The Influence of Peers on Managerial Honesty in Participative Budgeting: An Integrated Approach Combining Experiments and Agent-Based Modeling

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Summary

Recent surveys by Deloitte (2023) and the WHU Controller Panel (2023) show that firms still rely on decentral managers participating in the budgeting process when preparing budgets. Since the value of participative budgeting decreases when managers misreport their private information, ensuring managerial honesty in the budgeting process is still crucial for firms. In everyday life, most individuals seek approval from their peers. Therefore, individuals' behavior is often guided by their expectations about what their peers do and approve of (i.e., the social norm). Since managers do not act in social isolation at the workplace, social norms have received more attention in the participative budgeting literature. However, peers' influence through social norms is a double-edged sword because individuals' perceptions of appropriate behavior may change from pro-social to pro-self-behavior when receiving unexpected information about peers' behavior and beliefs. This is important for firms that recently tend to open their organization, as increased transparency among managers makes it more likely that managers receive information about peers' behavior and beliefs. In this regard, social norm theory emphasizes the importance of peer sanctioning for enforcing social norms to prevent the erosion of norm compliance over time. Peer sanctioning has received less attention in the participative budgeting literature despite its importance for social norms. Thus, it remains open to how peers affect honesty in participative budgeting over time when considering peer sanctioning. The fundamental motivation of this thesis is to contribute to the participative budgeting literature by examining how managerial honesty is affected by social norms when the possibility of peer sanctioning is considered. To this end, I conduct two experiments. In Experiment 1, I show that the possibility of peer sanctioning can increase honesty in participative budgeting by enforcing a social norm of honesty. In Experiment 2, I investigate how the presence of a pooled profit-sharing plan can amplify the effect of the possibility of peer sanctioning on honesty. The results of both experiments contribute to the participative budgeting literature on social norms by advancing our understanding under which conditions the possibility of peer sanctioning can mitigate the erosion of honesty. This provides guidance to firms on how to maintain honesty in participative budgeting when they open their organization. Finally, I combine experiments and agent-based modeling to provide additional support for a social norm of honesty as the mechanism underlying the observed behavior in the experiments.

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LIST OF SYMBOLS AND ACRONYMS

C	Strategy "cooperate“/Own compliance
D	Strategy "defect"
E	Explicit norm invocation
EU	Expected utility
ID	Individual drive
IW	Individual weight
K	Norm-sensitivity
M	Mediator variable
N	Norm function
ND	Normative drive
NPV	Observed non-punished violation
NW	Normative weigth
O_c	Observed compliance
O_v	Observed violation
P	Population
p	Probability
P_{cf}	Subset of conditional followers
P_f	Subset of actual followers
π	Payoff function
Pun	Inflicted/Observed/Received punishment
R	Behavioral rule
S	Inflicted/Observed/Received sanction
Sal	Norm salience
s	Strategy
U	Utility function
V	Own violation
w	Weight of norm cue
X	Independent variable
Y	Dependent Variable

1 INTRODUCTION

1.1 RESEARCH MOTIVATION

Budgeting is central in most organizations for planning, control, coordination, and resource allocation (Hannan, Rankin, & Towry, 2010; Libby & Lindsay, 2010). Budgeting turns managers' perspectives toward the future and encourages them to engage in long-term thinking, essential to anticipate business changes and improve an organization's competitiveness (Merchant & Stede, 2017). Further, for most organizations, budgeting is a pivotal element of their control system because budgets (e.g., planned revenues or costs) are used as targets to provide a benchmark for evaluating and rewarding managers' performance (Merchant & Stede, 2017).

As organizations tend to become more decentralized (Rajan & Saouma, 2006), budgeting benefits from managers' private information, which organizations may yield when managers participate in the budgeting process. The reason is that in decentralized organizations, managers have greater insights into the local business environment (e.g., revenue potentials, competitor positioning, or customer preferences) than their superiors (Hannan, Rankin, & Towry, 2006).[1] Top-down or *authoritative budgeting* shifts all decision rights to the superior and leaves the managers with minimal influence on setting their budgets. In contrast, bottom-up or *participative budgeting* involves managers in the budgeting process and provides them influence on setting their budget targets (Heinle, Ross, & Saouma, 2014; Kramer & Hartmann, 2014; Libby, 1999).

In 2021, Deloitte conducted a global survey on planning, budgeting, and forecasting, receiving over 750 responses from organizations across more than 55 countries. Their survey showed that the bottom-up approach is mostly used to prepare the annual budget (72%), followed by the top-down (56%) and driver-based approach (35%).[2] Further, most reports for the management are still produced by decentral units, such as cost center owners or business partner teams, as they often have close connections to stakeholders and businesses. The survey concludes that

[1] Throughout this dissertation, I refer to the subordinate manager who has private information about the local business environment as "manager", while I refer to the manager who is part of the central management and approves budgets as "superior".

[2] Most of the respondent organizations use more than one approach. For example, 38% use the top-down and bottom-up approach.

firms are still sticking with these traditional approaches while only slowly adapting to more advanced approaches, such as algorithmic planning (Deloitte, 2023). In 2023, the WHU – Otto Beisheim School of Management conducted a survey in German-speaking countries on the development of budgeting (as part of the annual WHU Controller Panel). Responses from 305 managers and accountants indicate that most organizations surveyed combine top-down and bottom-up approaches (47%), followed by a pure top-down approach (32%) and a pure bottom-up approach (21%). Overall, both surveys indicate that firms still rely on decentral managers participating in the budgeting process when preparing budgets.

Despite the outlined benefits of managers' participation in the budgeting process, participative budgeting has been criticized because "it encourages managers to lie and cheat" (M. Jensen, 2001). This aligns with principal-agent theory as one of the most important and widely accepted theories in management accounting (Brown, Evans III, & Moser, 2009; Lambert, 2001). In its most standard form, principal-agent theory follows the traditional model of *homo economicus*, assuming that agents are purely self-interested and want to maximize their utility by increasing wealth and decreasing effort (Baiman, 1990; Lambert, 2001). Therefore, standard principal-agent theory predicts that managers participating in the budgeting process will misrepresent their private information to maximize their wealth. The result of misrepresenting private information in the budgeting process (e.g., understating revenues or overstating costs) is referred to as *budget slack* (Schiff & Lewin, 1970).

However, experimental evidence contradicts the strong agency prediction that managers will build the highest amount of slack into the budget when participating in the budgeting process (e.g., Chow, Cooper, & Waller, 1988; Evans, Hannan, Krishnan, & Moser, 2001; Rankin, Schwartz, & Young, 2008). Young (1985) shows that this deviation from the agency prediction occurs when managers face social pressure to create less budget slack. Stevens (2002) and Hannan et al. (2006) replicate this finding but refer to social pressure as managers' desire to appear honest in front of others to receive social disapproval. Responding to a call from Brown et al. (2009), several experimental studies have utilized the strong agency prediction in the participative budgeting setting to test opposing predictions from behavioral theories. For example, one stream of the participative budgeting literature has investigated how social norms affect managers' reporting behavior (e.g., Douthit & Majerczyk, 2019; Douthit & Stevens, 2015; Hobson, Mellon, & Stevens, 2011). The reason is that most managers do not act in social

isolation and are affected by what their peers do and approve of (Bicchieri, 2017; Innes & Mitra, 2013), or as Elster (1989, p. 101) stated, „the workplace is a hotbed for norm-guided action."

To predict how managers' reporting behavior is affected by social norms, the social norm theory of Bicchieri (2006) is considered especially suitable (Blay, Gooden, Mellon, & Stevens, 2018; Hobson et al., 2011). Her theory defines a social norm in an operational way that allows one to make testable predictions (Bicchieri, 2006). According to social norm theory, individuals have a preference to follow a social norm conditional on their expectations about others' behavior and beliefs. These expectations are elicited through situational cues, which individuals interpret to categorize a situation. When a situation is categorized as a situation already encountered in the past, individuals know what to expect from others, and a social norm is activated. Therefore, most experimental studies in participative budgeting employ a dyadic superior-manager setting to investigate whether situational cues in the budgeting environment (e.g., information system, superior's contract selection, mode of budget communication) activate social norms, such as honesty, fairness, or reciprocity that limit managers' budget slack (e.g., Abdel-Rahim & Stevens, 2018; Cardinaels & Yin, 2015; Douthit et al., 2022; Douthit & Stevens, 2015).

