{1 - \theta_1 + \theta_2 - c(2 - \theta_1)}{3 - \theta_1 - \theta_2}. \tag{3.2}$$

At the first stage, the firms anticipate these choices and maximize their respective profits

$$\pi_1 = \frac{(1 - \theta_2 + c - \theta_1)(1 - \theta_2 + c + (1 - c)\theta_1)}{(3 - \theta_1 - \theta_2)^2}, \tag{3.3}$$
$$\pi_2 = \frac{(1 - 2c - (1 - c)\theta_1 - (1 - c)\theta_2)(1 - 2c - (1 - c)\theta_1 + \theta_2)}{(3 - \theta_1 - \theta_2)^2}, \tag{3.4}$$

by the choice of their CSR levels. The first-order conditions $\partial \pi_i / \partial \theta_i = 0$ imply

$$\theta_1(\theta_2) = \frac{(1 - \theta_2)^2 + (1 - \theta_2)c}{3 - \theta_2 - c}, \tag{3.5}$$
$$\theta_2(\theta_1) = \frac{(1 - \theta_1)^2 - (1 - \theta_1)(2 - \theta_1)c}{3 - \theta_1 - (2 - \theta_1)c}. \tag{3.6}$$

It is straightforward to show that $0 \leq \theta_1(\theta_2) < 1$ for all $0 < c < 1$ and all $\theta_2 \in [0, 1]$ as

[3] In this model, firms choose their CSR level strategically to commit to a higher output. For this, firms need to believably signal their commitment. Thus fixed costs of CSR may arise, e.g., due to efforts to obtain a CSR label or the preparation of a CSR report (Sharma, 2018).

well as $\theta_2(\theta_1) < 1$ for all $0 < c < 1$ and all $\theta_1 \in [0,1]$. Moreover, $0 < \theta_2(\theta_1)$ for $0 < c < 1$ and $\theta_1 \in [0,1]$ if and only if

$$\theta_1 < \frac{1-2c}{1-c}. \tag{3.7}$$

Consequently, for all $0 < c < 1$ and $\theta_1, \theta_2 \in [0,1]$, the first stage best responses of the firms are given by the reaction functions $r_1(\theta_2) := \theta_1(\theta_2)$ and $r_2(\theta_1) := \max\{\theta_2(\theta_1), 0\}$, where $\theta_1(\theta_2)$ and $\theta_2(\theta_1)$ are defined by equations (3.5) and (3.6), respectively.

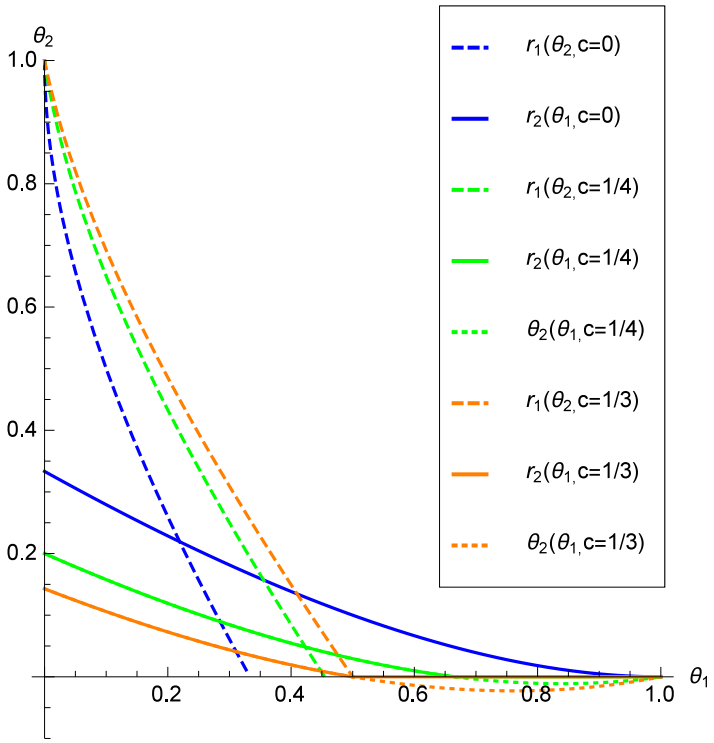


Figure 3.1: CSR levels in the SPE with asymmetric marginal costs

Figure 3.1 illustrates the equilibrium CSR levels depicting the reaction functions r_1 and r_2 for the cost differentials $c = 0$, $c = 1/4$, and $c = 1/3$, respectively. Lemma 1 in Appendix 3.A provides the comparative statics properties of the reaction functions. In particular, it shows that an increase in c increases r_1 and decreases r_2 wherever positive. For $c = 1/3$, we have $r_1(0) = \theta_1(0) = 1/2$ and $r_2(1/2) = \theta_2(1/2) = 0$ according to equations (3.5) and (3.6), and thus r_1 and r_2 intersect at $(\theta_1, \theta_2) = (1/2, 0)$. Lemma 1 then implies that, for any $c \geq 1/3$, we always have $\theta_2 = 0$ where r_1 and r_2 intersect. If $\theta_2 = 0$, however, equation (3.5) implies the best response $\theta_1 = (1+c)/(3-c)$, and thus $q_2 < 0$ for all $c > 1/3$ by equation (3.2), i.e., the non-negativity constraint on the quantity of firm 2 will be violated. This proves

Proposition 6 *If $c \geq 1/3$, the less efficient firm will leave the market.*

Notice that, without the strategic use of CSR ($\theta_1 = \theta_2 = 0$), the threshold marginal cost above which the less efficient firm leaves the market is larger ($c = 1/2$). Strategic CSR

may thus increase the market power of more efficient firms and foster market consolidation as well as the adaption of new technologies.

For smaller marginal costs, the intersection of the reaction functions r_1 and r_2 constitutes a SPE. We asterisk the corresponding equilibrium values.

Proposition 7 *For all $c \in (0, 1/3)$, the two-stage game with strategic CSR and Cournot competition between two asymmetric firms has a SPE in which*

(a) the firm with the lower marginal costs chooses a higher CSR level, produces more output, and earns higher profits, i.e., $\theta_1^* > \theta_2^* > 0$, $q_1^* > q_2^* > 0$, and $\pi_1^* > \pi_2^* > 0$ for all $0 < c < 1/3$;

(b) an increase in the cost differential increases the CSR level of the advantaged firm and decreases the CSR level of the disadvantaged firm, i.e., $d\theta_1^*/dc > 0$ and $d\theta_2^*/dc < 0$ for all $c \in (0, 1/3)$.

The proof can be found in Appendix 3.A. For the intuition behind these results, note that in this model a higher CSR level (i.e., more weight on consumer surplus) represents a strategic commitment to a higher output. Since the more efficient firm faces lower costs of production, increasing its output is less costly for this firm. Therefore, it has stronger incentives to use this commitment device.[4] The model thus applies particularly well to environments in which CSR measures aim at a high market coverage, e.g., in the provision of pharmaceuticals in developing countries.

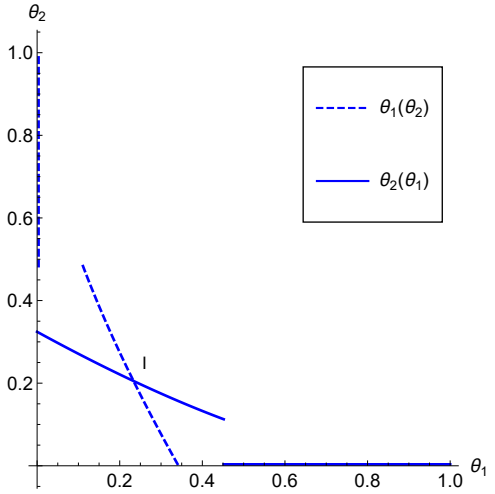
Proposition 2 is in line with several findings in the recent literature on strategic delegation. Straume (2006) and Fanti and Meccheri (2017) also find that the more efficient firm chooses a higher weight on the additional objective if managers maximize a weighted combination of profits and sales. For revenues as additional objective, Delbono et al. (2016) show that the more efficient firm earns higher equilibrium profits.[5] Moreover, Colombo (2019) finds that for sufficiently high cost differences the more efficient firm may even earn higher profits in the delegation equilibrium than if both firms abstained from delegation.

3.4 Inclusion of Fixed Costs for CSR

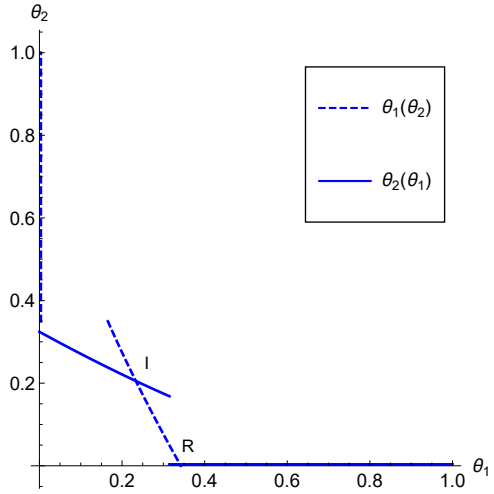
Fixed costs for CSR may induce firms to shy away from its strategic use. Based on numerical computations, we demonstrate that, depending on the level of fixed costs Z, different types of equilibria may exist: As Figure 3.2 illustrates (for $c = 0.02$), we may find not only interior solutions, I, in which both firms choose positive CSR levels, but also right (left) corner solutions, R (L), in which only the more (less) efficient firm chooses a positive CSR level, or an equilibrium, O, in which neither firm engages in CSR.

[4] Intuitively, the same reasoning also applies to Cournot competition with differentiated products. On markets with price (Bertrand) competition, however, the strategic use of CSR as a commitment to increase output is of no avail: It would be understood as a commitment to lower prices where instead some commitment to higher prices would be needed (Fershtman and Judd, 1987). Planer-Friedrich and Sahm (2020) offer a formal treatment of these issues in a framework with symmetric firms.

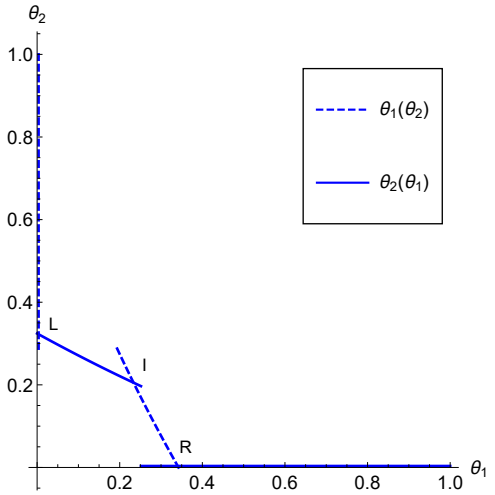
[5] This result also holds for sufficiently high cost differences in the analysis of Fanti and Meccheri (2017).



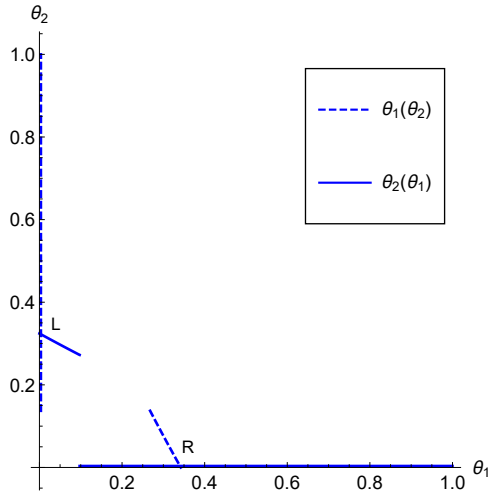
(a) $Z = 0.0020$



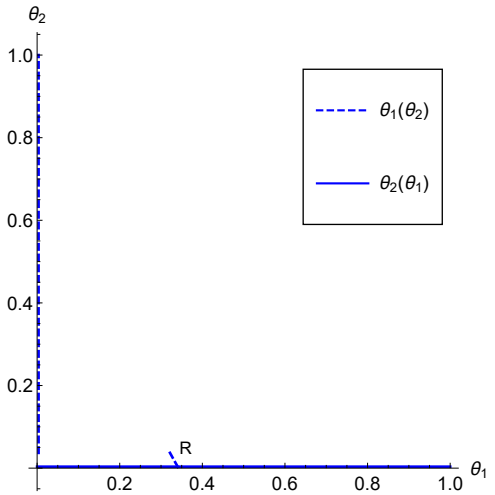
(b) $Z = 0.0041$



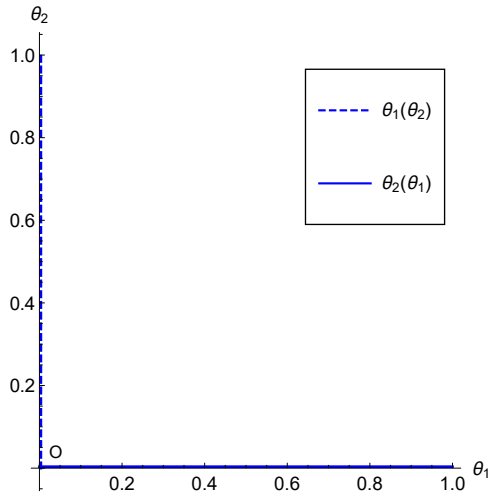
(c) $Z = 0.0054$



(d) $Z = 0.0095$



(e) $Z = 0.0130$



(f) $Z = 0.0170$

Figure 3.2: Best responses and equilibria at different levels of Z ($c = 0.02$)

Figure 3.3 depicts which equilibria may occur for different combinations of asymmetric marginal costs of production, c, and symmetric quasi-fixed costs of CSR, Z. Using equations (3.3) through (3.6), we compute the threshold values for Z for each given c in the following way:

$$\begin{aligned} Z_0 &= \pi_2(\theta_1(0), \theta_2(\theta_1(0))) - \pi_2(\theta_1(0), 0), \\ Z_1 &= \pi_2(\theta_1^*, \theta_2^*) - \pi_2(\theta_1^*, 0), \\ Z_2 &= \pi_1(\theta_1(\theta_2(0)), \theta_2(0)) - \pi_1(0, \theta_2(0)), \\ Z_3 &= \pi_2(0, \theta_2(0)) - \pi_2(0, 0), \\ Z_4 &= \pi_1(\theta_1(0), 0) - \pi_1(0, 0). \end{aligned}$$

Intuitively, if the costs of CSR are sufficiently small (below Z_1), it may pay off for both firms to choose positive CSR levels resulting in an interior solution (I). By contrast, if the costs of CSR are prohibitively large (above Z_4), both firms will abandon CSR in equilibrium (O). In the range of intermediate costs of CSR (above Z_0 and below Z_4), corner solutions may arise: Investing these costs and choosing a sufficiently high level of CSR, one firm can "take the lead" and commit to a quantity that makes such a costly commitment unprofitable for the other firm. Since a commitment to a larger quantity is less attractive for the less efficient firm (and the less so the higher its production costs c), the range of parameters for a left corner solution (L), where only the less efficient firm engages in CSR, is restricted to the area above Z_2 and below Z_3. By contrast, in the whole area between Z_0 and Z_4, there always exists a right corner solution (R), where only the more efficient firm engages in CSR.

Including fixed costs for CSR, our model thus provides an explanation why firms with and without CSR engagement may coexist.

3.5 Conclusion

We have examined the strategic use of Corporate Social Responsibility (CSR) in Cournot competition between two firms that differ in their marginal costs of production. The level of CSR determines the weight a firm puts on consumer surplus in its objective function before it decides upon supply. The results demonstrate that the strategic use of CSR complements cost advantages and reinforces differences in market power. Moreover, (symmetric) fixed costs of CSR provide an explanation for the coexistence of (highly profitable) firms that engage in CSR and (less profitable) firms that abstain from CSR. In the long-run, strategic CSR may thus foster market consolidation and accelerate the adoption of superior technologies.