However, managers' expectations about others' behavior and beliefs and, thus, their preference to follow a social norm can change when individuals receive new information from peers (Bicchieri, 2006). Therefore, some experimental studies in participative budgeting go beyond the dyadic superior-manager setting and include additional peers. These studies show that repeated interactions with peers can change managers' perception regarding the social norm, leading to less norm compliance and more budget slack over time (Brunner & Ostermaier, 2019; Guo, Libby, Liu, & Tian, 2020; Lill, Majerczyk, & Xu, 2023; Paz, Reichert, & Woods, 2014; Schwering, 2017). The reason for this erosion of norm-compliance over time is that a social norm is not self-sustaining as norm-compliance is often against individuals' material self-interest. In this regard, Bicchieri (2006) emphasizes the importance of peer sanctioning for enforcing social norms to prevent the erosion of norm-compliance over time. Despite its importance for social norms, peer sanctioning has yet received less attention in the participative budgeting literature. Thus, it remains open to how peers affect honesty in participative budgeting over time when considering peer sanctioning. The fundamental motivation of this thesis is to contribute to the participative budgeting literature by examining how managerial honesty is affected by social norms when the possibility of peer sanctioning is considered.

1.2 THEORETICAL CONTEXT AND RESEARCH OBJECTIVES

This dissertation focuses on how peers influence managers' reporting in participative budgeting by establishing social norms. According to social norm theory (Bicchieri, 2006), individuals have a preference to follow a social norm conditional on their expectations about peers' behavior and beliefs. These expectations come from past experiences that can change when receiving new information. For example, in a given situation, individuals may observe the unexpected behavior of peers, resulting in different expectations about peers' behavior the next time they enter such a situation. By changing individuals' expectations about peers' behavior and beliefs, individuals may no longer prefer to follow a particular social norm. Following findings from behavioral economics (e.g., Georganas, Tonin, & Vlassopoulos, 2015; Mas & Moretti, 2009), I argue that peers influence individuals' preference to follow a social norm in two ways. First, individuals could observe peers and imitate their behavior because they interpret it as the prevailing social norm. Second, individuals could be observed by peers; thus, individuals feel social pressure to behave in a way that their peers would approve of to avoid being sanctioned. Therefore, peers affect an individual through *peer observability* and *peer sanctioning*.

Both ways of peers' influence come into play when there is transparency among managers (Georganas et al., 2015; Maas & Van Rinsum, 2013; Mas & Moretti, 2009). Suitable for this, firms have increased organizational openness, i.e., the extent of transparency among employees, to foster communication, information sharing, and collaboration (Bernstein & Turban, 2018; Evans III, Moser, Newman, & Stikeleather, 2016; Waber, Magnolfi, & Lindsay, 2014). One way to foster organizational openness is to open the firm's internal reporting environment (Evans III et al., 2016). For example, companies could collect data such as sales success per employee in a database, which managers can access via business intelligence solutions (e.g., Power BI or Tableau) (Remmers & Schaupp, 2020). When the internal reporting environment is more open, managers receive more information about their peers' reports to the superior. In participative budgeting, one of the most common forms of internal reporting (Libby & Lindsay, 2010; Shields & Shields, 1998), managers may receive information about others' budgets when the internal reporting environment is open. Due to this development, the participative budgeting literature has shown increased interest in the influence of peers on managerial reporting in open reporting environments (e.g., Evans III et al., 2016; Lan Guo et al., 2020; Lill et al., 2023).

Several experimental studies in participative budgeting find that transparency among managers increases budget slack in multi-period settings due to an asymmetric effect of observable peer behavior (Brunner & Ostermaier, 2019; Emett, Guymon, Tayler, & Young, 2019; Guo et al., 2020; Paz et al., 2014; Schwering, 2017). This asymmetric effect of observable peer behavior stems from managers' tendency to make a self-serving use of empirical information by responding more strongly to observations of dishonest reporting than honest reporting. Thus, these results suggest that participative budgeting leads to more budget slack when the reporting environment becomes more open.

While prior literature has focused on the first way how peers influence managers' reporting in open reporting environments (i.e., peer observability), managers' behavior may also be affected by the possibility that peers socially sanction their behavior. Peer sanctioning, i.e., the informal act of expressing social disapproval, such as through gossiping, peer pressure, or ostracism, plays a central role in motivating norm compliance (Fehr & Gächter, 2000; Masclet, Noussair, Tucker, & Villeval, 2003; Noussair & Tucker, 2005). The reason is that following a social norm goes against an individual's material self-interest. For example, in participative budgeting, following a social norm of honesty by reporting private information honestly goes at the expense of additional budget slack. The possibility of peer sanctioning represents a counterweight to the material incentives of violating a social norm. The reason is that most individuals experience disutility through psychological costs like shame, discomfort, or loss of self-respect when being sanctioned (Blau, 1964; Fischer & Huddart, 2008; Williams, 1997). However, the participative budgeting literature has not considered that peers may influence managers' reporting behavior in an open internal reporting environment through peer sanctioning. The following research question summarizes this objective:

(1) How does budget slack in an open internal reporting change when the possibility of peer sanctioning as a second mechanism of peers' influence beyond peer observability is added?

While peer sanctioning may be effective in enforcing a social norm of honesty in participative budgeting, it remains open which managers are willing to sanction norm violators. The reason is that sanctioning norm violators is typically costly for the sanctioning party as it requires time and effort (Balafoutas, Nikiforakis, & Rockenbach, 2016; Fehr & Fischbacher, 2004). In participative budgeting, managers violating a social norm of honesty by creating budget slack

harm the organization but impose little material costs on peers' wealth. Therefore, peers might have little incentive to sanction norm violators. In the face of costs for the sanctioning but little material incentives, it is crucial to understand which managers, if any, bear the costs to sanction norm violators. The following research question reflects this objective:

(2) Which managers sanction norm violators in participative budgeting?

The behavioral economics literature argues that sanctions are driven by negative emotions like feelings of unfairness or being exploited (Falk, Fehr, & Fischbacher, 2005; Ernst Fehr & Fischbacher, 2004; Fehr & Gächter, 2002). Therefore, organizational settings where managers' budget slack elicits more negative emotions may trigger more sanctions. Besides organizational openness that makes norm violation observable, I consider group compensation contracts as another organizational factor amplifying the effect of peer sanctioning. In practice, group compensation contracts are widely used to motivate managers to act congruently with the organization's goals (Bonner & Sprinkle, 2002; Luft & Shields, 2003). Adopting a group compensation contract like a pooled profit-sharing plan introduces interdependency among managers because a manager's wealth is contingent upon peers' decisions. In this setting, managers' budget slack directly harms peers' wealth, which may elicit strong negative emotions. As a result, more sanctions may be inflicted on norm violators compared to a situation without a pooled profit-sharing plan. Overall, this leads to the following research question:

(3) How does peers' influence (i.e., peer observability and the possibility of peer sanctioning) affect budget slack under a pooled profit-sharing plan?

The central claim of this thesis is that peers influence managers' reporting through a social norm of honesty. Increasing confidence in a social norm of honesty as the causal mechanism for managers' reporting behavior in participative budgeting is important for firms. The reason is that different mechanisms would require different interventions to change managers' reporting effectively. In the case of a social norm of honesty, firms know that changing managers' expectations about peers' behavior and beliefs will influence managers' behavior. This is also important to prevent potentially adverse effects of decisions by the firm. For example, Cardinaels and Yin (2015) show that a superior's active decision to replace a compensation contract leaks information about others' misreporting, increasing budget slack. In contrast, if managers report honestly because they value honesty and not because they want

the approval of their peers, changing managers' expectations is unlikely to affect their reporting behavior. The following research question summarizes this objective:

(4) Is a social norm of honesty the underlying causal mechanism of peers' influence in participative budgeting?

1.3 STRUCTURE OF THE THESIS

The next chapter serves as the theoretical foundation of this thesis. The concept of participative budgeting and the inherent principal-agent problem are described. Further, the social norm theory by Bicchieri (2006) is outlined in addition to a detailed explanation of the process by which social norms become active and how peer observability and peer sanctioning affect the emergence of social norms.

In Chapter 3, I provide an overview of the participative budgeting literature on social norms. I differentiate between studies that focus on activating a social norm and studies that focus on how social norms change over time. Further, I link the results of all studies to Bicchieri (2006) social norm theory to identify which parts of her theory have received less attention in the participative budgeting literature.

In Chapter 4, I describe the design and the results of two experiments. Both experiments focus on how the possibility of peer sanctioning affects budget slack in participative budgeting. Experiment 1 aims to reproduce prior experimental results that budget slack increases when the internal reporting environment changes from closed to open because managers receive information about peers' behavior. Further, the additional effect of the possibility of peer sanctioning in an open internal reporting environment is analyzed. Experiment 2 aims to amplify the effect of the possibility of peer sanctioning on budget slack by introducing group compensation contracts. Next, the results of both experiments are compared. Finally, the results of both experiments and their comparison are discussed in view of the research questions and their contribution to the participative budgeting literature.

In Chapter 5, I combine experiments and agent-based modeling. First, agent-based modeling as a research method and the benefits of combining experiments and agent-based modeling are outlined. Second, the agent-based model by Andrighetto et al. (2013) that explicitly

incorporates social norms as part of agents' decision-making process is replicated. This replication serves as a starting point for building an agent-based model of participative budgeting. Next, the participative budgeting model is used to simulate reporting behavior with different agents representing competing theories. Finally, the simulated and empirically observed behavior is compared to draw conclusions regarding the hypothesis of a social norm as the underlying causal mechanism of managers' reporting behavior in participative budgeting.

In Chapter 6, I summarize the results and contributions of both experiments and the agent-based model of participative budgeting. Against the backdrop of the observed behavior in the experiments and the simulation results, I discuss limitations of this thesis and make suggestions to advance our understanding of how peers influence managerial honesty in participative budgeting.

2 BASIC CONCEPTS

2.1 PARTICIPATIVE BUDGETING

2.1.1 PURPOSE AND PROCEDURE OF BUDGETING

Budgeting refers to the process of arriving at a written plan in the form of budgets (Covaleski, Evans, Luft, & Shields, 2003). "A budget is a quantitative expression of a proposed plan of action by management for a future time period and is aid to the coordination and implementation of the plan" (Bhimani, Horngren, Rajan, & Datar, 2019, p. 425). Budgets cover non-financial aspects like units manufactured and the number of employees and financial aspects like income, profits, or cash flows. In contrast to a financial statement covering past periods, budgets quantify management's expectations regarding future periods in the form of a budgeted income statement, a budgeted cash-flow statement, or a budgeted balance sheet (Bhimani et al., 2019).

Budgeting in most organizations serves four main purposes: planning, coordination, target-setting for performance evaluation, and motivation (Merchant & Stede, 2017). The first purpose is planning, which can be described as making decisions in advance. When planning for future periods, managers must assess the development of their business and anticipate resource constraints or risks. Thereby, they better understand the organization's opportunities and threats and how different strategic and operational decisions affect organizational performance. This enables the organization to adapt to upcoming problems before these inflict severe damage and increases the organization's competitiveness (Merchant & Stede, 2017). The purpose of the planning determines the planning horizon. While organizational planning also includes long-term planning (strategic planning) and medium-term planning (capital budgeting), the term "budgeting" usually refers to operational budgeting, which involves the annual preparation of a one-year financial plan of detailed revenues and expenses (Merchant & Stede, 2017). The annual budget is often broken down into quarters or even months to enable the organization to compare actual and budgeted financial results between the planning period and use this information to revise budgets for later quarters (Bhimani et al., 2019).

The second purpose is coordination. To develop a plan that ensures the organization's objectives can be met, several business units and departments must communicate, share information, and coordinate their actions (Bhimani et al., 2019). For example, to make an

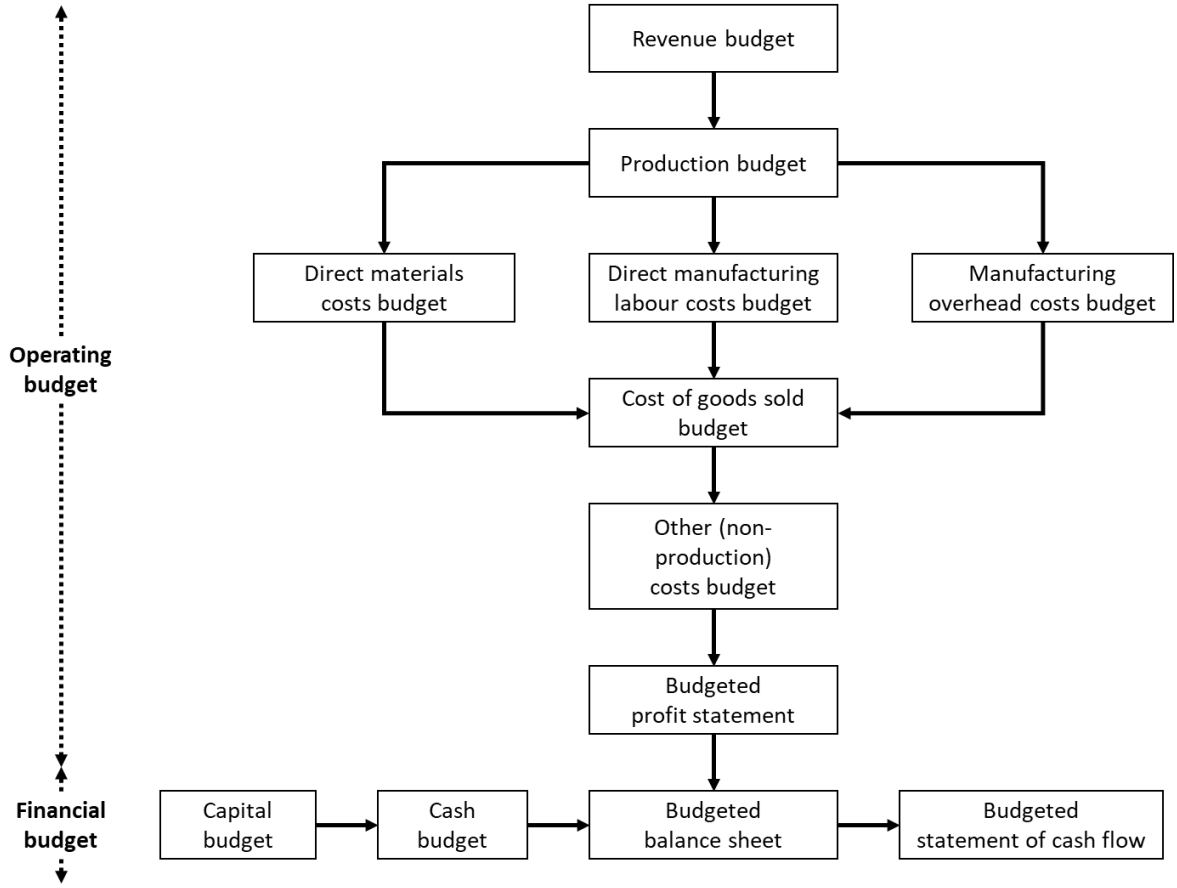
accurate forecast of revenues, the sales manager needs to know from the production manager whether it is possible to produce a certain number of goods. The production manager needs information from the purchase manager on whether the materials needed to produce the number of goods are available on the market. Information about shortages of needed materials or unexpected high material costs may then result in an adjusted sales plan, which again affects production. As everyone involved gets more informed, this more likely results in decisions considering all perspectives (Merchant & Stede, 2017).