The lessons for policymakers are twofold: First, the observation of differing CSR levels may convey information on differing costs of production. On markets with imperfect competition, a firm's CSR level may also be an indicator of market power. Thus such information may be useful for regulatory purposes. Second, if politics can control the fixed costs of CSR, e.g., by establishing an official CSR label, it may be able to influence the (type of) market equilibrium and outcome. We find both cases in which the government

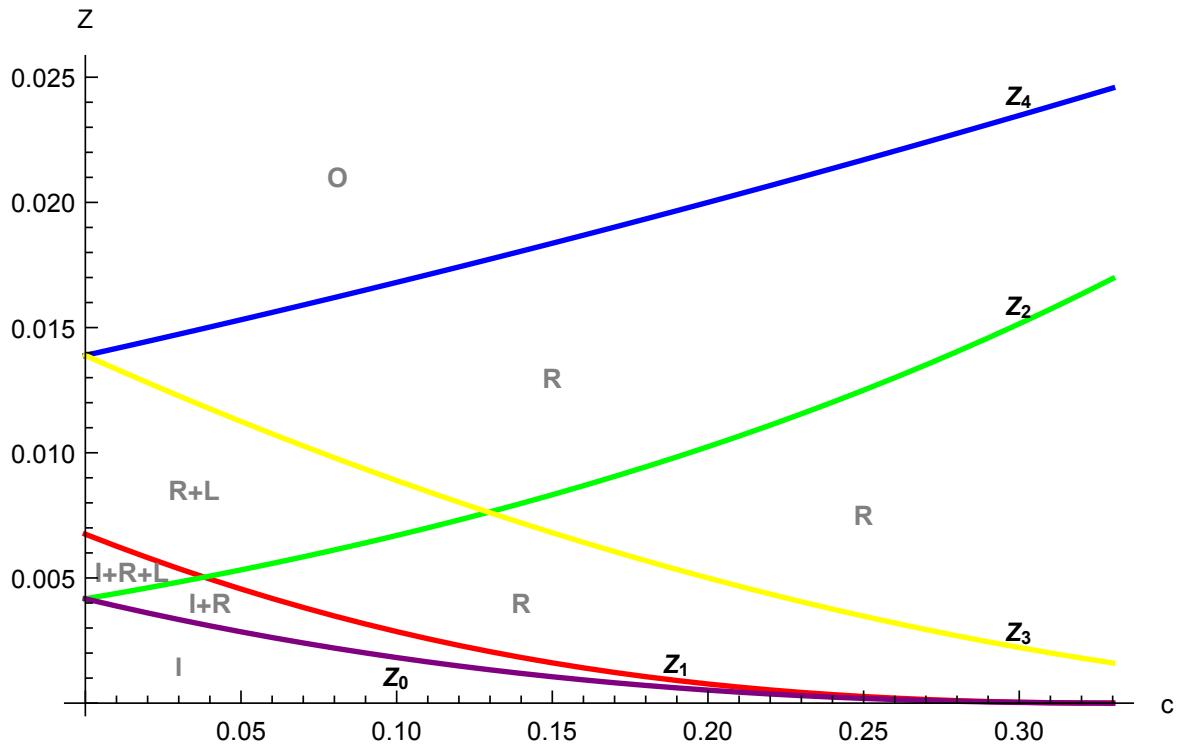


Figure 3.3: Occurence of equilibria depending on c and Z

can increase consumer surplus by reducing the fixed costs of CSR and cases in which it can do so by raising them.[6] A comprehensive welfare analysis is, however, beyond the scope of this short chapter.

Acknowledgments

We thank the editor and an anonymous referee. Open Access funding provided by Projekt DEAL.

[6]For the example from above with $c = 0.02$, the table below displays the consumer surplus and the firms' profits in the different equilibria (rounded to four decimals). Starting from a corner solution or an equilibrium without CSR, the government may enforce an interior solution and increase consumer surplus by reducing the fixed costs of CSR (below Z_0; see Figure 3.3). If such a reduction is not feasible, the government may still be able to reach an improvement: Starting from a left corner solution, raising the fixed costs (above Z_3; see Figure 3.3) leads to a right corner solution and increases consumer surplus.

	CS	π_1	π_2
I	0.2988	$0.0925 - Z$	$0.0757 - Z$
R	0.2775	$0.1301 - Z$	0.0552
L	0.2738	0.0676	$0.1152 - Z$
O	0.2178	0.1156	0.1024

Appendix

3.A Proof of Proposition 7

In order to prove part (a) of Proposition 7, first notice that for $c = 0$, a (unique) SPE exists (Planer-Friedrich and Sahm, 2020) and is symmetric with $\theta_1^* = \theta_2^* = (5 - \sqrt{17})/4$ according to equations (3.5) and (3.6). Now, suppose that an SPE with $\theta_i^* \in [0, 1]$ for $i \in \{1, 2\}$ exists for all $0 < c < 1$ and has the properties stated in part (b) of Proposition 7. Then these properties imply $\theta_1^* > \theta_2^*$ for all $0 < c < 1$, which, in turn, implies $q_1^* > q_2^*$ according to equations (3.1) and (3.2), and, consequently, $\pi_1^* > \pi_2^*$.

It remains to show that an SPE with $\theta_i^* \in [0, 1]$ for $i \in \{1, 2\}$ exists for all $0 < c < 1$ and has the properties stated in part (b). Notice that $r_1(1) = r_2(1) = 0$ and $r_1(0) > 0$ for all $0 < c < 1$. For $c = 1/3$, we have $r_1(0) = \theta_1(0) = 1/2$ and $r_2(1/2) = \theta_2(1/2) = 0$ according to equations (3.5) and (3.6), and thus $\theta_1^* = 1/2$ and $\theta_2^* = 0$ constitute an SPE. The existence of an SPE for all $0 < c < 1$ in which $\theta_i^* \in [0, 1]$ for $i \in \{1, 2\}$ and the respective comparative statics $d\theta_1^*/dc > 0$ for all $c \in (0, 1)$ and $d\theta_2^*/dc < 0$ for all $c \in (0, 1/3)$ as well as $\theta_2^* = 0$ for all $c \in [1/3, 1)$ now result from the following

Lemma 1 *For all $0 < c < 1$ and $\theta_1, \theta_2 \in [0, 1]$, the reaction function*

(a) r_1 strictly decreases in θ_2, i.e., $\partial r_1/\partial\theta_2 < 0$,

(b) r_2 strictly decreases in θ_1, i.e., $\partial r_2/\partial\theta_1 < 0$, wherever positive.

(c) r_1 shifts strictly upward in c, i.e., $\partial r_1/\partial c > 0$, for all $\theta_2 \in [0, 1)$

(d) r_2 shifts strictly downward in c, i.e., $\partial r_2/\partial c < 0$, for all $\theta_1 \in [0, 1)$ wherever positive.

Sketch of a proof.

(a) Using equation (3.5), it is straightforward to show that $\partial r_1/\partial\theta_2 = \partial\theta_1(\theta_2)/\partial\theta_2 < 0$ is equivalent to

$$-5 + c^2 - 2c\theta_2 + 6\theta_2 - \theta_2^2 < 0.$$

For $\theta_2 = 1$, the expression on the left-hand side (LHS) of this inequality is obviously negative for all $0 \leq c \leq 1$. As a function of c, the LHS is convex and takes its minimum at $c = \theta_2 \in [0, 1]$. Consequently, depending on θ_2, the LHS takes its maximum either at $c = 0$ or at $c = 1$. For $0 \leq \theta_2 \leq 1/2$ the LHS has a maximum of $-4 + 4\theta_2 - \theta_2^2 < 0$ at $c = 1$, and for $1/2 < \theta_2 < 1$ the LHS has a maximum of $-5 + 6\theta_2 - \theta_2^2 < 0$ at $c = 0$. The maximum of the LHS is thus always negative and, a fortiori, the inequality is correct for all $0 < c < 1$ and $\theta_2 \in [0, 1]$.

(b) Wherever r_2 is positive, $r_2(\theta_1) = \theta_2(\theta_1)$. Using equation (3.6), it is straightforward to show that $\partial\theta_2(\theta_1)/\partial\theta_1 < 0$ is equivalent to

$$(6 - 10c + 4c^2)\theta_1 - (1 - c)^2\theta_1^2 < 5 - 10c + 4c^2. \tag{3.8}$$

The expression on the left-hand side (LHS) of inequality (3.8) strictly increases in θ_1, because straightforward calculations show that

$$\frac{6 - 10c + 4c^2}{2(1-c)} > 1 \geq \theta_1$$

for all $0 < c < 1$ and $\theta_1 \in [0, 1]$. According to inequality (3.7), $\theta_1 < (1-2c)/(1-c)$ wherever r_2 positive. Consequently, wherever r_2 positive, the LHS of inequality (3.8) is smaller than

$$(6 - 10c^2 + 4c^2) \cdot \frac{1-2c}{1-c} - (1-c)^2 \cdot \left(\frac{1-2c}{1-c}\right)^2 = 5 - 12c + 4c^2$$

and thus obviously smaller than the right-hand side of inequality (3.8) for all $0 < c < 1$.

(c) Using equation (3.5), it is straightforward to show that $\partial r_1/\partial c = \partial \theta_1(\theta_2)/\partial c > 0$ is equivalent to

$$2 - 3\theta_2 + \theta_2^2 > 0,$$

which is obviously true for all $\theta_2 \in [0, 1)$ as the expression on the left-hand side of this inequality strictly decreases for all $\theta_2 \in [0, 1]$ and thus takes its minimum 0 at the corner $\theta_2 = 1$.

(d) Wherever r_2 is positive, $r_2(\theta_1) = \theta_2(\theta_1)$. Using equation (3.6), straightforward calculations show that $\partial \theta_2(\theta_1)/\partial c < 0$ for all $\theta_1 \in [0, 1)$.

□

Chapter 4

Why Firms Should Care for All Consumers

Lisa Planer-Friedrich and Marco Sahm

Abstract

We compare the strategic potential of Corporate Social Responsibility (CSR) and Customer Orientation (CO) as commitments to larger quantities in Cournot competition, modeled as a multi-stage game. First, in addition to profits, firms can choose to care for the surplus of either all consumers (CSR) or their own customers only (CO). Second, they decide upon the weight of this additional objective. We find that firms prefer to care for all consumers, choosing positive levels of CSR. This result provides an explanation for the recent shift in corporate culture from CO to CSR.

Keywords: Corporate Social Responsibility, Customer Orientation, Cournot Duopoly, Commitment
JEL classification: D43, L13, L21

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4.1 Introduction

Customer Orientation (CO), in the literature also referred to as Market Orientation (which typically includes CO) or Customer Satisfaction (which is often used as a synonym for CO), describes the corporate culture of focussing on the needs and wishes of the firms' buyers. Many authors, like Deshpandé et al. (1993) or Kohli and Jaworski (1990), have argued that such a focus on their *own customers* is beneficial for firms. More recently, however, other authors, like Eccles et al. (2014) or Flammer (2015a), have found that firms benefit as well from applying the broader concept of Corporate Social Responsibility (CSR). The term CSR includes all social and environmentally friendly activities of a firm beyond its legal requirements (Kitzmueller and Shimshack, 2012), implying the well-being of *all consumers*. In this chapter, we compare the strategic potential of CO and CSR as commitments to larger quantities in Cournot competition. In particular, we address the question whether firms prefer to care only for their own customers (CO) or for all consumers (CSR).

We model CO as introduced by Königstein and Müller (2001), including the weighted surplus of its *own customers* into the objective function of a firm. As Königstein and Müller (2001) show, CO will outperform pure profit maximization in Cournot competition, because it enables firms to commit to larger quantities. In order to model CSR, we include the weighted surplus of *all consumers* into the objective function of a firm (e.g., Fanti and Buccella, 2016, Goering, 2008a, Kopel and Brand, 2012, Kopel and Lamantia, 2016, Kopel et al., 2014, Ouattara, 2017, Planer-Friedrich and Sahm, 2020). Care for consumers constitutes an example from the wide range of possible socially responsible activities and has recently become a standard way of modeling CSR. A firm following this CSR approach takes more stakeholders into account than a firm choosing CO as a corporate culture.[1] Just as CO, CSR serves as a commitment to larger quantities in Cournot competition, and thus yields a strategic advantage over pure profit maximizing rivals (Kopel and Brand, 2012, Kopel et al., 2014).

We are building on the concept of strategic delegation, as introduced by Fershtman and Judd (1987), Sklivas (1987) and Vickers (1985) in their seminal papers and further investigated by, e.g., Miller and Pazgal (2001, 2002, 2005) and Ritz (2008). Models of strategic delegation show that firms may profit from employing a manager with a personal motivation or a working contract that differs from the firm's own objective (profit-maximization). Following this concept, Jansen et al. (2007, 2009) and Manasakis et al. (2010) have compared the strategic potential of several managerial incentive schemes. Furthermore, strategic delegation has also been used as a commitment to CSR in several models (Baron, 2008, Kopel and Brand, 2012, Kopel and Lamantia, 2016, Manasakis et al., 2014, Planer-Friedrich and Sahm, 2020).We are extending both strands of literature by comparing CSR and CO.

In order to explore and compare the strategic potential of the two corporate cultures, we consider a duopoly market for some homogeneous good with linear demand and constant marginal costs. We stick to the standard assumption of profit maximization but

[1] In the context of our model, the consumers even constitute the entirety of stakeholders that a firm could possibly take into account.

model competition between the two symmetric firms as a three-stage game. In the first stage, the firms simultaneously determine their corporate culture, choosing either CSR or CO. In the second stage, the firms simultaneously specify the extent of engagement into CSR/CO, hiring an executive who is known to have an appropriate concern. In the third stage, the firms' executives simultaneously decide upon output in order to maximize their objective functions.

Solving the game by backward induction for its subgame perfect equilibrium (SPE), we find that both firms choose CSR as their corporate culture, putting positive weight on the surplus of all consumers. In this sense, CSR outperforms CO. To gain some intuition, note that the surplus of all consumers includes the surplus of the firm's own customers, both being increasing and convex functions of the firm's output. The socially responsible firm thus derives, ceteris paribus, a larger marginal benefit from its output. This implies that CSR provides a stronger commitment to large quantities than CO. The three-stage game may as well be understood as an indirect evolutionary game (Güth and Yaari, 1992, Königstein and Müller, 2001) and, following this notion, the choice of CSR with a positive weight on consumer surplus for all firms is the evolutionary stable outcome.

In consideration of the growing importance of strategic aspects in industrial organization and management (Tahai and Meyer, 1999), the result provides an explanation why the focus in corporate culture has recently shifted from CO to CSR. KPMG (2015) and PwC (2016) provide evidence for a related change in business practice. According to the KPMG Survey of Corporate Responsibility Reporting 2015 the share of Global Fortune 250 firms reporting on CSR has increased from 35% in 1999 to 92% in 2015. In PwC's 19th Annual Global CEO survey (2016), the large majority of CEOs still names customers and clients as their top priority. However, not least because of consumers' changing prospect on firms, 84% of the CEOs realize that they should meet wider stakeholder expectations.[2]

4.2 The model

We consider Cournot competition between two profit maximizing firms on the market for some homogeneous good with normalized linear inverse demand $p = p(q_1, q_2) = 1 - (q_1 + q_2)$, where p denotes the price of the good and q_i denotes the output of firm $i \in \{1, 2\}$. Marginal costs of production are constant, identical for both firms, and, for simplicity, normalized to zero. Duopoly competition is modeled as a three-stage game Γ.

In the first stage, the firms simultaneously take the fundamental decision on their corporate culture to be either socially responsible, indexed by S, or customer oriented, indexed by C. This choice can be thought of as signing an appropriate corporate charter. Formally, CSR differs from CO in the respective objective function V_i: In addition to profits

$$\pi_i = [1 - (q_i + q_j)]q_i,$$

[2]Specifically, CEOs believe that five years from now, "the most successful organisations in their sector will have shifted their views and priorities in terms of recognising changing expectations and the value in addressing them, embedding corporate responsibility into their business, reporting on non-financial matters and taking the long-term view" (PwC, 2016).

the former contains the surplus of *all consumers*, denoted by CS (e.g. Kopel et al., 2014), where

$$CS = CS(q_i, q_j) = \int_0^{q_i+q_j} p(y,z)d(y+z) - p(q_i,q_j)(q_i+q_j),$$

whereas the latter only contains the surplus of the firm's *own customers*, denoted by C_i (Königstein and Müller, 2001), where

$$C_i = C_i(q_i, q_j) = \int_0^{q_i} p(y,q_j)dy - p(q_i,q_j)q_i.$$

Thus

$$V_i^S = \pi_i + \theta_i^S \cdot CS = [1-(q_i+q_j)]q_i + \frac{1}{2}\cdot\theta_i^S\cdot(q_i+q_j)^2, \tag{4.1}$$

and

$$V_i^C = \pi_i + \theta_i^C \cdot C_i = [1-(q_i+q_j)]q_i + \frac{1}{2}\cdot\theta_i^C\cdot q_i^2. \tag{4.2}$$

In the second stage, the firms simultaneously choose their level of CSR or CO, i.e. the weight $\theta_i^S \geq 0$ or $\theta_i^C \geq 0$ they put on consumer surplus CS or customer surplus C_i. This could be realized by hiring an executive manager with appropriate preferences, i.e., strategic delegation (Fershtman and Judd, 1987, Sklivas, 1987, Vickers, 1985). Allowing for zero weights, our model includes the ordinary case of pure profit maximization.[3] In the third stage, firms' executives decide simultaneously on the output levels $q_i \geq 0$ in order to maximize their objective functions V_i.

This sequence of decisions reflects the fact that fundamental corporate culture is adjusted less frequently than personnel politics, which, in turn, is adjusted less frequently than output.

4.3 Analysis

We solve game Γ by backward induction for its SPE. To this end, we distinguish the three different constellations that may arise after the first stage.

4.3.1 Competition between two CSR firms

First suppose that both firms have chosen CSR as corporate culture at the first stage and each firm $i \in \{1,2\}$ has chosen its CSR level θ_i^S at the second stage. At the third stage, firm i chooses its output q_i in order to maximize its objective function (4.1) for any given weight θ_j^S of the rival firm. From the first-order condition $\partial V_i^S/\partial q_i = 0$ we derive firm i's best response:

$$q_i(q_j) = \frac{1-(1-\theta_i^S)q_j}{(2-\theta_i^S)}.$$

[3]Varying θ_i^C between 0 and 1 is equivalent to varying t between 1 and 1/2 in the model of Königstein and Müller (2001). However, the additional restriction $\theta_i^C \leq 1$ is not necessary because, in equilibrium, it will always be fulfilled.