The third purpose is target-setting for performance evaluation. For most organizations, budgeting is an important control mechanism. Budgets are a pivotal element of a financial results control system because budgets are used as performance targets to provide a benchmark for evaluating employees' performance. As target attainment is often linked with rewards, this directs employees' attention towards relevant activities and encourages them to provide the needed effort to achieve the desired results. In most cases, budgets such as income, expenses or profits from the annual financial plan are used as performance targets and linked to an employee's incentive plan. Further, monitoring the target attainment during the year enables employees to identify negative variances at an early stage to solve related problems (Merchant & Stede, 2017).

The fourth purpose of budgeting is motivation. As already mentioned, budgets are used as targets to evaluate employees' performance and award rewards to direct their efforts toward activities that are relevant to organizational goals. If these targets are neither too easy nor too difficult, employees are motivated to achieve their performance target to receive performance-dependent rewards but also to enjoy a sense of achievement (Merchant & Stede, 2017).

Finally, to conclude this section and increase the understanding of how budgeting works, I will briefly outline a typical budgeting procedure. Since most organizations understand budgeting as the preparation of a plan for the next 12 months (Deloitte, 2023; Merchant & Stede, 2017), I describe next the process of annual budgeting, which considers both operations and financing decisions. While operation decisions are about the use of scarce resources, financing decisions concern the funds to acquire the resources (Bhimani et al., 2019).
Figure 1 provides a simplified overview of the different budgets that are typically planned for a manufacturing company (Bhimani et al., 2019).

Figure 1: Procedure of Annual Budgeting



Note. Adapted from *Management and Cost Accounting* (7th ed., p. 432), by A. Bhimani, C. Horngren, M. Rajan, and S. Datar, 2019, Pearson (https://elibrary.pearson.de/book/99.150005/9781292232676).

The bulk of Figure 1 shows several budgets that together form the "operating budget." These budgets go along the value chain and result in the budgeted profit statement. The process of budgeting starts with the revenue budget, which is the result of information gathering and discussions among field representatives and sales managers (Bhimani et al., 2019). While the revenue budget is typically the starting point because the production budget (i.e., budgeted goods in units) generally depends on the revenue forecast, the company may occasionally start with the production budget when production capacity is limited due to various reasons like shortages of personnel or materials. The production budget is then used to determine the needed material and labour hours in quantities and euros. Together with the manufacturing overhead costs (e.g., power, maintenance, or property insurance), this leads to the budget for the costs of goods sold. In addition, budgets for further non-production costs along the value chain, from research and development over marketing and distribution to customer service and

administration, are calculated. Overall, this results in the operating profit as quantified in the budgeted profit statement. The remaining part of
Figure 1 is called the "financial budget" and focuses on the impact of planned capital outlays and operations on cash. Most important is the cash budget, which is the result of the expected cash receipts and disbursements as well as financing decisions (i.e., borrowing loans) to resolve identified cash deficiencies. The capital budget, the cash budget, and the budgeted profit statement result in the budgeted balance sheet and budgeted statement of cash flow. In most organizations, several iterations and discussions across various business functions are needed to get to the final budget plan (Bhimani et al., 2019).

2.1.2 The Purpose of Participative Budgeting

One important issue regarding budgeting is the extent of influence managers should have in setting their budget targets (Merchant & Stede, 2017). Participative budgeting describes the "process in which individuals, whose performance will be evaluated, and possibly rewarded, on the basis of their achievement of budget targets, are involved in, and have influence on, the setting of these targets" (Brownell, 1982, p. 124). Managers' participation in the budgeting process might take place in the form that their information is used as input to determine targets, but targets may also directly be negotiated between superiors and managers (Merchant & Stede, 2017). In contrast, authoritative budgeting processes shift all decision rights to the superior and leave managers with minimal influence on their approved budget (Heinle et al., 2014; Kramer & Hartmann, 2014; Libby, 1999). Participative budgeting was first proposed by Argyris (1952) as a remedy to eliminate the problems managers felt with budgeting practices, like feelings of budget pressure due to the overemphasis on target fulfillment by superiors or the difficulty of budget targets. Since then, a lot of studies have investigated why organizations use participative budgeting.

Empirical findings indicate that firms mostly use participative budgeting to facilitate information sharing between different hierarchical levels and motivate managers to achieve budget targets (e.g., Clinton, 1999; Francis-Gladney, Little, Magner, & Welker, 2004; Hansen & Stede, 2004; Shields & Young, 1993). First, superiors' intention to obtain private and valuable information from decentral managers is a reason to use participative budgeting (Clinton, 1999). The difference in information between a superior and a manager is called information asymmetry. Information asymmetry is assumed to be most severe in large firms

that are geographically dispersed and with diverse products and technologies (Shields & Young, 1993). Valuable information includes information about expected revenues or costs managers obtain because they are closer to customers and the production process and, thus, are better informed than their superiors about the "operational" aspects of the firm (Lambert, 2001; Merchant & Stede, 2017). For example, firms may use information about local business opportunities to improve the efficiency of operational planning, such as resource allocation and, hence, firm-wide performance (David, 2002; Hansen & Stede, 2004; Shields & Young, 1993). Further, information about unobservable personal characteristics, e.g., managers' performance capabilities, skills, or risk aversion, is valuable for the firm (J. Fisher, Frederickson, & Peffer, 2002).

Second, participation in the budgeting process and, hence, involvement in target setting increases managers' motivation to achieve those targets (Merchant & Stede, 2017). For example, Clinton (1999) finds that when superiors consider it important to motivate managers, the degree of participation increases. Lau and Tan (2003) assume that superiors with a high emphasis on budgets use participative budgeting to maintain fairness in terms of realistic budget targets. Considering managers' information about production capabilities, costs, and revenues may result in achievable budget-targets that increase managers' motivation to achieve their budget targets (e.g., Brownell & McInnes, 1986; Dunk, 1993; Merchant & Stede, 2017). Budget achievement is often linked to several rewards like bonuses, autonomy, a higher probability of promotion, but also good self-esteem. Therefore, achievable targets motivate managers to meet their targets and receive these rewards. In contrast, when targets are very difficult to achieve, managers are discouraged from meeting their targets and exert less effort. For example, managers often operate in conditions of uncertainty where their performance might be affected by unforeseen, negative events. Considering managers' information about uncertainties when setting targets would result in achievable targets that motivate managers regardless of the business condition they face (Merchant & Stede, 2017).

Additionally, participating in the budgeting process increases managers' commitment. Budgets break down a strategy into several targets, which ensure that the organization achieves its goals. When managers are actively involved in the target-setting process, they are more likely to understand their performance target as part of the strategy implementation and are more committed to achieving their targets (Merchant & Stede, 2017).

Another benefit of participative budgeting is that it can be framed as an interactive debate and dialogue among organizational levels that may yield useful information about strategic uncertainties (Chapman, 1997; Libby & Lindsay, 2010; Parker & Kyj, 2006; Simons, 1995). In a study from Libby and Lindsay (2010), most of the surveyed US and Canadian companies agree with statements such as "setting the budget causes us to talk about and reflect upon our strategy" and "we sometimes change our strategy/tactics based on the feedback derived from going through the budgeting process" (p. 64). Thus, organizations may use budgeting not only as an instrument to monitor performance and correct identified deviations but also as an agenda for debating potential threats and opportunities affecting the organization's strategy implementation (Simons, 1995).

Despite the outlined benefits of managers' participation in the budgeting process, the use of participative budgeting has been criticized because "it encourages managers to lie and cheat" (Jensen, 2001, p. 96). This so-called "principal-agent problem" inherent in participative budgeting and principal-agent theory as its theoretical foundation will be outlined in the next section.

2.1.3 Principal-Agent Problem in Participative Budgeting

Principal-agent theory is one of the most important and widely accepted theories in management accounting (Brown et al., 2009; Lambert, 2001). An agency relationship consists of one or more individuals (called principals) that hire others (called agents) and transfer responsibilities to them, which are specified in an employment contract (Baiman, 1990). In the simplest principal-agent model, the firm consists of a principal and an agent. The principal supplies capital, bears the risk, and chooses a compensation contract, while the agent's role is to provide effort or make decisions on the principal's behalf (Lambert, 2001). The information asymmetry assumption is common to all principal-agent models. Agents have private information about their skills and efforts that firms cannot gain access to without costs (Baiman, 1990).

Given the information asymmetry assumption, two principal-agent problems arise, i.e., the hidden action of effort and the hidden information of skill. Both principal-agent problems provide an opportunity for the agent to take advantage of the principal, which represents a potential moral hazard to the principal. It is called a moral hazard with hidden action if the

agent's skill, but not his/her effort, is known to the principal. It is called a moral hazard with hidden information if the agent discovers information about his/her skill after accepting the contract while this information remains unknown to the principal. Agents taking advantage of their private information in these situations at the expense of the principal are described as opportunistic (Williamson, 1975). Principal-agent theory assumes that all individuals are solely motivated by self-interest and want to maximize their utility, which increases through wealth and decreases through effort (Baiman, 1990; Lambert, 2001). Therefore, principal-agent theory predicts that agents will take advantage of their private information and act opportunistically by increasing their payoff at the principal's expense (Jensen & Meckling, 1976). Another potential moral hazard problem with hidden information may arise when agents obtain pre-decision information unknown to the principal that is related to the operational aspects of the firm (Lambert, 2001). For example, in budgeting, the principal-agent problem arises when managers participate in the budgeting process, and firms use managers' reports as a basis for resource allocation or performance evaluation. In this situation, principal-agent theory predicts that managers will act opportunistically by creating budget slack (Baiman, 1990; Merchant, 1985).

Lukka (1982) defines budget slack as the difference between managers' maximum performance capability and the budgeted performance. Similarly, Young (1985) describes budget slack as the amount by which managers understate their productive capability to achieve a better performance evaluation. Budget slack improves managers‘ performance evaluation and compensation and hedges against uncertainties (Baiman & Demski, 1980; Cyert & March, 1963).[3] Onsi (1973) states that budget slack is the result of manipulation in a budgeting process whose efficient accomplishment depends on the private information of managers who are more proximate to resource usage. Similarly, Kren and Liao (1988) state that budget slack is the result of overstated expenses or understated revenues. This occurs due to managers' incentives to outperform the budget and leads to inefficiencies for the organization. For example, budget slack in the form of overstated costs or understated revenues results in inefficient resource allocation and less motivating target setting, which are counterproductive to an organization's goals (Baiman & Evans, 1983; Rankin et al., 2008; Sprinkle & Williamson, 2006).

[3] The literature often distinguishes between budget slack and organizational slack. In contrast to budget slack, organizational slack is viewed positively as a way to cope with uncertainty (Cyert & March, 1963; K. A. Merchant, 1985).

To prevent managers from engaging in behavior that is harmful to the organization, such as creating budget slack, management controls are implemented (Merchant & Stede, 2017; Widener, 2007). Management controls should ensure that employees' behavior and decisions align with the organization's strategies and objectives and include formal and informal controls (Berry, Coad, Harris, Otley, & Stringer, 2009; Malmi & Brown, 2008). Formal controls encompass explicit rules like processes or routines that employees must follow (Berry et al., 2009; Bisbe & Otley, 2004). Examples of formal controls are planning procedures, contractual obligations, service level agreements, performance monitoring, and reward systems (Bonner & Sprinkle, 2002; Malmi & Brown, 2008; Widener, 2007). Informal controls are implicit structures like organizational culture that should encourage employees to control each other's behaviors (Berry et al., 2009; Bisbe & Otley, 2004; Merchant & Stede, 2017). Examples of informal controls are value statements (Kachelmeier, Thornock, & Williamson, 2016), employees' feedback (Christ, Emett, Tayler, & Wood, 2016), or organizational culture (Henri, 2006).

Another example of an informal control is a social norm (Hobson et al., 2011). Recently, social norms have received increasing attention in the participative budgeting literature. Several studies utilized the social norm theory by Bicchieri (2006) as they found her theory useful to explain and predict behavior in settings with a strong agency prediction, such as participative budgeting (Abdel-Rahim & Stevens, 2018; Blay, Douthit, & Fulmer, 2019; Douthit & Stevens, 2015; Hobson et al., 2011). The next section describes social norm theory in more detail.

2.2 SOCIAL NORMS

2.2.1 THEORETICAL PERSPECTIVE

In almost every situation, individuals‘ behavior and interactions with others are guided by social norms (Bicchieri, Dimant, Gächter, & Nosenzo, 2022; Conte, Andrighetto, & Campennì, 2014). Social norms affect pro-social behavior, such as reciprocity (Gächter, Nosenzo, & Sefton, 2013), or fairness concerns (Bicchieri & Chavez, 2010), and also constrain anti-social behavior, such as cheating (Bicchieri, Dimant, & Sonderegger, 2020) or tax evasion (Hallsworth, List, Metcalfe, & Vlaev, 2017).

In general, there are two opposing views regarding the nature of social norms (Conte et al., 2014). On one side, social norms are defined as obligations issued by an exogenous authority.

Thus, social norms exist to the extent that they are emanated from a legitimate act and represent exogenous reasons for individuals to behave in a certain way (Kelsen, 1979). On the other side, social norms are considered endogenous products of individuals' interactions, and individuals behave in a certain way due to the perceived endogenous pressure to fulfill others' expectations (e.g., Bicchieri, 2006; Ullmann-Margalit, 1977). This endogenous view pays attention to the role of expectations in supporting social norms that allows to distinguish social norms from other pattern of behavior such as customs or descriptive norms. Being able to diagnose the nature of a pattern of behavior is crucial when choosing effective interventions (Bicchieri and Muldoon, 2011).

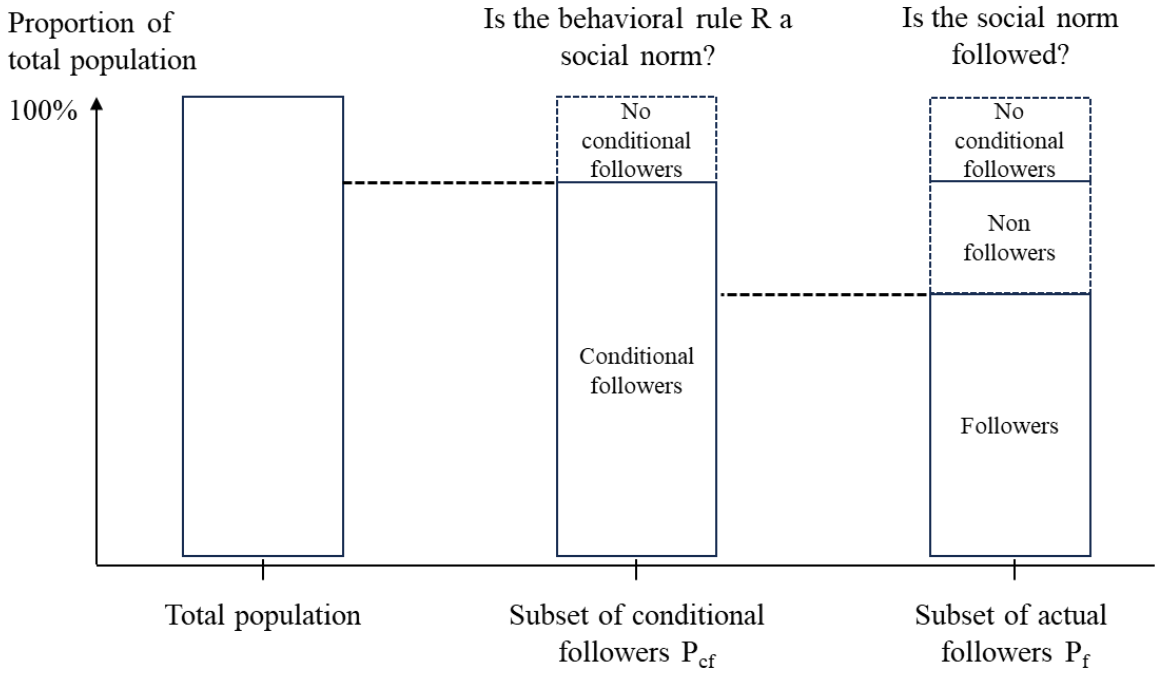
Following this endogenous view, I use the social norm theory of Bicchieri (2006). Her theory is firmly grounded within an expectation and preference framework and is, therefore, easier to operationalize and measure empirically. Having an operational definition is important because it allows to identify conditions in which a social norm exists and is followed and to make testable predictions (Bicchieri, 2017). Further, her theory explains how social norms are activated by cues that are salient in a given situation. Thus, the social norm theory by Bicchieri (2006) is suitable to explain and predict behavior in a business setting as it considers both individual and organizational factors (Blay et al., 2018). According to Bicchieri (2006, p. 11), a behavioral rule R is a social norm in a population P if there is a sufficiently large proportion of individuals ($P_{cf} \subseteq P$) who