Inserting one reaction function into the other, we compute the equilibrium quantity of firm $i \in \{1,2\}$ as a function of θ_i^S and θ_j^S:

$$q_i = \frac{1+\theta_i^S-\theta_j^S}{3-(\theta_i^S+\theta_j^S)}.$$

At the second stage, each firm anticipates these quantities and the corresponding price and chooses the CSR level θ_i^S in order to maximize the corresponding profit

$$\pi_i = [1-(q_i+q_j)]q_i = \frac{(1-\theta_j^S)^2-(\theta_i^S)^2}{(3-\theta_i^S-\theta_j^S)^2}.$$

The first-order condition $\partial\pi_i/\partial\theta_i^S = 0$ yields the best response

$$\theta_i^S(\theta_j^S) = \frac{(1-\theta_j^S)^2}{3-\theta_j^S}. \tag{4.3}$$

Using the symmetry of firms, we compute the equilibrium weights on consumer surplus $\theta_i^S = \theta^{SS} := (5-\sqrt{17})/4 \approx 0.219$ as well as the corresponding quantities $q_i = q^{SS} \approx 0.3903$ and profits $\pi_i = \pi^{SS} \approx 0.0856$ for $i \in \{1,2\}$.

4.3.2 Competition between one CSR firm and one CO firm

Now suppose that one firm, S, has chosen CSR, whereas the other firm, C, has chosen CO as corporate culture at the first stage. Further suppose that each firm $i \in \{S,C\}$ has chosen its weight θ^i at the second stage. At the third stage, firm $i \in \{S,C\}$ chooses its output q^i in order to maximize its objective function V^i for any given weight θ^j of firm $j \neq i$, where V^S and V^C are given by (4.1) and (4.2). From the first-order conditions $\partial V^i/\partial q^i = 0$ we derive the best response functions

$$q^S(q^C) = \frac{1-(1-\theta^S)q^C}{2-\theta^S} \qquad \text{and} \qquad q^C(q^S) = \frac{1-q^S}{2-\theta^C}.$$

Solving for the equilibrium quantities as functions of θ^S and θ^C yields

$$q^S = \frac{1-\theta^C+\theta^S}{3-2\theta^C-\theta^S+\theta^S\theta^C} \qquad \text{and} \qquad q^C = \frac{1-\theta^S}{3-2\theta^C-\theta^S+\theta^S\theta^C}.$$

At the second stage, the firms maximize their anticipated profits

$$\begin{aligned} \pi^S &= \frac{(1-\theta^C)(1-\theta^C+\theta^S\theta^C-(\theta^S)^2)}{(3-2\theta^C-\theta^S+\theta^S\theta^C)^2}, \\ \pi^C &= \frac{(1-\theta^C)(1-\theta^S)^2}{(3-2\theta^C-\theta^S+\theta^S\theta^C)^2} \end{aligned}$$

by the simultaneous choice of θ^S and θ^C, respectively. From the first order conditions

$\partial\pi^i/\partial\theta^i = 0$ for $i \in \{S, C\}$, we derive the firms' best response functions

$$\theta^S(\theta^C) = \frac{1}{3-\theta^C} \qquad \text{and} \qquad \theta^C(\theta^S) = \frac{1-\theta^S}{2-\theta^S}.$$

Solving this system of equations yields $\theta^S = \theta^C = \theta^{SC} := (3-\sqrt{5})/2 \approx 0.382$. Although the two firms are not symmetric, both choose the same level of responsibility in equilibrium. Due to their differing objective functions, however, the firms produce different quantities of the good:

$$q^S = \frac{1}{3(1-\theta^{SC})+(\theta^{SC})^2} = \frac{1}{2} > \frac{\sqrt{5}-1}{4} = \frac{1-\theta^{SC}}{3(1-\theta^{SC})+(\theta^{SC})^2} = q^C.$$

Intuitively, because both C_i and CS are increasing and convex functions of the firm's own output, $C_i < CS$ implies that a marginal increase in output is, ceteris paribus, more valuable for the CSR firm than for the CO firm. Put differently, CSR offers a stronger commitment to increase output than CO. Consequently, the CSR firm also makes higher profits than the CO firm:

$$\pi^S = \frac{(1-\theta^{SC})^2}{[3(1-\theta^{SC})+(\theta^{SC})^2]^2} > \frac{(1-\theta^{SC})^3}{[3(1-\theta^{SC})+(\theta^{SC})^2]^2} = \pi^C.$$

4.3.3 Competition between two CO firms

Finally suppose that both firms have chosen CO as corporate culture at the first stage and each firm $i \in \{1, 2\}$ has chosen its CO level θ_i^C at the second stage. At the third stage, firm i chooses its output q_i in order to maximize its objective function (4.2) for any given weight θ_j^C of the rival firm. From the first-order condition $\partial V_i^C/\partial q_i = 0$ we derive firm i's best response:

$$q_i(q_j) = \frac{1-q_j}{2-\theta_i^C}.$$

Inserting one reaction function into the other, we compute the equilibrium quantity of firm $i \in \{1, 2\}$ as a function of θ_i^C and θ_j^C:

$$q_i = \frac{1-\theta_j^C}{3-2\theta_i^C-2\theta_j^C+\theta_i^C\theta_j^C}.$$

At the second stage, each firm anticipates these quantities and the corresponding price and chooses the CO level θ_i^C in order to maximize the corresponding profit

$$\pi_i = \frac{(1-\theta_j^C)(1-\theta_i^C-\theta_j^C+\theta_i^C\theta_j^C)}{(3-2\theta_i^C-2\theta_j^C+\theta_i^C\theta_j^C)^2}.$$

The first-order condition $\partial\pi_i/\partial\theta_i^C = 0$ yields the best response

$$\theta_i^C(\theta_j^C) = \frac{1}{2-\theta_j^C}. \tag{4.4}$$

Using the symmetry of firms, we compute the equilibrium weights on customer surplus $\theta_i^C = \theta^{CC} := 1$ as well as the corresponding quantities $q_i = q^{CC} := 1/2$ and profits $\pi_i = \pi^{CC} := 0$ for $i \in \{1, 2\}$. With homogeneous goods, Cournot competition between two CO firms leads to the same efficient allocation as perfect competition, i.e. zero profits and maximum consumer surplus.[4]

4.3.4 Choosing corporate culture: CSR or CO?

Combining the results from the three scenarios, we now examine the firms' decisions on corporate culture in the first stage. The possible actions and the corresponding continuation payoffs are represented in Table 4.1. Obviously, CSR is a dominant action for both firms.

		Firm 2	
		CSR	CO
Firm 1	CSR	$\pi^{SS} \approx 0.0856 \quad \pi^{SS} \approx 0.0856$	$\pi^{S} \approx 0.0955 \quad \pi^{C} \approx 0.0590$
	CO	$\pi^{C} \approx 0.0590 \quad \pi^{S} \approx 0.0955$	$\pi^{CC} = 0 \quad \pi^{CC} = 0$

Table 4.1: Normal form representation of the first stage decisions

Proposition 8 *In the unique SPE of game Γ, both firms will choose CSR as their corporate culture, put positive weight θ^{SS} on consumer surplus, and produce output q^{SS}, thereby making positive profits π^{SS}.*

As explained in Section 4.3.2, CSR provides a stronger commitment to large quantities than CO. Moreover, a CSR firm does not only suffer indirectly from a rise in the rival's quantity due to decreasing price and profit, but, unlike a CO firm, also benefits directly from it due to increasing consumer surplus. Compared to a CO firm, this makes a CSR firm react less aggressive to an increase in the rival's θ, i.e. to a tougher commitment to large quantities by the rival. Indeed, as the respective reaction functions (4.3) and (4.4) show, CSR levels are strategic substitutes, whereas CO levels are strategic complements. As a result, competition with CSR is less severe than with CO and allows for positive profits.

4.4 Discussion

The superiority of CSR over CO has been shown under the assumptions of symmetric firms, homogeneous goods, and sequential decisions about the nature of corporate culture and the level of engagement. In what follows, we briefly argue that the main result will hold even if we relax these assumptions.

[4]The result $\theta^{CC} = 1$ is equivalent to the finding that $t^* = 1/2$ for homogeneous goods ($\gamma = 1$) in the model of Königstein and Müller (2001).

4.4.1 Positive marginal costs

For simplicity, we have assumed that constant marginal costs of production equal $c = 0$ for both firms. It is straightforward to show that the firms' decisions on the level of commitment in stage 2 are not affected by the marginal cost parameter c as long as it is identical for both firms. As a consequence, a common marginal cost parameter only scales down profits but has no impact on the strategic decision between CSR and CO in stage 1. Furthermore, our result also holds for increasing marginal costs (for the calculations cf. Appendix 4.A).

Allowing for asymmetric marginal costs, Planer-Friedrich and Sahm (2021) find that the strategic interaction reinforces the cost advantage in the sense that the low-cost firm chooses a higher level of commitment than the high-cost firm and thereby increases its relative profitability compared to the regular Cournot equilibrium without commitment opportunities. Since this effect on the firms' decisions in stage 2 is stable across the three scenarios of Sections 4.3.1 to 4.3.3, CSR will remain a dominant strategy for both firms in stage 1 even if they have different marginal costs: Intuitively, the low-cost firm uses CSR to further expand its advantage while the high-cost firm uses CSR to compensate for its disadvantage.

4.4.2 Differentiated products

In their model of Cournot competition between two CO firms, Königstein and Müller (2001) incorporate the possibility of differentiated products. They find, however, that incentives to commit to large quantities are the stronger, the less differentiated the products are.[5] This is intuitive: With fully differentiated goods, the two firms are monopolists on two independent markets and do not need any strategic quantity commitment. The less differentiated the products are, however, the fiercer the competition between the firms and the stronger their strategic motives to commit to large outputs.

We thus conjecture that, qualitatively, the superiority of CSR over CO as a commitment device will hold in markets with differentiated products as well. Because the commitment incentives are weaker then, quantitatively, the advantage of CSR over CO will be less pronounced and vanish in the limit as the markets become independent.

4.4.3 Simultaneous choice of corporate culture and level of commitment

Our analysis builds on a sequential set-up with three stages. Alternatively, we can consider a two-stage game in which the firms decide about their type of corporate culture and their level of commitment simultaneously in stage 1, and about their output in stage 2. For each choice θ_j^k, $k \in \{S, C\}$ of her opponent j, player i has then two best responses as depicted in Figure 3: CSR level $\theta_i^S(\theta_j^k)$ and CO level $\theta_i^C(\theta_j^k)$.

[5] In the language of their model, the equilibrium weight on customer surplus $1 - t^*$ increases in the degree of homogeneity γ (Königstein and Müller, 2001, Proposition 1): It is zero ($1 - t^* = 0$) for independent products ($\gamma = 0$) and largest ($1 - t^* = 1/2$) for perfect substitutes ($\gamma = 1$).

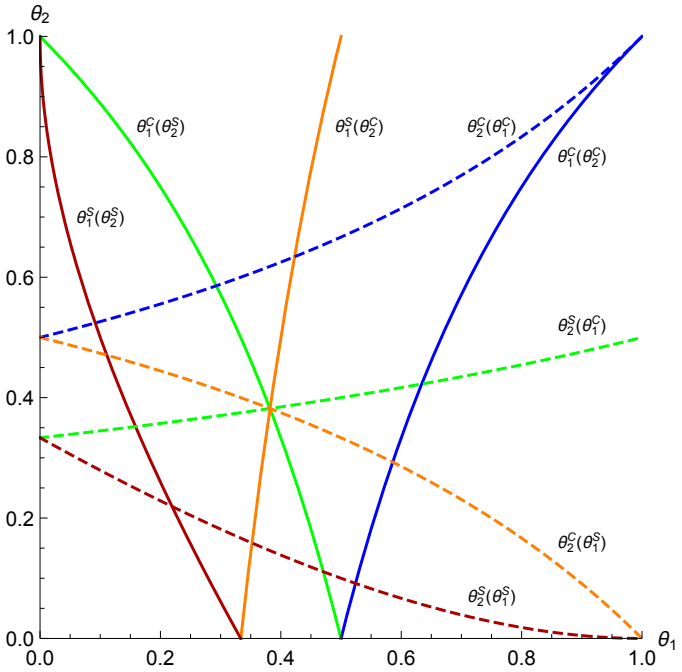

Figure 4.1: Best Response Correspondences

The modified game thus has four SPE which are represented by the intersections of same-color best responses in Figure 4.1. The respective payoffs correspond to those given in Table 4.1. While none of the four equilibria is evolutionary stable under the indirect evolutionary approach,[6] the two symmetric ones are neutrally stable with the symmetric CSR equilibrium Pareto-dominating the symmetric CO equilibrium (from the firms' perspective). Following this refinement strategy, the result that CSR outperforms CO is robust.

4.5 Conclusion

Comparing the strategic potential of CO and CSR as commitments to larger quantities in Cournot competition, we have shown that firms prefer to care for all consumers rather than for own customers only, choosing positive levels of CSR. The strategic advantage of CSR over CO contributes to an explanation for the recent shift in corporate culture from CO to CSR.

Surprisingly, this shift is associated with a decrease in welfare as measured by total surplus or consumer surplus. In our simple model, both, total surplus and consumer surplus, increase if and only if aggregate output $q_1 + q_2$ increases (as long as it does not exceed 1). Comparing the three different scenarios of Sections 4.3.1 to 4.3.3, we find that aggregate output is largest for competition between two CO firms ($q_1 + q_2 = 1$) and smallest for competition between two CSR firms ($q_1 + q_2 \approx 0.7806$). Intuitively, the fact that a firm cares not only for its own but all consumers softens competition. Weaker

[6]The indirect evolutionary approach has been introduced by Güth and Yaari (1992) and employed by Königstein and Müller (2001) in order to analyze competition between two CO firms.

competition, however, implies higher prices and a reduction in welfare.

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Appendix

4.A Increasing marginal costs

We consider the three-stage set-up as explained in Section 4.2 with increasing marginal costs such that

$$\pi_i = [1 - (q_i + q_j)]q_i - \frac{1}{2}q_i^2.$$

Again, we distinguish between the three different constellations that may arise after the first stage.

In the case of competition between *two CSR firms*, we compute the equilibrium weights on consumer surplus $\theta^{SS} := (7 - \sqrt{41})/4 \approx 0.149$ as well as the corresponding quantities $q^{SS} \approx 0.2702$ and profits $\pi^{SS} \approx 0.0877$.

In the case of competition between *one CSR firm and one CO firm*, we compute the equilibrium weights on consumer surplus and customer surplus $\theta^S \approx 0.189$ and $\theta^C \approx 0.289$, respectively, as well as the corresponding quantities $q^S \approx 0.2790$ and $q^C \approx 0.2659$ and profits $\pi^S \approx 0.0880$ and $\pi^C \approx 0.0857$.

In the case of competition between *two CO firms*, we compute the equilibrium weights on customer surplus $\theta^C := (3 - \sqrt{5})/2 \approx 0.382$ as well as the corresponding quantities $q^{CC} \approx 0.2764$ and profits $\pi^{CC} \approx 0.0854$.

Combining the results from the three scenarios, we can examine the firms' decisions on corporate culture in the first stage. The possible actions and the corresponding continuation payoffs are represented in Table 4.2. Obviously, CSR is a dominant strategy and we can thus confirm Proposition 8 also for increasing marginal costs.

		Firm 2	
		CSR	CO
Firm 1	CSR	$\pi^{SS} \approx 0.0877 \quad \pi^{SS} \approx 0.0877$	$\pi^{S} \approx 0.0880 \quad \pi^{C} \approx 0.0857$
	CO	$\pi^{C} \approx 0.0857 \quad \pi^{S} \approx 0.0880$	$\pi^{CC} \approx 0.0854 \quad \pi^{CC} \approx 0.0854$

Table 4.2: Normal form representation of the first stage decisions

Chapter 5

Strategic Social Responsibility in Three-Party Ultimatum Games

Lisa Planer-Friedrich

Abstract

I conduct a laboratory experiment with three treatments: a regular ultimatum game (Baseline treatment) and two three-party ultimatum games with an NGO (NGO treatment) and a third person (TP treatment) as third party, respectively. I find that proposers in the three-party treatments allocate positive amounts to the third party. I show that proposers do not exclusively follow social preferences, but also strategic motives play a role when giving to the third party. In addition, responders are more willing to accept a proposal the higher the proposed share for the third party suggesting potential for strategic social responsibility. Proposers in the TP treatment can improve their relative payoffs compared to payoffs in the Baseline treatment by behaving strategically socially towards the third person.

Keywords: Ultimatum Game, Experiment, Third Party, Social Responsibility, Self-Interest

JEL classification: C78, C91, D63, D64

5.1 Introduction

Corporate Social Responsibility (CSR) is by now a well-known phenomenon and has increasingly become an important concern for firms (see, e.g., KPMG, 2017). CSR describes all social and environmentally friendly activities of a firm that go beyond legal requirements (Kitzmueller and Shimshack, 2012). Different motives for CSR (co-)exist: Next to altruism by either stakeholders or management of a firm, also strategic reasons play an important role. There is evidence that firms can gain an advantage if they engage in strategic Corporate Social Responsibility in goods markets (see, e.g., Elfenbein and McManus, 2010, Etilé and Teyssier, 2016) or labor markets (see, e.g., Fehrler and Kosfeld, 2014, Koppel and Regner, 2014). But also individuals may display care for others due to differing reasons.

The present set-up builds on the well-known ultimatum game, as introduced to experimental economics by Güth et al. (1982). The game consists of a simple bargaining situation with two negotiating parties and an exogenously given pie to share. The proposer proposes a split of the pie into x and y, where x is the share she wants to keep and y is the offer to the other party. The responder can only accept or reject the offer. If the responder accepts, the proposed allocation is paid out. In case of a rejection, the negotiation fails and both walk away with nothing.