1. Know that the rule exists and applies to the situation **(contingency condition) and**
2. Would follow the rule conditionally on their expectations that **(conditional preference condition)**
    a. Sufficiently many others follow it **(empirical expectations condition) and either**
    b. Sufficiently many others believe the rule should be followed **(normative expectations condition) or**
    b'. Sufficiently many others believe the rule should be followed and are willing to sanction deviations from it **(normative expectations with sanctions condition).**

I define P_{cf} as the set of individuals who are aware of the rule R and would follow R on the condition that, for them, conditions 2a and either 2b or 2b' are met. I define P_f as the set of individuals who follow R because, for them, the conditions 2a and either 2b or 2b' are met. If there exists a sufficiently large proportion of conditional followers for which the conditions 2a and either 2b or 2b' are met ($P_f \subseteq P_{cf}$), then a social norm is followed by the population. For

these actual followers $P_{f,}$ the empirical and normative expectations conditions are fulfilled, and therefore, they prefer to follow the social norm in this situation. The term "sufficiently" regarding the subset of conditional followers in the population ($P_{cf} \subseteq P$) reflects the fact that a rule can be a social norm in a population when not everyone conditionally prefers to follow the behavioral rule or even knows it (see Figure 2).

Figure 2: Conditional and Actual Followers in a Population



The term "sufficiently" regarding the subset of actual followers ($P_f \subseteq P_{cf}$) necessary to state that the social norm is followed by a population reflects the fact that among the conditional followers, some may not prefer to follow the social norm in this situation. The reason is that they do not expect that sufficiently many others follow the rule (i.e., their empirical expectations condition is not fulfilled) or do not expect that sufficiently many others believe that the rule should be followed and/or may be willing to sanction deviations (i.e., their normative expectations condition is not fulfilled). Finally, "sufficiently" regarding the empirical and normative expectations condition reflects the fact that individuals have different thresholds for when their empirical and normative expectations condition are fulfilled.

The contingency condition says that individuals' awareness regarding the existence of a behavioral rule is a condition for a social norm to exist. In this regard, context and situational

cues are very important to make salient that a certain social norm applies to the situation (Bicchieri, 2006). The role of situational cues and the resulting process of interpreting and categorizing a social situation will be explained in more detail in the next section.

The conditional preference condition says that a behavioral rule satisfies the properties of a social norm when there is a sufficient proportion of individuals in a population whose preference to follow the rule is dependent on their expectations about others' behavior and beliefs. If the contingency, empirical expectations, and normative expectations condition are fulfilled, these individuals prefer to comply with the social norm and experience greater utility for conformance than for non-conformance. This implies that if these individuals do not expect that sufficiently many others follow the rule or think one should follow the rule, they would also not prefer to follow the rule. The reason is that following social norms is often contrary to self-interest when it is defined in purely material terms (Bicchieri et al., 2022).

When people have a conditional preference to follow a social norm, their expectations about what others do and approve of affect their behavior. These expectations are just beliefs. On the one hand, beliefs can be classified as normative or non-normative. On the other hand, beliefs can be classified as social or non-social (Bicchieri, 2017). Table 1 gives an overview of the different types of beliefs.

Table 1: Classification of Beliefs

Normative	Social	
	No	Yes
No	Factual beliefs	Empirical expectations
Yes	Personal normative beliefs	Normative expectations

Note. Adapted from *Norms in the wild* (p. 12), by C. Bicchieri, 2017, Oxford University Press (https://doi.org/10.1093/acprof:oso/9780190622046.001.0001).

The difference between non-normative and normative beliefs refers to whether the belief is about states of affairs or expresses an evaluation of something. The difference between non-social and social beliefs refers to whether the belief is about what an individual thinks is right and how he/she perceives a situation or whether the belief is about other people’s behaviors and beliefs. In the category of non-social beliefs, one can distinguish between factual beliefs about

states of affairs, for example, “Today is Monday,” which may be true or false, and personal normative beliefs, which express an evaluation. For example, “People should tell the truth,” which in this case signals disapproval of lying (Bicchieri, 2017).

Social beliefs can be categorized as empirical or normative expectations (Bicchieri, 2017). Expectations are beliefs about what is going to happen or should happen and assume a continuity between past and present or future. Empirical expectations are beliefs about others’ behavior in a particular situation. Individuals may have observed others’ behavior in the past over a long period and therefore infer, ceteris paribus, that others will act as in the past. In this situation, individuals have formed empirical expectations about others’ future behavior. For example, if one has observed multiple times that most colleagues eat lunch and go to the cafeteria at 11:30 a.m., one will expect the same behavior the next time.

Normative expectations express one’s belief about what others think is appropriate or inappropriate behavior. In other words, normative expectations are beliefs about others’ personal normative beliefs (i.e., second-order beliefs). For example, an employee expects that most colleagues in the firm believe that punctuality is important for a good employee and unpunctuality should be avoided. Again, normative expectations also presuppose a continuity between the past and the future (Bicchieri, 2017). Although a social norm is not followed when people do not expect others to follow (i.e., empirical expectations condition is not fulfilled), a social norm would at least exist within a group of people if the rule is known to apply within that group and normative expectations are mutually consistent (Bicchieri et al., 2022).

The strength with which empirical and normative expectations influence individuals’ behavior depends on their norm sensitivity. Norm sensitivity is a stable, norm-specific disposition and embodies individuals’ personal reasons to conform to a social norm. Therefore, individuals’ personal normative beliefs can be a good proxy for individuals’ norm sensitivity (Bicchieri, 2017). A highly norm-sensitive individual has several important reasons in mind why a social norm should be followed, while a individual with low norm-sensitivity does not care about what the social norm stands for (Bicchieri, 2017). However, a low-sensitive individual may be induced to comply with the social due to the expectations of being sanctioned when violating the social norm. Thus, the less an individual’s behavior changes in response to changing empirical and normative expectations, the more sensitive the individual is to the particular norm (Bicchieri, 2017, pp. 75, 182).

Throughout Section 2.2, I use an example in a game-theoretic context from Bicchieri (2006) to illustrate how empirical expectations, normative expectations, and norm-sensitivity interactively influence individuals' behavior. I follow the logic in Figure 2 and start by showing how individuals' norm sensitivity determines whether they are conditional followers (P_{cf}). Therefore, I use the following one-shot prisoner's dilemma (PD), as shown in Figure 3. The payoffs may present sums of money that players receive because of their chosen strategies.[4] Thus, a self-interested player will always choose to defect (*D*), his/her dominant strategy, and never cooperate (*C*) if self-interest is narrowly defined as a desire for material possessions.