The subgame-perfect equilibrium given that both players are pure payoff-maximizers and that this is common knowledge suggests that responders should accept any offer above zero and proposers should thus offer the smallest possible amount, keeping almost all of the pie for themselves.[1] However, many experimental analyses of the game show that proposers frequently offer higher shares and very unequal splits are frequently rejected by responders.[2] In the dictator game, where no possibility to reject exists, positive offers are made as well, but they are typically smaller than in ultimatum games. This suggests that both social preferences and strategic motives exist in ultimatum games (Camerer and Thaler, 1995). Other studies of the ultimatum game also find that proposers do not (only) offer substantial shares due to social preferences, but rather display strategic fairness to increase their own payoffs by averting rejections (see, e.g., Carpenter, 2003, van Dijk et al., 2004).

In the present experiment, I investigate a standard ultimatum game as the Baseline treatment. In two further treatments, I examine two extensions of the ultimatum game with a third party. The third party is a non-profit organization (NGO treatment) and a third person in the lab (TP treatment), respectively. In these treatments, the proposer suggests a split into x, y and z, where z is the share intended for the third party. Accepting the proposal leads to the proposed allocation, whereas a rejection leaves all three with a payoff of zero.

Payoff-maximizing players and common knowledge about this imply the same subgame-perfect equilibrium as for the regular ultimatum game. As the third party has no bargaining power, there is no need to allocate a positive amount to it. Evidence from similar

[1] In fact, even the responder accepting any offer including zero and the proposer offering zero is a subgame-perfect equilibrium.

[2] For an overview, see, e.g., the surveys by Camerer and Thaler (1995) and Güth and Kocher (2014).

set-ups with a third person in the lab is mixed with rather fair splits among all three to very small amounts allocated to the third person (Güth et al., 2007, Güth and van Damme, 1998). In this chapter, I further investigate a three-party ultimatum game varying the type of third party and compare the behavior of players to the regular ultimatum game. I am especially interested in the shares given to third parties as well as the shares of the other players compared to the Baseline treatment. Positive offers for the third party can be motivated by social preferences and I control for this using the result from a dictator game in the first part of the experiment. If third parties receive positive amounts, however, while proposers still keep rather high (selfish) shares for themselves, I conclude that also strategic motives play a role. Proposers thus display social behavior strategically to convince the responder to accept a lower offer and I call this behavior strategic social responsibility. I shed light on the question, whether the third party is used for strategic social responsibility in both three-party treatments and whether this pays off for proposers.

I find that proposals do not imply a significant difference between absolute shares for proposers in the TP treatment compared to the other treatments. Furthermore, in the presence of a third person, proposers attempt to reach higher relative shares, measured as the difference $x - y$, than in the other two treatments. This behavior is not clearly influenced by social preferences and the effect of proposers' social preferences on x and z is also not always significant depending on the estimated model. By contrast, proposers claim higher shares for themselves in all treatments over time as they gain more experience, lowering the offers for both other parties in the three-party treatments. Still, a substantial proportion of selfish proposals includes a positive z. I show that social preferences, measured by behavior in a dictator game in the first part of the experiment, can explain the proposed shares to third parties in the NGO treatment. In the TP treatment, strategic social responsibility also plays a role.

Further, I show that responders' probability to accept a proposal depends positively on y and z, but responders are clearly more concerned with their own share. It is thus more effective to increase y rather than z in order to induce the responder to accept. Nonetheless, proposers attempt to use the positive effect of z on the probability to accept strategically, especially in the TP treatment. Accordingly, rejection rates are highest in the TP treatment and the final payoffs over all rounds are smaller than in the Baseline treatment. Also in the NGO treatment, payoffs are lower than in the Baseline treatment. In this treatment, proposers offer higher y's and smaller z's than in the TP treatment and thus do not try to take advantage of the possibility of strategic social responsibility equally strongly. Relative payoffs of proposers, however, are biggest in the TP treatment. I thus show that strategic social responsibility is useful if the bargainer is concerned about her relative standing.

The remainder of this chapter is structured as follows. In Section 5.2, I discuss the related literature. In Section 5.3, I form hypotheses about the behavior of participants in the experiment. Section 5.4 introduces the experimental design and explains the procedures in the lab. In Section 5.5, I present the results with respect to proposer and responder behavior as well as final outcomes. I discuss the results in Section 5.6. Section 5.7 concludes.

5.2 Related literature

Several experimental studies of three-person (and three-player) ultimatum games exist. To my knowledge, only the experimental designs of Güth and van Damme (1998) and Güth et al. (2007) are strategically equivalent to the present design. As in my Third Person treatment, Güth and van Damme (1998) analyze a three-person ultimatum game, where the proposer offers a split (x, y, z) and the responder may accept (leading to the proposed split) or reject (leading to payoffs of zero for all). In the six-round treatment comparable to my set-up, proposers claim approximately 60% of the cake, offer 30% to the responder and less than 10% for the third person. In my third party treatments, proposers offer somewhat more for third persons, leaving less for themselves. Güth and van Damme (1998) also vary the information about the split available to responders prior to making their decision. They find that proposers become greedier the less useful they believe the information given to the responders to be. They conclude that proposers only want to appear fair to avoid rejections. I show that if proposers believe responders to have social preferences, they dare to claim similar amounts for themselves as in the normal ultimatum game also in a full information setting and are able to improve their relative profit.

Güth et al. (2007) consider the same general set-up for the three-person ultimatum game as a one-shot game. The choice set for the proposer was restricted as the experiment was conducted through a newspaper with readers as voluntary participants. Further, participants had to answer both in the role of the proposer and the responder and the situation was framed by the newspaper as three brothers sharing an amount received from their aunt. In this set-up, the equal split was by far the most frequent decision and also on average proposals were closer to the equal split than in Güth and van Damme (1998). I thus see that results in this game are rather context-dependent which also helps to explain that my results differ somewhat from the results in both experiments. In both studies, a comparison to a Baseline treatment, i.e., a regular ultimatum game conducted under the same experimental design and circumstances, is not made. Including such a treatment in the analysis enables me to explore the effects of changing the strategic possibilities directly.

Sääksvuori and Ramalingam (2015) also use the same general experimental design for the three-person ultimatum game. However, they allow for verbal communication between the bargaining parties and manipulate if and how the third player can observe this communication. Proposals exhibit similar average shares for responders as in my NGO treatment and similar average shares for the third person as in my TP treatment. Thus the proposer tries to capture only a smaller share than in my treatments. This observation can probably be attributed to the use of communication which eliminates all rejections but also riskier strategic behavior.

In a related strand of literature, the third person is in the role of a hostage, i.e., the payoff of the third person is exogenously given but also reduced to zero in case of rejection. Fershtman and Gneezy (2001) find that the shares proposers wish to keep, x, are significantly higher in this set-up than in a regular ultimatum game. By contrast, Shupp et al. (2006) find that proposals are not significantly affected by the presence of

a hostage. Further, responders are more willing to reject an offer the lower their payoff relative to the hostage would be. The experiment by Schmitt et al. (2008) also supports the finding that offers do not change in the presence of a hostage. However, responders were more accepting of unfavorable offers.

Though similar, the present set-up differs in two strategic aspects. On the one hand, allocating a positive share to the third party reduces the pie to be shared by proposer and responder and may thus be perceived negatively by the responder. On the other hand, the fact that the proposer actively shows social responsibility towards the third party may appease the responder if she has social preferences. Proposers in the TP treatment seem to rely on the latter when making higher offers to the third party than proposers in the NGO treatment and claiming similar shares as in the Baseline treatment.

Other experiments with three-person ultimatum games also differ from the present experiment in the possibilities of strategic behavior. For example, in the first three-person set-up by Oppewal and Tougareva (1992), the third person receives an exogenously determined percentage of the offer to the responder, which eliminates the possibility of being socially responsible to one while taking advantage of the other's social preferences. In the experiment of Kagel and Wolfe (2001), one out of player 2 and player 3 is randomly chosen to respond to the proposal and the resulting non-responder receives a predetermined consolation price upon rejection, so that strategic social responsibility is not possible as in the present experiment. McDonald et al. (2013) use the third person only as a reference group receiving a fixed payment regardless of the bargaining outcome. While proposers can use this reference payment strategically, strategic social responsibility cannot be used here.

To my knowledge, a three-party ultimatum game with a charity or non-profit organization has not yet been considered and thus also not compared to a three-person treatment in the existing literature. However, Eckel and Grossman (1996) experimentally analyze a dictator game with either a charity or an anonymous person in the lab as the recipient. They show that dictators gave a significantly higher amount to charity than to a fellow participant, apparently deeming the charity a more deserving recipient. These findings suggest that, also in a three-party ultimatum game, the identity of the third party may play a role for the decisions of both proposers and responders.

This chapter is also related to other studies investigating in how far Corporate Social Responsibility influences market outcomes. Both Etilé and Teyssier (2016) and Feicht et al. (2016) consider an experimental market in which sellers can connect the sale of a virtual good with a donation to charity. In both studies, the credibility of this socially responsible behavior is varied. While both find that a share of sellers donates and buyers in principle appreciate this, only Etilé and Teyssier (2016) can show that buyers also pay higher prices for these socially responsible goods (if the commitment to donate is actually credible). Elfenbein and McManus (2010) study data from eBay comparing prices from charity and noncharity auctions of identical goods. They find that prices as well as bids below the winning bid are higher in auctions where (parts of) the generated revenue go to charity.

Corporate Social Responsibility also plays a role in employer-employee relationships which are strategically closer to the present one-on-one ultimatum bargaining situation.

Koppel and Regner (2014) show in a gift exchange game experiment that if participants in the role of employers donate a share of the firm's profits, participants in the role of workers reciprocate this social responsibility and employers can generally increase their profits using CSR. Fehrler and Kosfeld (2014) show in an experimental labor market experiment that workers provide the same effort if they can generate a donation to an NGO or a payment to an anonymous student from their university as if no donation/extra-payment is attached. In a second experiment, they find that a share of their subjects self-select into working contracts which are additionally connected to a donation to an NGO rather than a payment to an anonymous student and they exert more effort than the other subjects, even if the alternative contract offers them a higher wage.

5.3 Hypotheses

The game-theoretic solution of the ultimatum game under pure payoff-maximization is simple. A payoff-maximizing individual in the role of the responder should accept any positive offer as it makes her better off than a payoff of zero. Knowing this, a payoff-maximizing proposer offers the smallest positive amount possible. In this case, the offer of the proposer would be 1 point, leaving the rest for the proposer and the responder accepts this in the subgame-perfect equilibrium. The presence of a third party does not change the equilibrium, as the third party has no negotiation power and any positive amount given to the third party only reduces the payoff of the others. The proposer should allocate 1 point to the responder and keep the rest for herself in the NGO and TP treatments. Additionally, even the responder accepting any offer including zero and the proposer offering zero are strategies that form a subgame-perfect equilibrium if no minimum offer is required. However, experimental investigations of the regular as well as the three-person ultimatum game show that individuals do not behave like pure payoff-maximizers (see, e.g., Camerer and Thaler, 1995, Güth et al., 2007, Güth and van Damme, 1998). As responders frequently reject very unfavorable proposals, proposers have to offer considerably more than the smallest possible amount.

Payoff-maximization also abstracts from social preferences which typically play a role in the strategic use of (corporate) social responsibility.[3] If, however, proposers believe that such motives exist, they may behave socially responsible towards the third party in order to make the responder more accepting of unfavorable offers. The literature already mentions some signs in favor of strategic social responsibility possibilities. Güth and van Damme (1998) find that proposers only want to avert rejections and, therefore, "make offers which *appear* fair" (cf. p. 230). In an ultimatum game experiment, van Dijk et al. (2004) show that on average offers to responders went down if those received less information about the proposal and the authors conclude that "strategic fairness" plays a role. They attribute this strategic behavior to participants they call "proselfs" due to some pre-experimental test of social value orientation. Also Carpenter (2003) finds that egoistic participants make more selfish proposals if they expect responders to be more accepting. As the literature on Corporate Social Responsibility shows, consumers' will-

[3] I discuss the role of social preferences in more detail in Section 5.6.

ingness to pay rises if a donation is connected to the purchase (Elfenbein and McManus, 2010, Etilé and Teyssier, 2016). If similar considerations play a role in the present set-up, proposers may believe responders to be more accepting of offers that include a positive share for the third party and thus they may use strategic social responsibility to gain an advantage.

Hypothesis 1 *Compared to the Baseline treatment, proposers propose higher shares for themselves in the NGO and in the TP treatment.*

Social preferences are measured in the present experiment in a dictator game played before the actual treatment. In the dictator game, participants are asked to divide 40 points between themselves and an NGO. I expect that participants try to profit less from strategic social responsibility (or any other strategy) the more generous they behaved in the dictator game. More precisely, I expect the following.

Hypothesis 2 *The higher the share a proposer donated in the dictator game, the lower the proposed shares, x, for this proposer in the ultimatum game.*

The effect on offers, y, may go either way. The social preferences I measure may include the responder or be only directed towards the third party, possibly at the expense of the responder. Because of the possibility to use z for strategic purposes, the effect on z is also not clear.

Güth and van Damme (1998) let their participants play several rounds and observe some learning. In particular, the proposed share of the proposer, x, tends to go up whereas the other shares tend to go down. Under the expectation that proposers will also learn more about the possibilities of using strategic social responsibility and use it more frequently or heavily as they gain more experience with the game, also the share for the third party is expected to go up.

Hypothesis 3 *The more periods the game has already been played for,*

(a) the higher I expect proposed shares of the proposer and the third party to be,

(b) the lower I expect proposed offers to the responder to be.

If responders are indeed susceptible to strategic social responsibility as suggested by evidence from studies on CSR (cf. Elfenbein and McManus, 2010, Etilé and Teyssier, 2016), I expect them to be more accepting the higher the offer to the third party.

Hypothesis 4 *The probability of a responder to accept an offer will be higher,*

(a) the higher the offer for herself, y,

(b) the higher the offer for the third party, z.

Thus taking the hypotheses together, I expect that strategic social responsibility pays off for proposers (and third parties) as will be visible in the negotiation outcomes.

Given that I consider two three-party treatments, I could expect results to differ between them due to the differing recipients of z. No respective evidence from three-party ultimatum games exists. Fehrler and Kosfeld (2014) show in their experimental

labor market that participants prefer a contract that generates a donation to an NGO rather than to a randomly determined student from their university. As mentioned before, Eckel and Grossman (1996) found that participants give significantly more to an NGO than to a completely anonymous person in a different room when playing a dictator game. Different to the aforementioned studies, in my TP treatment the third persons are participants of the experiment and also present in the same room. They were only anonymous in the sense that no participant knew who of the other participants was in the role of the third person. Due to this proximity and the possibility of sensing the atmosphere in the room, participants may be more reluctant to give very little to third persons. Furthermore, it is clear to participants that third persons spend as much time in the experiment as everyone else without any possibility of acting, which possibly makes them seem more deserving than a far-away NGO. I thus have ambiguous expectations concerning differences between the treatments.

5.4 Experimental design and procedures

I test the predictions derived in Section 5.3 in an ultimatum game experiment with three treatments: one two-person and two three-party versions. This enables me to investigate the effects of a third party in the ultimatum game on the decisions of proposers and responders as well as to compare the results with an NGO and a person in the lab as third party, respectively, under controlled ceteris paribus conditions. In this section, I describe the design and procedures of the experiment.

5.4.1 Experimental design

In the beginning, I measure the social preferences of the participants (Part 1). I let the participants play a dictator game: Participants can dispose of 40 points of which they may give as many as they wish to an NGO. This way of eliciting participants' social preferences has been used by Etilé and Teyssier (2016) and I deem it preferable to just eliciting participants' social preferences via the questionnaire. If I ask questions about participants' real-life donation behavior, answers may be biased as they depend on social image concerns and the real-life financial means of participants. Clearly, also answers to hypothetical questions are likely to suffer from biases. The dictator game is played before the participants receive any information about the main part of the experiment (see the instructions in Appendix 5.C).

In the main part of the experiment (Part 2), the participants play 16 rounds of the basic ultimatum game (Baseline treatment), the ultimatum with an NGO as a third party (NGO treatment) or the ultimatum game with a third person in the lab as a third party (TP treatment), respectively. In each round, the proposer of the Baseline (NGO or TP) treatment proposes a split of 100 points (150 points)[4] between the responder (as well as the NGO or the third person) and herself. More precisely, the proposer chooses the

[4]The amount of points to be split is varied across treatments in order to guarantee the same expected payment for all participants in the experiment, irrespective of the treatment they were assigned to.

shares for the responder y (and the third party z) while the proposer's own share x follows implicitly from this proposal. Any integer between 0 and 100 (150) can be chosen for each of the shares, as long as the sum equals 100 (150), so there is no minimum amount required. The responder receives full information about the proposal. The responder has the choice between accepting and rejecting the offer. If the responder accepts, the proposed allocation is attributed to the participants (including the NGO and the third person, if applicable) as their income in this round. If the responder rejects the offer, all participants (including the NGO and the third person, if applicable) receive zero points as their income in this round. At the end of each round, all players (including the third person, but not the NGO) receive full information about the proposal and the decision of the responder.

As the NGO I chose UNICEF for this experiment, as it is an organization that is neither politically nor religiously bound and was deemed as a worthy cause by a non-representative sample of colleagues. Participants received information about UNICEF in the beginning of the experiment and when asked in the questionnaire many claimed to have already known UNICEF well before the experiment (Min.: 1, 1st Qu.: 4, Median: 5, Mean: 5.229, 3rd Qu. 6, Max.: 7; on a 1-7 scale, where 1 was no and 7 very high knowledge). Furthermore, most participants did rather approve of UNICEF and its goals (Min.:1, 1st Qu.: 4, Median: 5, Mean: 4.856, 3rd Qu.: 6, Max.: 7; on a 1-7 scale, where 1 was very little and 7 was very high approval), showing that UNICEF was a fairly good choice.

5.4.2 Procedures in the lab

The experiment was conducted at the Bamberg Laboratory for Experimental Research between June 2018 and November 2019. Participants were invited using the ORSEE recruitment system (Greiner, 2015). The experiment was programmed in z-Tree (Fischbacher, 2007). The experiment was conducted in seven sessions (two per Baseline and NGO treatment, three for the Third Person treatment) à 12 to 18 participants. A total of 118 participants participated in the experiment; 30 in the Baseline treatment, 34 in the NGO treatment and 54 in the Third Person treatment.[5] Participants were mostly students from the University of Bamberg and between 18 and 64 years old (median: 23); 45.76 % were female.

When participants arrived at the lab they were randomly assigned a seat and computer. On their desk they already found some general instructions concerning the lab and the experiment. When the experiment started, participants received instructions for Part 1. They were given time to read the instructions at their own pace. Then the instructions were also read aloud and afterwards participants were asked to answer some comprehension questions. The experimenters checked the participants' answers and explained mistakes if necessary. Additionally, the instructions contained some general information on the recipient in this part of the experiment, UNICEF. Then, the participants

[5]As the number of proposers and responders is smaller in the Third Person treatment, fewer participants were needed in the other two treatments to reach a similar amount of observations in all treatments.

started Part 1. Up until here, treatments did not differ. More precisely, when making the decision in Part 1, participants did not know what they would be asked to do in Part 2.

Once all participants had finished Part 1, they received instructions for Part 2. Again, they were given time to read at their own pace. The instructions were then read aloud and afterwards participants were asked to answer some comprehension questions. The experimenters checked the participants' answers and explained mistakes if necessary. The instructions described all possible roles, such that all information was common knowledge. In the beginning of part 2, participants were then randomly and privately assigned one role which they kept throughout this part of the experiment. The roles were called "Player A" (proposer), "Player B" (responder) and - this role only existed in the Third Person treatment - "Player C" (third person). The participants then played 16 rounds of the ultimatum game. In each round they were anew randomly[6] matched into groups of two (three in the Third Person treatment) to play with each other. In each round there were 100 (150) points to be allocated in the Baseline (NGO and Third Person) treatment. Once all participants had made their 16 decisions, one of the sixteen rounds was determined and only the incomes from this round were paid out. To determine the relevant round, one participant was randomly selected to throw a sixteen-sided die.

Finally, participants were asked to fill out a questionnaire containing questions on demographics, attitudes and their behavior in the experiment. Participants were then paid individually and privately in a separate room. All earnings from the experiment were converted at the rate 1 point = 10 Eurocents. In addition, participants received 4€ as a participation fee. Donations to UNICEF from the first part of the experiment (and in case of the NGO treatment also from the second part of the experiment) were handed to the participants so that they could put them into a piggy bank installed for this purpose. Participants received a receipt signed by the experimenter stating their payment as well as their donation to UNICEF and attesting that all donations would be aggregated and transferred to UNICEF via bank transfer by the experimenter. Participants were told that they could inquire about proof of the bank transfer via e-mail after the experiment.

Sessions lasted 50 minutes on average (excluding payment). Average total earnings were €11.89 with a standard deviation of €2.98(Baseline: average €11.80, sd €1.43; NGO: average €13.52, sd €2.43; Third Person: average €10.91, sd €3.48) including the show-up fee of €4.[7] Average donations to UNICEF were €1.39 with a standard deviation of €1.39 (Baseline: average €1.20, sd €1.20; NGO: average €1.76, sd €1.82; Third Person: average €1.26, sd €1.15). In the main (second) part of the experiment, I collected 1888 choices.

[6]There were not enough players in one session to facilitate a perfect stranger matching. However, there were enough participants to make a direct educating effect of one responder's decision on one proposer unlikely.

[7]I observe the smallest average earnings and the highest variation in earnings in the Third Person treatment, especially due to rather small shares given to the third person.

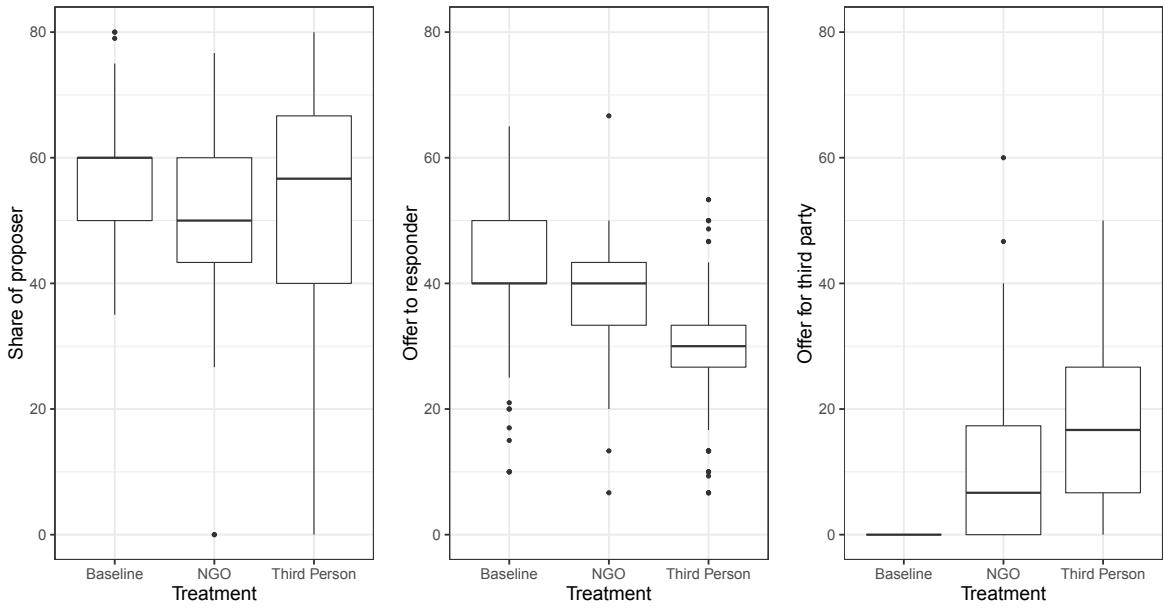
5.5 Experimental results

The decisions of proposers and responders are analyzed separately in Subsections 5.5.1 and 5.5.2. Subsection 5.5.3 consists of the analysis of the resulting payoffs. As the amount to be split was varied across treatments, all shares are transformed into percentages for the analysis. All results presented are based on these percentage values for the share of the proposer, the offer to the responder, and the offer for the third party.

5.5.1 Analysis of proposers' decisions

In all treatments, the participants in the role of the proposer propose a complete allocation of the pie. Therefore, I analyze the proposed values of all three shares. I also calculate the difference between the share of the proposer and the offer to the responder in order to analyze the relative performance of the proposer in the different treatments. With the donations in the dictator game (Part 1 of the experiment), I measure the individual social preferences of the participants. My interpretation is that, for most participants, the higher the donation, the stronger the participant's social preferences. For this part of the analysis, I only consider the donations made by the proposers. Figures 5.1 to 5.3 display box-and-whisker-plots of all these variables with median (horizontal line), interquartile range (box), all values which still fall within 1st quartile - 1.5×interquartile range and 3rd quartile + 1.5×interquartile range, respectively, (whiskers) and potential outliers (dots). Complete summary statistics can be found in Table 5.10 in Appendix 5.B.

Figure 5.1: Box-and-whisker-plots for the proposed shares in percent in the separate treatments



The relation between the three shares in proposed allocations can to a large part be described by:

$$\text{Share of proposer} \geq \text{Offer to responder} \geq \text{Offer for third party.}$$

Figure 5.2: Box-and-whisker-plots for the proposed differences between the share of the proposer and the offer to the responder in the separate treatments

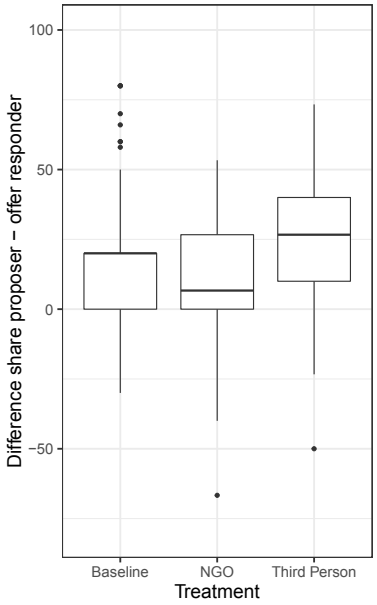
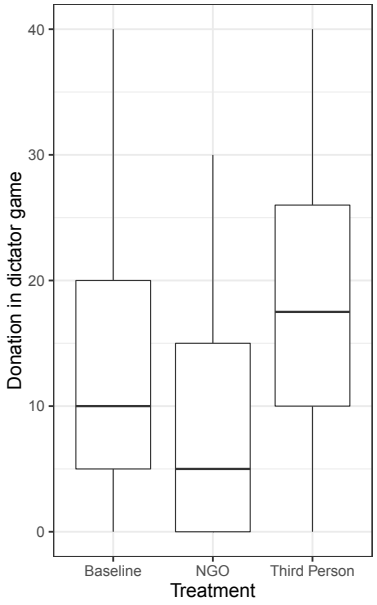


Figure 5.3: Box-and-whisker-plots for the donations in the dictator game (only proposers) in the separate treatments



This is true for 93% of all proposed allocations, for 94.58% of proposed allocations in the Baseline treatment, 94.12% in the NGO treatment, and 90.63% in the TP treament. Given the results from experimental studies of the (three-person) ultimatum game (e.g., Güth et al., 2007, Güth and van Damme, 1998), this was to be expected.

In order to test for differences between treatments concerning the shares of proposer, responder and the third party as well as the difference between the shares of proposer and responder, I use random effects models with the data from the two treatments for which I want to compare the shares and estimate a treatment effect via a respective dummy variable only. To test for differences between treatments concerning the donations in the dictator game, I use the Wilcoxon-Mann-Whitney test.[8] The results are shown in Table 5.1. I find that the share the proposer wants to keep in the TP treatment is not significantly different from the share in the Baseline or NGO treatment, while the shares in Baseline and NGO treatment differ significantly. The offer to the third party is higher if it is a person than if it is an NGO. This is at the expense of responders: The offers are lower in the TP treatment than in the other two treatments. Thus the difference between the proposer share and the offer to the responder is higher in the TP treatment than in the other two treatments. The results from this aggregate analysis suggest that the differing strength of social preferences among individuals in the different treatments (as measured by the donation in the dictator game) can explain the differences in z. I will, however, show in the panel analysis that this relation is not clear on an individual level. Social preferences cannot, on an aggregate level, explain the offers to responders. Rather, it seems that proposers want to let responders in the TP treatment "pay" for the high values of z. This clearly suggests that proposers are using socially responsible

[8] I comment on the econometric methods used in more detail in Appendix 5.A.

Table 5.1: Results from comparisons of proposed allocations

	Average value	Compared to NGO treatment	Compared to Third Person treatment
Share of proposer x			
Baseline treatment	56.88	$p = 0.002$	$p = 0.144$
NGO treatment	51.16	-	$p = 0.199$
Third Person treatment	54.04	-	-
Offer to responder y			
Baseline treatment	43.12	$p = 0.143$	$p = 0.000$
NGO treatment	37.72	-	$p = 0.014$
Third Person treatment	29.13	-	-
Offer for third party z			
NGO treatment	11.12		$p = 0.011$
Third Person treatment	16.83	-	-
Difference between share of proposer and offer to responder x-y			
Baseline treatment	13.76	$p = 0.954$	$p = 0.000$
NGO treatment	13.44	-	$p = 0.035$
Third Person treatment	24.92	-	-
Donation in dictator game (only proposers)			
Baseline treatment	14.87	$p = 0.053$	$p = 0.248$
NGO treatment	8.82	-	$p = 0.026$
Third Person treatment	18.39	-	-

Notes: P-values are based on the coefficient of the treatment effect in a random effects model with session-clustered standard errors and the treatment dummy as the only explanatory. The direction of the effect corresponds to the difference between averages. P-values of the differences between donations in the dictator game are based on one-sided Wilcoxon-Mann-Whitney tests (alternative hypothesis based on averages).

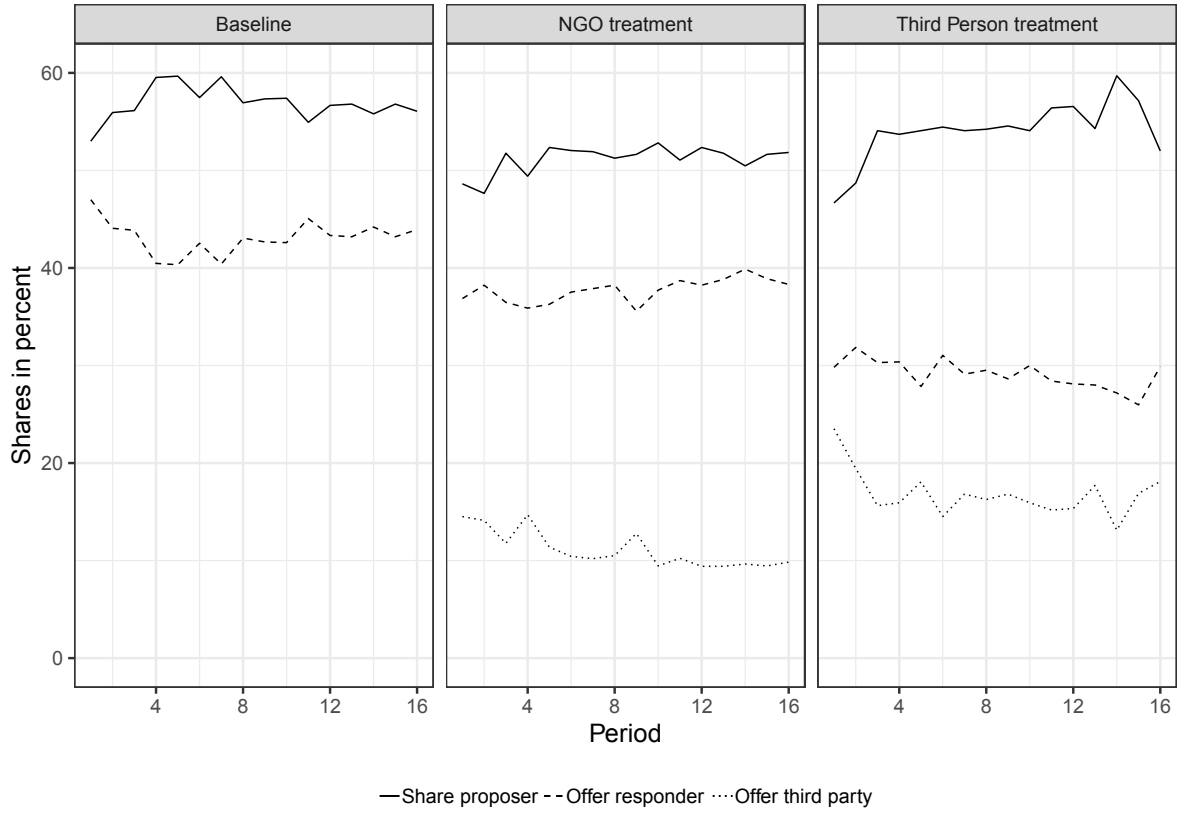
behavior strategically.

In the aggregate analysis, I cannot fully account for the influence of individual differences and how proposals change over time. Figure 5.4 displays the average shares over the 16 periods for the separate treatments. The figure suggests a time trend for the shares. Given that the curves are often steeper for the first periods, I include 1/Period as explanatory variable in the regression analysis presented in Tables 5.2 to 5.4 to account for a stronger effect of experience and learning about the game and the responders' reactions in early periods.

Table 5.2 shows the results of the panel regressions with the share of the proposer x as dependent variable. I do not find a general treatment effect for the NGO or TP treatment. However, using interaction terms I shed light on how other explanatory variables influence x in the different treatments. In all treatments, I observe an increase over time which is most pronounced in the TP treatment.[9] Both in the NGO and in the TP treatment, social preferences, as measured by the donation in the dictator game, lead to a decrease

[9]For the interpretation of the coefficients, note that the variable 1/Period is decreasing over time. Thus a positive (negative) coefficient signifies a decrease (increase) of the dependent variable over time.

Figure 5.4: Averages of the proposed shares in percent in the separate treatments over periods



in x and this effect is higher and more significant in the NGO treatment.[10] Only in the Baseline treatment, I observe that having experienced a rejection in a previous period leads proposers to make significantly smaller claims.