Figure 3: Payoffs in Prisoner's Dilemma Game

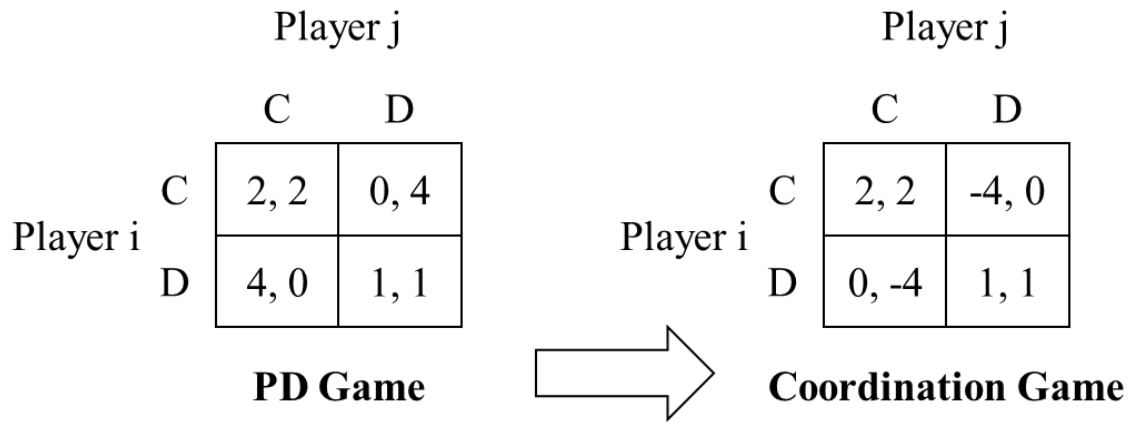
		Player j: C	Player j: D
Player i	C	2, 2	0, 4
	D	4, 0	1, 1

Note. Adapted from *The Grammar of Society: The Nature and Dynamics of Social Norms* (p. 53), by C. Bicchieri, 2006, Cambridge University Press (https://doi.org/10.1017/CBO9780511616037).

The original PD game, however, can be transformed into a coordination game when a social norm of cooperation exists in a population, and individuals are sensitive regarding a social norm of cooperation. Figure 4 shows the transformation of the original PD game into the coordination game.

[4] For example, if Player *i* chooses *C* and Player *j* choose *D*, then Player *i* would yield a payoff of 0 and Player *j* would yield a payoff of 4.

Figure 4: Social Norm Transforms a PD Game into a Coordination Game



Note. Adapted from *The Grammar of Society: The Nature and Dynamics of Social Norms* (p. 53), by C. Bicchieri, 2006, Cambridge University Press (https://doi.org/10.1017/CBO9780511616037).

To explain the conditions for the transformation of the original PD game into a coordination game, Bicchieri (2006) uses a norm-based utility function, which assumes that players who are norm-sensitive experience disutility from transgressing the norm or being the victim of a norm violation. She states that one should "think of a norm as a function that maps one's expectations concerning the behavior of others into what one ought to do. In other words, a norm regulates behavior conditional on other people's behavior" (Bicchieri, 2006, p. 52). A simplified version[5] of her norm-based function is given by

$$U_i(s) = \pi_i(s) - k_i \, max_{m \neq j} \left\{ \pi_m \left(s_{-j}, N_j(s_{-j}) \right) - \pi_m(s), 0 \right\} \quad (1)$$

Where U_i, π_i, and k_i are the utility, payoff, and sensitivity of Player i to this specific norm. In a game with two players (i and j), the first part of the utility function is the Player i's payoff resulting from both players' strategies s. The maximum operator considers payoff losses due to norm violations, which are multiplied by a Player's norm sensitivity k. Importantly, the norm-based utility considers both perspectives of norm violation. If a player has a $k > 0$ and thus is sensitive to the norm, the player experiences disutility from transgressing the norm as well as being the victim of a norm violation. For example, if the strategy from Player i (here s_{-j})

[5] The long version of her norm-based utility function also considers that norm instantiations and thus norm violations might be ambiguous.

instantiates a norm for Player *j* or, in other words, N_j is defined at s_{-j}, then Player *j* violates the norm if $s_j \neq N_j(s_{-j})$. The first part of the subtraction shows the payoff of Player *i* if Player *j* had followed the norm. The second part of the subtraction shows the actual payoff of Player *i* considering Player *j*'s actual strategy (i.e., norm violation). If there is a payoff difference, this difference multiplied by k_i results in a utility deduction for Player *i* since norm-sensitive players also experience disutility from being the victim of a norm violation.

To calculate the payoffs for the coordination game in Figure 4, it is assumed that for both players, a norm is defined at *C* but not at *D*, and both players have a norm-sensitivity $k = 2$. Using the norm-based utility function, Player *i*'s utility in the four possible strategy combinations would be as follows:

$$
\begin{aligned}
&U_i(C, C) = \pi(C, C) - k_i(\pi(C, C) - \pi(C, C)) = 2 - 2(2\text{-}2) = 2 \\
&U_i(D, D) = \pi(D, D) - k_i(\pi(D, D) - \pi(D, D)) = 1 - 2(1\text{-}1) = 1 \\
&U_i(C, D) = \pi(C, D) - k_i(\pi(C, C) - \pi(C, D)) = 0 - 2(2\text{-}0) = -4 \\
&U_i(D, C) = \pi(\mathrm{D}, \mathrm{C}) - k_i(\pi(C, C) - \pi(D, C)) = 4 - 2(2\text{-}0) = 0
\end{aligned} \qquad (2)
$$

The PD game only transforms into a coordination game when $U_i(C, C) > U_i(D, C)$ and $U_j(C, C) > U_j(D, C)$, which means that *D* is no longer a dominant strategy and a player has to think about the other player's strategy. Since the norm is only defined at *C*, there is only a payoff difference between the original PD game and the coordination game where one player chooses *C* and the other player chooses *D* and thereby does not follow what the norm prescribes. This change in payoffs depends on the payoff structure in the original PD game but also on the player's norm-sensitivity *k*. For example, Figure 5 shows the payoffs if Player *i* has a norm-sensitivity $k_i = 0.5$.[6]

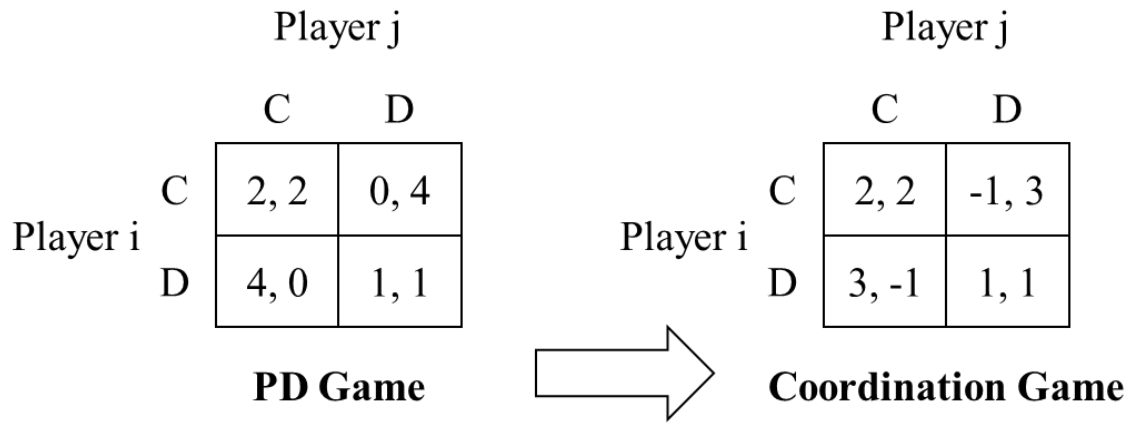
[6] $U(C, C) = \pi(C, C) - k(\pi(C, C) - \pi(C, C)) = 2 - 0.5*(2\text{-}2) = 2$

$U(D, D) = \pi(D, D) - k(\pi(D, D) - \pi(D, D)) = 1 - 0.5*(1\text{-}1) = 1$

$U(C, D) = \pi(C, C) - k(\pi(C, C) - \pi(C, D)) = 0 - 0.5*(2\text{-}0) = -1$

$U(D, C) = \pi(D, C) - k(\pi(C, C) - \pi(D, C)) = 4 - 0.5*(2\text{-}0) = 3$

Figure 5: Payoffs in the Coordination Game (Norm Sensitivity of 0.5)