Table 5.3 shows the results of the panel regressions with the offer y to the responder as dependent variable. I find a clear treatment effect with respect to the TP treatment. The offer to the responder is significantly and considerably smaller in the TP treatment than in the Baseline and NGO treatment. Both in the Baseline treatment and the TP treatment, offers also decrease over time. Again, only in the Baseline treatment, I observe that having experienced a rejection has an effect; proposers increase their offer y afterwards. Social preferences have no clear effect on y.

In Table 5.4, the results of the panel regressions with the offer z to the third party as dependent variable are given.[11] The results are also widely confirmed by a Tobit model (see Table 5.11 in Appendix 5.B). The results show that z is generally higher in the TP treatment than in the NGO treatment and I cannot simply attribute this difference to stronger social preferences in the TP treatment. Rather, the positive effect of social preferences on z is higher in the NGO treatment than in the TP treatment and when I consider the estimates of model 2 and the Tobit model it is insignificant for the

[10]Remember that the donation in the dictator game could be anything between 0 and 40 points. I.e., although the coefficients look small, the effect is substantial for individuals who made a high donation.

[11]For obvious reasons only data from the two treatments with a third party is used.

Table 5.2: Results of panel regressions using random effects with the share x the proposer wants to keep as dependent variable

	(1)	(2)
Intercept	60.545***	73.119***
	(1.225)	(18.753)
NGO treatment	-1.755	-2.303
	(5.737)	(5.834)
Third Person treatment	4.079	5.806
	(4.601)	(4.785)
Donation from dictator game × Baseline	-0.084**	0.134
	(0.036)	(0.108)
Donation from dictator game × NGO	-0.750***	-0.663***
	(0.248)	(0.240)
Donation from dictator game × Third Person	-0.328	-0.290*
	(0.206)	(0.158)
1/Period × Baseline	-5.943***	-6.075***
	(0.618)	(0.604)
1/Period × NGO	-4.365**	-4.508**
	(2.076)	(2.070)
1/Period × Third Person	-13.217**	-13.013**
	(6.720)	(6.513)
Reject in past × Baseline	-3.553***	-3.752***
	(0.083)	(0.109)
Reject in past × NGO	-0.239	-0.442
	(4.522)	(4.481)
Reject in past × Third Person	-3.050	-2.831
	(4.321)	(4.131)
Further controls		
Age		-0.165
		(0.131)
Female		-2.191
		(2.310)
Siblings		-0.153
		(0.463)
Final school grade		-3.591
		(2.606)
Final math grade		-1.654
		(1.487)
Risk taking		0.108
		(1.034)
Generosity		1.119
		(0.690)
Importance payment		0.715
		(1.571)
Importance payment responder		-1.140
		(0.736)
No. observations	800	800
No. individuals	50	50
R^2	0.178	0.275

Notes: Session-clustered standard errors in parentheses. $^*p < 0.10$ $^{**}p < 0.05$ $^{***}p < 0.01$

TP treatment (for the NGO treatment only in the Tobit model). In both treatments, proposers decrease their offers for the third party, z, over time. In neither treatment can I observe an effect of the experience of a rejection in at least one previous period. Considering the additional controls in model 2 shows that participants who claim that

Table 5.3: Results of panel regressions using random effects with the offer y to the responder as dependent variable

	(1)	(2)
Intercept	39.267***	17.669
	(1.299)	(15.919)
NGO treatment	-2.150	-2.443
	(3.692)	(3.516)
Third Person treatment	-12.609***	-17.639***
	(2.095)	(3.223)
Donation from dictator game × Baseline	0.085**	-0.075
	(0.039)	(0.054)
Donation from dictator game × NGO	-0.003	-0.020
	(0.069)	(0.087)
Donation from dictator game × Third Person	0.030	0.189
	(0.067)	(0.159)
1/Period × Baseline	6.192***	6.208***
	(0.665)	(0.719)
1/Period × NGO	-0.345	-0.445
	(0.928)	(0.928)
1/Period × Third Person	4.329***	4.287***
	(1.304)	(1.334)
Reject in past × Baseline	3.928***	3.952***
	(0.097)	(0.201)
Reject in past × NGO	1.884	1.743
	(1.277)	(1.303)
Reject in past × ThirdPerson	1.750	1.705
	(1.378)	(1.294)
Further controls		
Age		0.145
		(0.136)
Female		1.028
		(2.173)
Siblings		0.895***
		(0.229)
Final school grade		4.712*
		(2.515)
Final math grade		0.126
		(1.394)
Risk taking		1.109
		(0.910)
Generosity		-0.658
		(0.732)
Importance payment		0.540
		(1.312)
Importance payment responder		0.539
		(0.578)
No. observations	800	800
No. individuals	50	50
R^2	0.277	0.364

Notes: Session-clustered standard errors in parentheses. $^*p < 0.10$ $^{**}p < 0.05$ $^{***}p < 0.01$

they care much about their own payment make smaller offers to the third party. This is not surprising given that the proposer can only increase her share by reducing at least one of the other shares. However, a substantial fraction of proposals consists of $x > 50$ and $z > 0$ (in the NGO treatment 29.04% and in the TP treatment even 45.14% of

Table 5.4: Results of panel regressions using random effects with the offer z for the third party as dependent variable

	(1)	(2)
Intercept	3.856	-0.409
	(2.730)	(14.322)
Third Person treatment	4.395	7.279***
	(4.923)	(1.251)
Donation from dictator game × NGO	0.755**	0.565**
	(0.326)	(0.262)
Donation from dictator game × Third Person	0.301**	-0.037
	(0.145)	(0.121)
1/Period × NGO	5.001***	5.106***
	(1.158)	(1.080)
1/Period × Third Person	9.393*	9.246*
	(5.461)	(5.211)
Reject in past × NGO	-1.234	-1.085
	(3.234)	(3.107)
Reject in past × ThirdPerson	1.845	1.686
	(3.719)	(3.515)
Further controls		
Age		0.523
		(0.339)
Female		1.780
		(1.490)
Siblings		-0.703
		(1.043)
Final school grade		-0.900
		(1.725)
Final math grade		1.706
		(1.217)
Risk taking		-0.896
		(0.878)
Generosity		-0.674
		(0.410)
Importance payment		-2.009*
		(1.104)
Importance payment responder		0.822
		(1.162)
Importance payment third party		1.606
		(1.552)
No. observations	560	560
No. individuals	35	35
R^2	0.288	0.434

Notes: The models consist only of data from the NGO and the TP treatment. Session-clustered standard errors in parentheses. $^*p < 0.10$ $^{**}p < 0.05$ $^{***}p < 0.01$

all proposals). Thus even rather selfish proposers show social responsibility towards the third party possibly out of strategic motives.

While proposers in the TP treatment do not try to reach a higher share than proposers in the Baseline treatment, they do try to improve their relative share compared to responders. In Table 5.5 I find a high and positive effect for the TP treatment on differences between x and y in the proposals. By contrast, in the NGO treatment, responders choose a similiar difference $x - y$ as in the Baseline treatment. Social preferences further decrease $x - y$ in the NGO treatment and (less strongly) in the TP treatment. I also find

Table 5.5: Results of panel regressions using random effects with the difference $x - y$ between the proposed share for the proposer and the proposed share for the responder as dependent variable

	(1)	(2)
Intercept	21.167***	55.425*
	(2.481)	(33.577)
NGO treatment	0.382	0.058
	(9.869)	(9.197)
Third Person treatment	16.617**	23.345***
	(7.668)	(7.562)
Donation from dictator game × Baseline	-0.169**	0.208
	(0.073)	(0.131)
Donation from dictator game × NGO	-0.746***	-0.642***
	(0.178)	(0.156)
Donation from dictator game × Third Person	-0.357	-0.480*
	(0.273)	(0.287)
1/Period × Baseline	-11.988***	-12.115***
	(1.256)	(1.313)
1/Period × NGO treatment	-3.867	-3.830
	(2.934)	(2.928)
1/Period × Third Person treatment	-17.349**	-17.038**
	(7.959)	(7.806)
Reject in past × Baseline	-7.260***	-7.451***
	(0.092)	(0.230)
Reject in past × NGO	-1.908	-1.855
	(5.740)	(5.745)
Reject in past × Third Person	-4.589	-4.253
	(5.239)	(5.026)
Further controls		
Age		-0.312
		(0.230)
Female		-3.244
		(4.377)
Siblings		-1.054**
		(0.475)
Final school grade		-8.289*
		(5.013)
Final math grade		-1.781
		(2.772)
Risk taking		-1.015
		(1.871)
Generosity		1.786
		(1.156)
Importance payment		0.156
		(2.822)
Importance payment responder		-1.662*
		(0.986)
No. observations	800	800
No. individuals	50	50
R^2	0.114	0.218

Notes: Session-clustered standard errors in parentheses. $^*p < 0.10$ $^{**}p < 0.05$ $^{***}p < 0.01$

that this difference increases over time both in the Baseline and in the TP treatment. The experience of a rejection only has a negative effect on $x-y$ in the Baseline treatment. In the following, I summarize the results from the panel regressions.

Result 1 *Based on the panel regressions,*

(a) there is no significant treatment effect of the NGO and the TP treatment, respectively, on the shares proposers propose for themselves,

(b) there is a positive treatment effect of the TP treatment, but not the NGO treatment, on the differences between the proposer's share and the offer to the responder in proposals,

compared to the Baseline treatment.

As Table 5.4 provides some evidence that the offer z for the third party is higher in the TP than in the NGO treatment, Result 1(b) suggests that proposers in the TP treatment attempt to gain an advantage from the presence of the third person. Additionally, note that if players indeed perceive the game as a three-party situation, the "fair" share of a player in the three-party treatments is 100/3 as opposed to 100/2 in the Baseline treatment. The average proposed x's are clearly considerably higher than this fair share in the three-party treatments, showing that proposers in both treatments still make rather selfish proposals although they do not try to reach higher shares than proposers in the Baseline treatment.

Result 2 *The higher the share a proposer donated in the dictator game, the lower the proposed shares for the proposer, x, in the NGO treatment.*

There is also some evidence that social preferences, measured in the dictator game, lead to higher offers for the third person in the NGO treatment, suggesting that proposers give up own payoff in order to give to the NGO. This is also supported by the negative effect of social preferences on the difference $x - y$ in the NGO treatment. In the TP treatment, these effects are smaller and not always significant (depending on the estimated model). In the Baseline treatment, we do not find clear effects of social preferences on x and y in Tables 5.2 and 5.3. This suggests that strategic reasoning based on payoff-maximization is more prevalent in the TP and Baseline treatment. In this strategically complex situation, proposers are also possibly not sure towards whom of the two other parties they should behave altruistically. It is also possible that the test for social preferences better predicts behavior in a similar environment with the same recipient of donations which could also add to the explanation why I only find a clear effect in the NGO treatment. Finally, I find changes over time.

Result 3 *The more periods the game has already been played for, the*

(a) higher are proposed shares of proposers in all treatments,

(b) lower are proposed offers to responders only in the Baseline and TP treatment, and

(c) lower are offers for third parties in both three-party treatments.

The detected effect on offers for third parties in Table 5.4 is thus opposite to the expected. Clearly, if proposers choose rather small z's in the beginning and only gradually learn about the usefulness of z in strategic social responsibility, the values of z will go up over time. However, if proposers start at rather high levels of z, e.g., because they overestimate responders' expectation with respect to z, learning about responders' reactions and the possibility of strategic social responsibility will lead to smaller offers for third parties. The results suggest that the latter effect outweighs the first in this experiment.

5.5.2 Analysis of responders' decisions

Responders can only accept or reject the proposals. Rejecting an offer is thus the only possibility for a responder to convey disapproval with the proposed allocation. Table 5.6 displays the frequencies of accept and reject decisions in all and the separate treatments, respectively.

Table 5.6: Frequencies of accept (and reject) decisions

Treatments	All	Baseline	NGO	Third Person
Accept frequency	701	220	244	237
In percent	87.6	91.7	89.7	82.3
Reject frequency	99	20	28	51
In percent	12.4	8.3	10.3	17.7

As rejecting implies earnings of zero in this round, the cost of rejecting depends on the offer made to the responder. Not surprisingly, I observe the highest rejection rates in the TP treatment where the offers y are especially low. Table 5.7 displays the results from linear random effects probability models with the decision to accept as the dependent variable and provides further insight into what drives the decision in the different treatments.

As can be seen from Table 5.7, the offer made to the responder is the main driver of the decision to accept a proposed allocation in all treatments, i.e., the higher y, the higher the probability that the responder will accept. While the coefficient of the final math grade and the importance of the proposer's payment is higher than the cofficients of the offer to the responder, note that the former are measured on a scale from 1 to 5 and 1 to 7, respectively, while the offers to responders vary between 6.67 and 66.67, depending on the treatment. Thus the effect of the offer to the responder is clearly higher than other effects in the regression. In the NGO and the TP treatment, the offer made to the third party also has a significant effect: the higher z, the higher the willingness to accept. However, the size of the effect of y is more than three times as high as the effect of z. So even if responders do feel somewhat responsible for the third party, their own payoff is evidently more important to them. A higher level of social preferences leads only responders in the TP treatment to reject proposals with a higher probability. The effects of responders' declared preferences hint to the unclear strategic considerations prior to a decision. Caring for the proposer rather clearly suggests to accept a proposal. However, if a responder cares about her own and/or the third party's payoff, the best choice is

Table 5.7: Results of linear probability models using random effects with the decision to accept the proposal as dependent variable (where accept=1 and reject=0)

	(1)	(2)
Intercept	0.160	-0.202
	(0.166)	(0.159)
NGO treatment	-0.018	
	(0.114)	
Third Person treatment	0.187	0.242
	(0.143)	(0.179)
Offer to responder × Baseline	0.016***	
	(0.002)	
Offer to responder × NGO treatment	0.017***	0.019***
	(0.001)	(0.003)
Offer to responder × Third Person treatment	0.017***	0.018***
	(0.003)	(0.003)
Offer for third party × NGO treatment		0.006***
		(0.002)
Offer for third party × Third Person treatment		0.005***
		(0.002)
Donation from dictator game × Baseline	-0.001	
	(0.003)	
Donation from dictator game × NGO	0.003	-0.001
	(0.005)	(0.003)
Donation from dictator game × Third Person	-0.012***	-0.013***
	(0.002)	(0.002)
Further controls		
Age	-0.004*	-0.000
	(0.002)	(0.001)
Female	0.049	0.064
	(0.043)	(0.044)
Siblings	-0.014	0.005
	(0.024)	(0.038)
Final school grade	0.022	0.060
	(0.033)	(0.062)
Final math grade	0.028***	0.030
	(0.009)	(0.022)
Risk taking	0.000	-0.002
	(0.011)	(0.008)
Generosity	0.008	-0.000
	(0.011)	(0.013)
Importance payment	-0.007	-0.007
	(0.023)	(0.025)
Importance payment proposer	0.024***	0.024**
	(0.005)	(0.012)
Importance payment third party		0.015
		(0.020)
No. observations	800	560
No. individuals	50	35
R^2	0.210	0.230

Notes: Model 2 consists only of data from the NGO and the TP treatment. Session-clustered standard errors in parentheses. $^*p < 0.10$ $^{**}p < 0.05$ $^{***}p < 0.01$

not obvious. Although accepting clearly yields the higher payoff in the current period (as long as the offered share is above zero), rejecting may promise higher payoffs in the

future.[12] The main finding from Table 5.7 is summarized in the following result.

Result 4 *The probability that a responder will accept the proposed allocation is higher*

(a) the higher the offer to herself,

(b) the higher the offer for the third party.

These results are confirmed by a random effects Probit model (cf. Table 5.12 in Appendix 5.B). Additionally, in the Probit model I find a positive treatment effect for the TP treatment. This indicates that, everything else equal, responders in the TP treatment are more likely to accept a given proposal than responders in the other treatments. Indeed, the average accepted offer y is only 30.28 in the TP treatment compared to 38.84 in the NGO and 44.25 in the Baseline treatment. This suggests, on the one hand, that responders are more reluctant to hurt the third person in the room than the faraway NGO. On the other hand, I find the positive treatment effect although rejection rates are higher in the TP treatment than in the other treatments. As seen in Section 5.5.1, proposals in general are less generous towards the responder in the TP treatment. Thus an offer that is seen as unacceptable in the Baseline or NGO treatment may be considered not so bad in the TP treatment compared to the level of offers that responders usually face in this treatment. Put differently, responders have to be more accepting of low offers if they want to receive positive payoffs in the TP treatment, as proposers continue to make selfish offers even after rejections.

Table 5.8 shows comparisons of all shares and the difference between proposer and responder share of the accepted proposals as well as the donation of responders in the dictator game between all treatments.[13] As can be seen, the average shares for the proposers are smaller in those allocations that were accepted than in all proposals for all treatments. In the accepted allocations, the share of the proposer is significantly smaller in the TP treatment than in the Baseline treatment and not significantly different from the share in the NGO treatment. Nevertheless, even in the accepted allocations, proposers in the TP treatment can reach a higher relative share than proposers in the other treatments.

5.5.3 Analysis of negotiation outcomes

Finally, I analyze the negotiation outcomes in all treatments.

Table 5.9 displays the results from comparisons of the payoffs of all parties between treatments.[14] The negotiation outcome is zero for all parties when the responder rejected a proposal.[15] I thus observe that at the end of the negotiation the payoff of the proposer

[12] Although participants know that they will be grouped anew and randomly every period, with the game lasting for 16 periods responders may still hope to meet the same proposer again or that other responders will also help to induce fairer offers through rejections. I discuss this in more detail in Section 5.6.

[13] For full summary statistics of accepted allocations, see Table 5.13 in Appendix 5.B.

[14] For full summary statistics of the negotiation outcomes, see Table 5.14 in Appendix 5.B.

[15] I am still considering the values normalized to a pie size of 100 for comparability between treatments. As the payoffs of zero in case of a rejection are taken into account, the averages no longer sum to

Table 5.8: Results from comparisons of accepted allocations

	Average value	Compared to NGO treatment	Compared to Third Person treatment
Share of proposer x			
Baseline treatment	55.75	$p = 0.001$	$p = 0.093$
NGO treatment	49.59	-	$p = 0.269$
Third Person treatment	52.36	-	-
Offer to responder y			
Baseline treatment	44.25	$p = 0.107$	$p = 0.000$
NGO treatment	38.84	-	$p = 0.014$
Third Person treatment	30.28	-	-
Offer for third party z			
NGO treatment	11.57	-	$p = 0.008$
Third Person treatment	17.36	-	-
Difference between share of proposer and offer to responder x-y			
Baseline treatment	11.49	$p = 0.964$	$p = 0.000$
NGO treatment	10.75	-	$p = 0.039$
Third Person treatment	22.07	-	-
Donation in dictator game (only responders)			
Baseline treatment	9.07	$p = 0.384$	$p = 0.144$
NGO treatment	8.71	-	$p = 0.241$
Third Person treatment	11.39	-	-

Notes: P-values are based on the coefficient of the treatment effect in a random effects model with session-clustered standard errors and the treatment dummy as the only explanatory. The direction of the effect corresponds to the difference between averages. P-values of the differences between donations in the dictator game are based on one-sided Wilcoxon-Mann-Whitney tests (alternative hypothesis based on averages). Differences to the proposed allocations with respect to significance at the 10%-level are marked in red.

in the TP treatment is smaller than in the Baseline treatment due to the high number of rejections in the TP treatment. Payoffs in the NGO and TP treatment, however, do not differ significantly. Although I observe a considerable drop in the average difference between payoffs of proposers and responders in all treatments, it is still higher in the TP treatment than in the other treatments.

Result 5 *In negotiation outcomes, proposers*

(a) earn lower absolute payoffs in the third party treatments,

(b) earn higher relative payoffs in the TP treatment

than in the Baseline treatment.

Nonetheless, even after taking the payoffs of zero from rejections into account, proposers still earn payoffs far above the "fair" payoffs of 100/3 in the three-party treatments.

approximately 100. For example, the average payoff of the proposer and the average payoff of the responder in the Baseline treatment, given in Table 5.9, only sum to 91.67.

Table 5.9: Results from comparisons of realized allocations

	Average value	Compared to NGO treatment	Compared to Third Person treatment
Payoff of proposer			
Baseline treatment	51.10	$p = 0.000$	$p = 0.005$
NGO treatment	44.49	-	$p = 0.602$
Third Person treatment	43.09	-	-
Payoff of responder			
Baseline treatment	40.57	$p = 0.181$	$p = 0.000$
NGO treatment	34.84	-	$p = 0.017$
Third Person treatment	24.92	-	-
Payoff of third party			
NGO treatment	10.38	-	$p = 0.032$
Third Person treatment	14.28	-	-
Difference between payoff of proposer and payoff of responder			
Baseline treatment	10.53	$p = 0.808$	$p = 0.007$
NGO treatment	9.64	-	$p = 0.034$
Third Person treatment	18.16	-	-

Notes: P-values are based on the coefficient of the treatment effect in a random effects model with session-clustered standard errors and the treatment dummy as the only explanatory. The direction of the effect corresponds to the difference between averages. Differences to the proposed allocations with respect to significance at the 10%-level are marked in red.

5.6 Discussion

Just as previous experimental results on (three-person) ultimatum games, the present results can hardly be explained by the game-theoretic model based on pure payoff-maximization. Social preferences thus clearly play a role in explaining the experimental results in ultimatum games.

For example, inequity aversion can explain positive offers to the responder. In models of inequity aversion, individuals typically have disutility from inequitable outcomes (cf., e.g., Fehr and Schmidt, 1999). It is thus possible that an inequity averse individual has a lower utility from a very inequitable allocation that still gives her a positive payoff than from the completely equitable allocation after rejecting a proposal that gives her a payoff of zero. Even if the proposer is a payoff-maximizer, she then has to offer a (non-negligible) positive amount to the responder to induce her to accept. In models of inequity aversion, however, the aversion is typically assumed to be weaker with respect to outcomes favorable than with respect to outcomes unfavorable to oneself. A payoff-maximizing proposer would thus not offer anything for the third party as it is more effective to increase the offer to the responder and thereby decrease the inequity between herself and the responder in order to induce acceptance. Indeed, the present results show that the effect of the offer to the responder on the probability to accept is higher than the effect of the offer to the third party (cf. Table 5.7).

Positive offers for third parties could be explained by social preferences of proposers.

In the present experiment, social preferences of proposers, as measured in the dictator game, may indeed explain why proposers decrease their own shares and increase their offers for the NGO in the NGO treatment (cf. Tables 5.2 and 5.4). However, depending on the estimated model, the effect of the social preferences of proposers on their own proposed share and on offers to the third person is not always significant in the TP treatment (cf. Tables 5.2, 5.4 and 5.5).

From Table 5.7, it can be seen that responders in the TP treatment are more likely to reject an offer, the higher their social preferences. The model by Rotemberg (2008) assumes that individuals base their decision to accept on whether the proposer displays a minimal acceptable altruism. If a proposal signals altruism below this threshold, the responder becomes angry and rejects. If responders judge a proposer's altruism also by the behavior towards the third person, giving to this person is necessary out of strategic considerations. Proposers then show strategic social responsibility towards the third person in order to be perceived as sufficiently altruistic and not to anger the responder. Depending on the exact measure of altruism the responder uses, it may even be strategically useful for the proposer to redistribute somewhat from the responder to the third person compared to the Baseline case. Indeed, proposers in the TP treatment earn lower payoffs than proposers in the Baseline treatment, but reach a better relative standing compared to the responder.

Although participants knew that they would be grouped anew and randomly every period, with the game lasting for 16 periods I was not able to facilitate a perfect stranger matching. Responders thus may still have hoped to meet the same proposer again. Even though the proposer will not realize if she meets the same responder again due to anonymity, responders may hope to educate proposers by rejecting selfish offers and profit by receiving a more favorable offer in a later round from that proposer. If this were the main motivation for rejections, the usefulness of rejecting would cease in later rounds. However, I observe rejection rates of 6.67%, 11.76% and 27.78% in the Baseline, NGO and TP treatment, respectively, in the last round of the game. These rates are not much different from the overall rejection rates in the Baseline and NGO treatments and even considerably higher than the overall rejection rate in the TP treatment. As can be seen from the variation in donations in the dictator game, participants are also very heterogeneous in their (social) preferences. Additionally, proposers may also have heterogeneous expectations about responders' preferences. Consequentially, results cannot be explained by only one type of social preference.

Furthermore, as the differences between the results from Güth and van Damme (1998) and Güth et al. (2007) show, proposers' behavior is also rather context-dependent. Proposers in the present experiment allocate a higher share to the third party than in the experiment by Güth and van Damme (1998), but less than in the experiment by Güth et al. (2007), where completely fair splits were very common. In the latter set-up, the framing of the game was not neutral but based on the story of three brothers splitting the amount, which can clearly influence the results. In my experiment, proposers consider the strategic role of social responsibility possibly because they face the test for social preferences (dictator game) in the beginning and are thus more aware of the donation aspect of giving to the third party. The overall effect is smaller in the NGO treatment and,

in fact, only little bigger[16] than in Güth and van Damme (1998) (where a third person is considered, though). The reason may be that participants donated to the same NGO in the dictator game and some proposers thus believe responders' goodwill towards the NGO to have ceased. By contrast, proposers themselves are still guided by social preferences, propose a positive z and pay for it by claiming a smaller share than proposers in the Baseline treatment. When proposers themselves are willing to pay for a higher z, it remains unclear why they might believe that responders are not. Also, the effect of z on the probability to accept is as high in the NGO treatment as in the TP treatment. This suggests that the strategic use of social responsibility is also possible if the third party is an NGO. The results thus remain inconclusive on whether the success of strategic social responsibility depends on the type of party the proposer can donate to.

5.7 Conclusion

In this chapter, I analyzed the results from a laboratory experiment with three treatments: a regular ultimatum game, a three-party ultimatum game with an NGO as third party and a three-person ultimatum game. Inspired by findings on strategic fairness from regular ultimatum games and findings on strategic Corporate Social Responsibility from market experiments, I investigated the possibilities of employing social responsibility towards the third party strategically.

I find that proposers attempt to gain a higher payoff by using strategic social responsibility towards the third party in the TP treatment. Selfish proposals are dampened in the NGO treatment if proposers have social preferences and intensified the more periods have been played in all treatments. Responders generally approve of positive shares to the third party, but care more about their own payoff and reject too selfish proposals in both three-party treatments. In the TP treatment, proposers earn higher relative payoffs, measured as the difference between the proposer's and the responder's share, than in the other treatments. Absolute payoffs are smaller in the three-party treatments than in the Baseline treatment. While, in the NGO treatment, altruism of proposers may explain offers for the NGO, in the TP treatment, also strategic motives may play a role when giving to the third person.

I conclude that strategic social responsibility can be used strategically in a three-player ultimatum game in order to achieve higher relative payoffs. Furthermore, strategic social responsibility can have distributional effects not only in markets but also in bargaining situations. Although the bargaining situation of an ultimatum game is rather abstract, one may see similar effects in wage negotiations. While Koppel and Regner (2014) and Fehrler and Kosfeld (2014) focus on the effort that employees excert given a certain wage and social responsibility of the firm, the wage negotiation itself may also be subject to the strategic use of social responsibility. Employers can try to get job candidates to accept lower wage offers if they invest in social activities that candidates approve of.[17]

[16]Note, however, that in the present set-up the proposer did not have to allocate a minimum amount to each party, so the third party could have been much more easily completely ignored.

[17]For example, Preston (1989) and Greening and Turban (2000) show some evidence that employees may accept lower wages if they work for a socially responsible or non-profit organization.

Further, although wages typically can be negotiated more freely than in an ultimatum game, wage negotiations also may fail. Especially, if an employer has already invested in CSR activities, believing that these would make future employees more willing to accept given wage offers, she may not have enough room or no longer be willing to offer higher wages to less accepting candidates. The optimal amount of CSR engagement is thus subject to uncertainty as in the present experiment. If the wage negotiation breaks down, employer and candidate have to incur further search costs. Similarly, in the ultimatum game, welfare is destroyed if strategic social responsibility is used too aggressively and the responder rejects the proposal.

In future research, the role of the dictator game in Part I could be further elicited. On the one hand, one could explore how much behavior in this treatment may have been affected by the fact that donations were made to the same NGO in both parts of the experiment by choosing a different NGO for the dictator game. On the other hand, the game in Part I can be interpreted as context-generating for Part II. To test this, the game in Part I could be varied, possibly generating different contexts and thus different behavior in the three-party ultimatum game.

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Appendix

5.A Methods

To gain a first overview over the structure of the data, I present box-and-whisker-plots of all shares, of the differences between shares, $x - y$, and of the donations in the dictator game separately for each treatment. The box-and-whisker-plot displays the interquartile range, i.e., the values which fall into the 2nd and 3rd quartile and thus represent the middle 50 percent of the data, in form of a box. All values which still fall within the range of 1st quartile - 1.5×interquartile range and the range of 3rd quartile + 1.5×interquartile range, respectively, are displayed as the so-called whiskers, i.e., the vertical lines at each side of the box. Furthermore, the median is shown as a horizontal line. Values which do not fall into the range given by the box and the whiskers are displayed as dots and often considered possible outliers. The plot visualizes the variation and skewness in a sample and facilitates the visual comparison with other samples.

In order to be able to analyze the behavior of players, I use regressions and explicitly take the panel structure into account. The random effects error structure, with the individual subject as the random effect, accounts for the multiple decisions made by a subject. More specifically, in a fixed effects model, I cannot estimate effects of explanatory variables which are constant over time, such as an individual's social preferences (see,

e.g., Moffat, 2016, p. 90). As these are assumed to be correlated with other explanatory variables which vary over time they are eliminated in the estimation. As I believe that, e.g., social preferences have an effect that is separate from other explanatories, I use the random effects model. This means that I assume that social preferences are uncorrelated with the other estimated effects (see Wooldridge, 2016, p. 441). I report cluster-robust standard errors where session is the cluster variable. Although I do not deliberately sample clusters of units, the sampling method is not completely random. Rather, participants self-select into sessions and the resulting clustering of characteristics of participants (e.g., only early birds register for morning sessions) may influence behavior of participants in one session in the same way. Furthermore, participants react to each other's actions, which influences the behavior within a session. It is, therefore, becoming more common in experimental studies to control for such effects by standard errors adjusted by session in regressions (see, e.g., Etilé and Teyssier, 2016, Feicht et al., 2016).

When testing for differences of a certain share/payoff or the difference between proposer and responder share/payoff between treatments, I only use the data from the two treatments for which I want to compare the shares. I then estimate a treatment effect via a respective dummy variable using the random effects model with cluster-robust standard errors to account for dependence with respect to individual and session. In Tables 5.1, 5.8, and 5.9, I report the p-values of the coefficients of these dummy variables. For the donation in the dictator game, I use the Wilcoxon-Mann-Whitney test. As the dictator game is played only once and at the beginning of the experiment, no panel structure exists for these observations and dependence is reduced to a minimum. The Wilcoxon-Mann-Whitney test is commonly used in the experimental literature (see, e.g., Etilé and Teyssier, 2016, Feicht et al., 2016, Fershtman and Gneezy, 2001, Sääksvuori and Ramalingam, 2015, Schmitt et al., 2008, Shupp et al., 2006). It tests "if two samples could have come from two populations with the same mean" (Kanji, 1993, p. 86). Being a non-parametric test, it does not rely on any distributional assumptions. This property makes it useful in testing for differences between small samples and thus this test is standard in the analysis of experiments.

Note that the observations for the offer to the third party are censored, as there are several observations of zero (and negative values were not possible). As the Tobit model can be convenient for the analysis of censored data (see Wooldridge, 2016, p. 537), I report the results of a Tobit model with random effects and cluster-robust standard errors in Appendix 5.B.[18] The coeffcients of a Tobit model are less straightforward to interpret than those of a linear model. I thus only compare if the effects are the same in direction and significance as in the linear model. As Wooldridge (2016, p. 536) notes, the linear model can in principle be used for such data, as well. I thus report the results from a linear random effects panel model for the offer to the third party in the main part of this chapter for reasons of consistency and easier comparison with the other results.

I take a similar approach in the analysis of the decision to accept. I present the results from the linear probability model with random effects and cluster-robust standard

[18] I use the implementation for mixed effects models in Stata as it allows for the estimation of cluster-robust standard errors. As Moffat (2016, p. 93) shows, when only clustering at the participant level is applied the mixed model is equivalent to a random effects model.

errors in the main part of this chapter due to its straightforward interpretation. Despite the fact that linear probability models may sometimes predict negative values (or values above one) which clearly cannot be true for probabilities (see Wooldridge, 2016, p. 226), it serves well for an understanding of how the separate explanatories affect the probability to accept. In Appendix 5.B, I present the results from a random effects Probit model with clustered standard errors. The Probit model has the advantage that it only predicts values between zero and one, as it is based on the standard normal cumulative distribution function (Wooldridge, 2016, p. 526). Again, the interpretation of single coefficients is somewhat tedious which is why I restrict myself to interpreting the direction and significance of effects and to checking if these results support the results from the linear model.

5.B Tables

Table 5.10: Summary statistics of the proposed allocations for the separate treatments and the proposers' donations in the dictator game

	n	Min	Max	Mean	SD	Median
Share of proposer x						
Baseline treatment	240	35.00	90.00	56.88	8.58	60.00
NGO treatment	272	0.00	76.67	51.16	11.85	50.00
Third Person treatment	288	0.00	83.33	54.04	13.81	56.67
Offer to responder y						
Baseline treatment	240	10.00	65.00	43.12	8.58	40.00
NGO treatment	272	6.67	66.67	37.72	8.52	40.00
Third Person treatment	288	6.67	53.33	29.13	8.17	30.00
Offer for third party z						
NGO treatment	272	0.00	60.00	11.12	11.58	6.67
Third Person treatment	288	0.00	50.00	16.83	11.91	16.67
Difference between share of proposer and offer to responder x-y						
Baseline treatment	240	-30.00	80.00	13.76	17.15	20.00
NGO treatment	272	-66.67	53.33	13.44	17.08	6.67
Third Person treatment	288	-50.00	73.33	24.92	19.31	26.67
Donation in dictator game (only proposers)						
Baseline treatment	15	0.00	40.00	14.87	12.17	10.00
NGO treatment	17	0.00	30.00	8.82	9.27	5.00
Third Person treatment	18	0.00	40.00	18.39	14.38	17.50

Table 5.11: Results of mixed-effects Tobit models with the offer z for the third party as dependent variable

	(1)	(2)
Intercept	0.210	-7.631
	(4.189)	(31.841)
Third Person treatment	4.614	7.453***
	(6.157)	(2.129)
Donation from dictator game × NGO	0.841*	0.636
	(0.473)	(0.433)
Donation from dictator game × Third Person	0.360**	-0.009
	(0.180)	(0.229)
1/Period × NGO	5.920***	6.037***
	(1.158)	(1.619)
1/Period × Third Person	11.560*	11.371*
	(6.285)	(5.962)
Reject in past × NGO	-1.710	-1.493
	(5.352)	(5.100)
Reject in past × ThirdPerson	2.269	2.039
	(4.438)	(4.168)
Further controls		
Age		0.720
		(0.488)
Female		1.824
		(2.062)
Siblings		-0.899
		(1.558)
Final school grade		-1.670
		(3.139)
Final math grade		2.799
		(1.827)
Risk taking		-2.475*
		(1.470)
Generosity		-0.609
		(0.760)
Importance payment		-1.741
		(2.424)
Importance payment responder		1.687
		(1.681)
Importance payment third party		1.341
		(2.116)
No. observations	560	560
No. individuals	35	35
Uncensored	435	435
Left-censored	125	125

Notes: The models consist only of data from the NGO and the TP treatment. Session-clustered standard errors in parentheses. $^{*}p < 0.10$ $^{**}p < 0.05$ $^{***}p < 0.01$

Table 5.12: Results of random effects Probit models with the decision to accept the proposal as dependent variable (where accept=1 and reject=0)

	(1)	(2)
Intercept	-8.901***	-10.099***
	(1.476)	(2.578)
NGO treatment	3.450	
	(2.215)	
Third Person treatment	5.711***	3.570***
	(2.115)	(1.022)
Offer to responder × Baseline	0.246***	
	(0.062)	
Offer to responder × NGO treatment	0.171***	0.223***
	(0.023)	(0.024)
Offer to responder × Third Person treatment	0.152***	0.170***
	(0.032)	(0.035)
Offer for third party × NGO treatment		0.093***
		(0.013)
Offer for third party × Third Person treatment		0.034***
		(0.004)
Donation from dictator game × Baseline	0.096	
	(0.059)	
Donation from dictator game × NGO	0.023	0.002
	(0.063)	(0.057)
Donation from dictator game × Third Person	-0.111***	-0.106***
	(0.025)	(0.032)
Further controls		
Age	-0.053	-0.010
	(0.033)	(0.020)
Female	0.483	0.852
	(0.732)	(0.864)
Siblings	-0.289	0.235
	(0.402)	(0.496)
Final school grade	0.547	0.721
	(0.381)	(0.977)
Final math grade	0.287	0.271
	(0.237)	(0.267)
Risk taking	-0.285	-0.118
	(0.359)	(0.296)
Generosity	0.466*	0.181
	(0.256)	(0.113)
Importance payment	-0.039	0.040
	(0.298)	(0.218)
Importance payment responder	0.275***	0.264
	(0.071)	(0.172)
Importance payment third party		0.047
		(0.266)
No. observations	800	560
No. individuals	50	35

Notes: Model 2 consists only of data from the NGO and the TP treatment. Session-clustered standard errors in parentheses. *$p < 0.10$ **$p < 0.05$ ***$p < 0.01$

Table 5.13: Summary statistics of the accepted allocations for the separate treatments and the responders' donations in the dictator game

	n	Min	Max	Mean	SD	Median
Share of proposer *x*						
Baseline treatment	220	35.00	90.00	55.75	7.44	55.00
NGO treatment	244	0.00	76.67	49.59	11.21	50.00
Third Person treatment	237	0.00	83.33	52.36	13.91	53.33
Offer to responder *y*						
Baseline treatment	220	10.00	65.00	44.25	7.44	45.00
NGO treatment	244	13.33	66.67	38.84	7.84	40.00
Third Person treatment	237	6.67	53.33	30.28	7.96	33.33
Offer for third party *z*						
NGO treatment	244	0.00	60.00	11.57	11.66	6.67
Third Person treatment	237	0.00	50.00	17.36	12.24	16.67
Difference between share of proposer and offer to responder *x*-*y*						
Baseline treatment	220	-30.00	80.00	11.49	14.88	10.00
NGO treatment	244	-66.67	53.33	10.75	15.44	6.67
Third Person treatment	237	-50.00	73.33	22.07	19.07	21.33
Donation in dictator game (only responders)						
Baseline treatment	15	0.00	40.00	9.07	11.54	4.00
NGO treatment	17	0.00	20.00	8.71	8.01	10.00
Third Person treatment	18	0.00	40.00	11.39	10.40	10.00

Table 5.14: Summary statistics of the realized allocations for the separate treatments

	n	Min	Max	Mean	SD	Median
Payoff of proposer						
Baseline treatment	240	0.00	90.00	51.10	17.00	50.00
NGO treatment	272	0.00	76.67	44.49	18.46	46.67
Third Person treatment	288	0.00	83.33	43.09	23.66	50.00
Payoff of responder						
Baseline treatment	240	0.00	65.00	40.57	14.17	40.00
NGO treatment	272	0.00	66.67	34.84	13.96	40.00
Third Person treatment	288	0.00	53.33	24.92	13.65	30.00
Payoff of third party						
NGO treatment	272	0.00	60.00	10.38	11.59	6.67
Third Person treatment	288	0.00	50.00	14.28	12.93	15.67
Difference between payoff of proposer and payoff of responder						
Baseline treatment	240	-30.00	80.00	10.53	14.59	0.00
NGO treatment	272	-66.67	53.33	9.64	14.98	0.00
Third Person treatment	288	-50.00	73.33	18.16	19.24	13.33

5.C Instructions (translated from German)

The following instructions are translated from the German original used in the experimental sessions. Comments in italics are added only for this publication.

Welcome to the experiment!

Please do not touch the computer mouse and the keyboard until you are asked to do so.

This is an experiment about strategic decision making. Thank you very much for your participation.

Your being on time secures you a payment of 4 euro.

If you follow these instructions, you can earn additional money depending on your own decisions, the decisions of fellow participants and chance. You will receive the overall payment at the end of the experiment in private and in cash.

Additionally, depending on your own decisions, the decisions of fellow participants and chance, donations to UNICEF can be generated. These will also appear on your personal receipt which you receive at the end of the experiment. By taking part and making donations in this experiment, you agree to the collection of all donated amounts in a piggy bank at the end and the transfer of the overall amount to UNICEF by the experimenter after the experiment. Please understand that the experimenter cannot issue individual donation receipts. By sending an e-mail to the Professorship of Economic Theory you can inquire about the overall donation amount and receive a copy of the transfer voucher.

We ask you to remain silent from now on and stay seated at your computer. The computer may only be used for the experiment. During the experiment, communication with fellow participants is not allowed. Should you have a question during the experiment, please raise your hand and wait until one of the experimenters comes to you. Participants who do not adhere to these rules will be asked to leave the experiment without payment.

During the experiment you can earn an income. This will be expressed in points. At the end of the experiment the income from some of your decisions will be paid out to you. The exchange rate for that is

10 points = 1 euro.

All decisions are anonymous. No participant will get to know which decisions you personally have made. The experimenter will analyze your data only in anonymous form.

The experiment consists of two parts and a final questionnaire.

Part 1

In the first part of the experiment **40 points** have to be divided. You decide, how many of these points you want to donate to UNICEF. You can only choose integers. You can only donate between including 0 and 40 points. Below you can find some information about the activities of UNICEF.

Your payment from this part: 40 points minus the donated points.

Information about UNICEF

UNICEF (United Nations International Children's Emergency Fund) is the children's aid organization of the United Nations (UN). This is how UNICEF describes its mission: "Every child in the world has the right to a childhood - we work to make sure that this right becomes reality. UNICEF was founded in 1946 and helps children in about 150 countries. Together with many supporters and partners UNICEF provides every third child worldwide with vaccines, equips schools and campaigns, for example, for effective child protection laws."

(Source: https://www.unicef.de/informieren/ueber-uns/unicef-international - *direct citation in German*)

The donations in this experiment go to Deutsches Komitee für UNICEF e.V., which represents the children's aid organization in Germany.

Deutsches Komitee für UNICEF e.V. is among the top 5 charities in the transparency donation ranking 2014 of Spiegel online[19] with 4.7 out of 5 stars. Like the other top 5 charity organizations from 2014 UNICEF was not considered in the ranking of 2016.

(Source: http://www.spiegel.de/wirtschaft/service/spenden-ranking-2016-so-transparent-arbeiten-50-grosse
-organisationen-a-1122713.html)

Further, Deutsches Komitee für UNICEF e.V. has been awarded the donation label of the German Central Institute for Social Issues (DZI).

(Source: http://www.dzi.de/spenderberatung/datenbanksuchemaske/suchergebnisse/?11286)

[19] *This is the online version of a major German weekly magazine.*

Comprehension questions

With the following questions we want to make sure, that the instructions have been understood. Please answer the questions to the best of your knowledge and raise your hand when you are done. One of the experimenters will come to you and go through the answers with you.

A participant donates 10 points.
Thus her payment is _____ points and UNICEF receives _____ points.
The payments in euro are: participant _____, UNICEF _____.

A participant donates 32 points.
Thus her payment is _____ points and UNICEF receives _____ points.
The payments in euro are: participant _____, UNICEF _____.

Instructions for the Baseline treatment

Part 2

In the beginning of part 2, each participant is assigned one of two possible roles: player A or player B. Part 2 consists of 16 consecutive rounds, in which each participant makes one decision, respectively. Participants keep their role throughout all 16 rounds. In the beginning of each round, the participants are anew and randomly regrouped into groups of two consisting of a player A and a player B.

Within the group, **100 points** have to be split in each round. The possible decisions are the following:

Player A: First, player A makes a proposal of how many points player B should receive. Only integers between including 0 and 100 points may be chosen. The points that player A does not offer player B would be kept by player A. The true incomes in this round do, however, still depend on the decision of player B.

Player B: Player B gets to know the proposal of player A. Player B decides whether to accept or reject the offer.

- If the proposal is accepted, player B receives the number of points offered by player A as income in this round. Player A then receives 100 points minus the offer to player B as income in this round.
- If the proposal is rejected, each player receives 0 points as income in this round.

After all 16 rounds, 1 round will be randomly selected. The income earned by the participant in this round determines the participant's payment in the second part of the experiment. To select the relevant round, a randomly determined participant will roll a 16-sided die once.

Comprehension questions

With the following questions we want to make sure, that the instructions have been understood. Please answer the questions to the best of your knowledge and raise your hand when you are done. One of the experimenters will come to you and go through the answers with you.

Player A proposes in one round that player B receives 42 points. Player B accepts the offer.
Player A receives an income of _____ points in this round and player B receives an income of _____ points in this round.

Player A proposes in one round that player B receives 7 points. Player B rejects the offer.
Player A receives an income of _____ points in this round and player B receives an income of _____ points in this round.

Player B is not content with the proposal of player A. What can player B do?
( ) In the next round, in which she is player A, she can make a proposal that leaves a higher amount of points for herself.
( ) She can accept the proposal and then each player receives the income implied by the proposal of player A. She can reject the proposal and then both receive 0 points.
( ) She can make a direct counterproposal with a higher amount of points for herself and a smaller amount of points for player A.

How often will you meet the same participant?
( ) In each round.
( ) Only in one round.
( ) This is random and it is not apparent to me, how often I meet the same participant.

At the end of the experiment, round 7 is determined as the relevant round for payment. Which payment will you receive in total?
( ) The income from round 7.
( ) The income from round 7 and round 1.
( ) The income from round 7, the payment from part 1 of the experiment, and 4 euro for your timely arrival.

Instructions for the Third Person treatment

Part 2

In the beginning of part 2, each participant is assigned one of three possible roles: player A, player B, or player C. Part 2 consists of 16 consecutive rounds, in which player A and player B each make one decision, respectively. Participants keep their role throughout all 16 rounds. In the beginning of each round, the participants are anew and randomly regrouped into groups of three consisting of a player A, a player B, and a player C.

Within the group, **150 points** have to be split in each round. The possible decisions are the following:

Player A: First, player A makes a proposal of how many points player B and player C, respectively, should receive. Only integers between including 0 and 150 points may be chosen. In total, the offers may not exceed 150 points. The points that player A does not offer to give to player B and player C would be kept by player A. The true incomes in this round do, however, still depend on the decision of player B.

Player B: Player B gets to know the proposal of player A. She gets to know how many points she and player C, respectively, should receive. Player B decides whether to accept or reject the offer.

- If the proposal is accepted, player B and player C receive the number of points offered by player A as income in this round. Player A then receives 150 points minus the offer to player B and minus the offer for player C as income in this round.
- If the proposal is rejected, each player receives 0 points as income in this round.

Player C: Player C cannot influence the decision of player A and player B. Her income depends only on the decisions of player A and player B.

After all 16 rounds, 1 round will be randomly selected. The income earned by the participant in this round determines the participant's payment in the second part of the experiment. To select the relevant round, a randomly determined participant will roll a 16-sided die once.

Comprehension questions

With the following questions we want to make sure, that the instructions have been understood. Please answer the questions to the best of your knowledge and raise your hand when you are done. One of the experimenters will come to you and go through the answers with you.

Player A proposes in one round that player B receives 35 points and player C receives 40 points. Player B accepts the proposal.
The incomes in this round are: player A _____ points, player B _____ points, and player C _____ points.

Player A proposes in one round that player B receives 50 points and player C receives 20 points. Player B rejects the proposal. The incomes in this round are: player A _____ points, player B _____ points, and player C _____ points.

Player B is only partly content with the proposal of player A. She would like to accept the amount that she is being offered. Player C, however, should in her opinion receive a higher amount. What can player B do?
( ) In the next round, in which she is player A, she can make a proposal that allocates a higher amount of points to player C.
( ) She can accept the proposal and then each player receives the income implied by the proposal of player A. She can reject the proposal and then all players receive 0 points.
( ) She can make a direct counterproposal with a higher amount of points for player C.

Player C is not content with the proposed allocation. Can she influence the result?
( )Yes, she can reject the offer. Then all players receive 0 points.
( ) No, she cannot influence the result. Her income depends only on the decisions of player A and player B.
( ) Yes, she can make a different proposal to the other players.

How often will you meet the same participant?
( ) In each round.
( ) Only in one round.
( ) This is random and it is not apparent to me, how often I meet the same participant.

At the end of the experiment, round 7 is determined as the relevant round for payment. Which payment will you receive in total?
( ) The income from round 7.
( ) The income from round 7 and round 1.
( ) The income from round 7, the payment from part 1 of the experiment, and 4 euro for your timely arrival.

Instructions for the NGO treatment

Part 2

In the beginning of part 2, each participant is assigned one of two possible roles: player A or player B. Part 2 consists of 16 consecutive rounds, in which each participant makes one decision, respectively. Participants keep their role throughout all 16 rounds. In the beginning of each round, the participants are anew and randomly regrouped into groups of two consisting of a player A and a player B.

Within the group, **150 points** have to be split in each round. The possible decisions are the following:

Player A: First, player A makes a proposal of how many points player B and UNICEF, respectively, should receive. Only integers between including 0 and 150 points may be chosen. In total, the offers may not exceed 150 points. The points that player A does not offer to give to player B and UNICEF would be kept by player A. The true incomes in this round do, however, still depend on the decision of player B.

Player B: Player B gets to know the proposal of player A. She gets to know how many points she and UNICEF, respectively, should receive. Player B decides whether to accept or reject the offer.

- If the proposal is accepted, player B and UNICEF receive the number of points offered by player A as income in this round. Player A then receives 150 points minus the offer to player B and minus the offer for UNICEF as income in this round.
- If the proposal is rejected, each player as well as UNICEF receives 0 points as income in this round.

After all 16 rounds, 1 round will be randomly selected. The income earned by the participant in this round determines the participant's payment in the second part of the experiment. The same holds for the donation to UNICEF. To select the relevant round, a randomly determined participant will roll a 16-sided die once.

Note that the donated amount from the relevant round of the second part of the experiment will only show up on the receipt of player A. Player A will put the donation from the relevant round into the piggy bank.

Comprehension questions

With the following questions we want to make sure, that the instructions have been understood. Please answer the questions to the best of your knowledge and raise your hand when you are done. One of the experimenters will come to you and go through the answers with you.

Player A proposes in one round that player B receives 20 points and UNICEF receives 10 points. Player B rejects the proposal.
The incomes in this round are: player A _____ points, player B _____ points, and UNICEF _____ points.

Player A proposes in one round that player B receives 29 points and UNICEF receives 41 points. Player B accepts the proposal.
The incomes in this round are: player A _____ points, player B _____ points, and UNICEF _____ points.

Player B is only partly content with the proposal of player A. She would like to accept the amount that she is being offered. UNICEF, however, should in her opinion receive a higher amount. What can player B do?
( ) In the next round, in which she is player A, she can make a proposal that allocates a higher amount of points to UNICEF.
( ) She can accept the proposal and then all receive the income implied by the proposal of player A, respectively. She can reject the proposal and then all receive 0 points.
( ) She can make a direct counterproposal with a higher amount of points for UNICEF.

How often will you meet the same participant?
( ) In each round.
( ) Only in one round.
( ) This is random and it is not apparent to me, how often I meet the same participant.

At the end of the experiment, round 7 is determined as the relevant round for payment. Which payment will you receive in total?
( ) The income from round 7.
( ) The income from round 7 and round 1.
( ) The income from round 7, the payment from part 1 of the experiment, and 4 euro for your timely arrival.

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