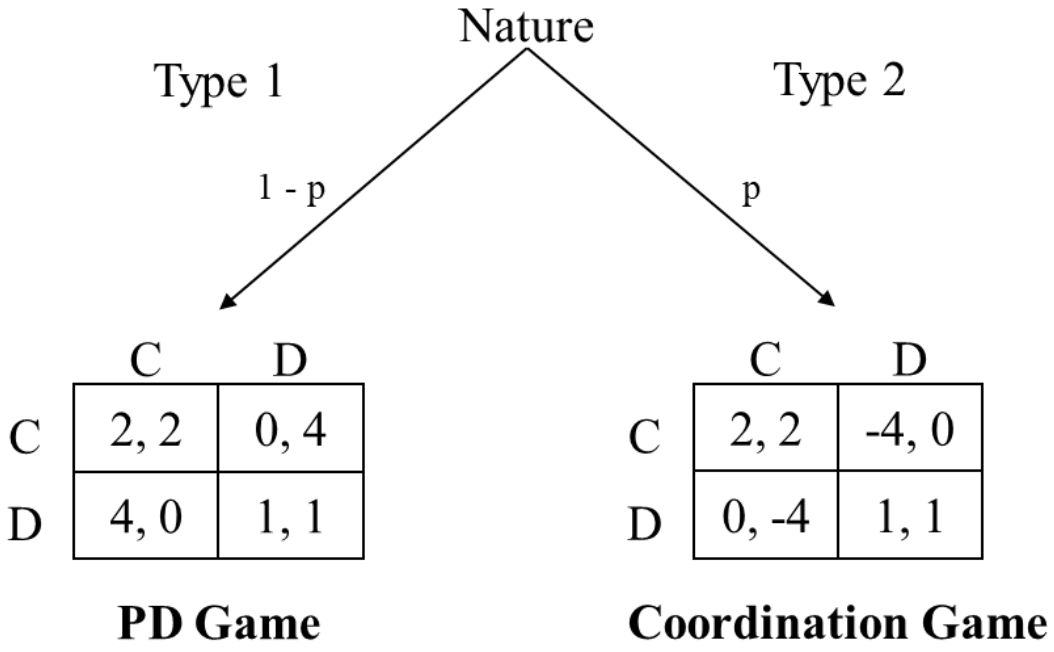
Note. Adapted from *The Grammar of Society: The Nature and Dynamics of Social Norms* (p. 53), by C. Bicchieri, 2006, Cambridge University Press (https://doi.org/10.1017/CBO9780511616037).

In this situation, *D* is still the Player *i*'s dominant strategy because it always yields a higher payoff than *C,* no matter which strategy the other player chooses. In other words, although Player *i* is aware of the norm and is to some extent sensitive to it, the PD game does not transform into a coordination game because $U_i(C, C)$ is not higher than $U_i(D, C)$. Thus, for this example, only a player with a $k > 1$ will see the coordination game and will cooperate conditionally on having sufficient expectations being matched with someone who also sees and plays the coordination game. For players with a $k \leq 1$, the PD game does not transform into a coordination game as these players always choose *D* because it always yields a higher payoff than *C,* no matter which strategy other players choose. Thus, their expectations about others' behavior do not affect their decision (i.e., the conditional preference condition is not fulfilled). The same would be true for a player who is not aware that a social norm of cooperation applies to this situation (i.e., contingency condition not fulfilled). Overall, a player's *k* and the payoff structure of the game determine whether the player is a conditional norm follower (potentially playing the coordination game).

Next, I show how individuals' empirical and normative expectations determine whether a conditional norm follower actually follows the norm. For a social norm to exist and to be followed in a population, it is not necessary that everybody is a conditional follower and that every conditional follower actually follows the social norm. Some individuals are not aware that a rule applies to a given situation, and some do not have a conditional preference to follow

a social norm of cooperation. Thus, when a social norm exists, the conditional follower's choice to follow or to defect can be modeled as a Bayesian game, as shown in Figure 6:

Figure 6: Social Norm as a Bayesian Game



Note. Adapted from *The Grammar of Society: The Nature and Dynamics of Social Norms* (p. 27), by C. Bicchieri, 2006, Cambridge University Press (https://doi.org/10.1017/CBO9780511616037).

Continuing the example (i.e., both players have a norm-sensitivity $k = 2$), a conditional follower is faced with a finitely repeated PD game and knows that a social norm of cooperation applies to this situation. The conditional follower also knows that there are two types of players. The first type of player plays the original PD game, and the second type of player plays the coordination game. With a prior probability of p, the conditional follower faces the type of player who plays the coordination game, and with a probability of $(1 - p)$, the opponent is playing the original PD game. If the probability of facing a similar type (a norm follower) is sufficiently high, the conditional follower will choose to cooperate. The fulfillment of a conditional follower's empirical and normative expectations is equivalent to a sufficiently high probability of being matched with a norm follower.

To understand this in more detail, the definitions of normative and empirical expectations are recalled. An individual's normative expectations are expectations about others' personal

normative beliefs. Personal normative beliefs can be seen as a proxy for an individual's norm sensitivity. Therefore, normative expectations can be interpreted as a player's expectation regarding the subset of individuals in a population who are aware of the norm and have a norm sensitivity high enough to transform the PD game into the coordination game. In other words, normative expectations are an estimation of the subset of conditional followers ($P\mathrm{c_f} \subseteq P$). Empirical expectations are expectations about whether others follow the norm, which is an estimation of the subset of actual followers ($P_\mathrm{f} \subseteq P_\mathrm{cf}$). Thus, empirical and normative expectations both affect the perceived probability of being matched with a norm follower. This determines whether the conditional norm follower chooses to follow the norm (i.e., here, cooperate).

As an example, I assume that Player *i* has a $k_i = 2$ and is confronted with the following situation: On the one side, there are players who have a norm-sensitivity $k <= 1$, thus always play the PD game (i.e., *D* is their dominant strategy). On the other side, there are players who have a norm-sensitivity of $k > 1$; these players are conditional norm-followers and would follow the cooperation norm conditionally on assessing a sufficiently high probability to be matched with a norm-follower. Player *i* expects that 100% of the population have a norm-sensitivity $k > 1$ (i.e., Player *i*'s normative expectations) but expects that only 80% actually follow the cooperation norm (i.e., Player *i*'s empirical expectations). Therefore, Player *i* assesses a probability of 80% to be matched with a norm-follower (i.e., $p(C) = 0.8$). The expected utility for *C* and *D* is calculated as shown in Equation 3. In this situation, the expected utility (EU) of *C* is higher than the EU of *D*. Thus, Player *i* would choose C.

$$
\begin{aligned}
&\mathrm{EU}(C) = \mathrm{p}(C)*\mathrm{U}(C, C) + (1- \mathrm{p}(C))*\mathrm{U}(C, D)\\
&\mathrm{EU}(D) = \mathrm{p}(C)*\mathrm{U}(D, C) + (1- \mathrm{p}(C))*\mathrm{U}(D, D)\\
&\mathrm{EU}(C) = 0.8*(2) + 0.2*(-4) = 0.8\\
&\mathrm{EU}(D) = 0.8*(0) + 0.2*(1) = 0.2
\end{aligned}
\qquad (3)
$$

But, if Player *i* experiences that other players defect, this may result in decreasing empirical expectations (or even normative expectations) and reverting to the equilibrium strategy in the original PD game (*D*). For example, after experiencing some other players defect, Player *i* expects that still, 100% of the population have a norm-sensitivity $k > 1$ but expects that only 70% follow the cooperation norm. Therefore, Player *i* assesses a probability of 70% to be matched with a norm-follower and chooses *D* due to the higher EU (Equation 4).

$$EU(C) = p(C)*U(C, C) + (1- p(C))*U(C, D)$$
$$EU(D) = p(C)*U(D, C) + (1- p(C))*U(D, D)$$
$$EU(C) = 0.7*(2) + 0.3*(-4) = 0.2$$
$$EU(D) = 0.7*(0) + 0.3*(1) = 0.3 \quad (4)$$

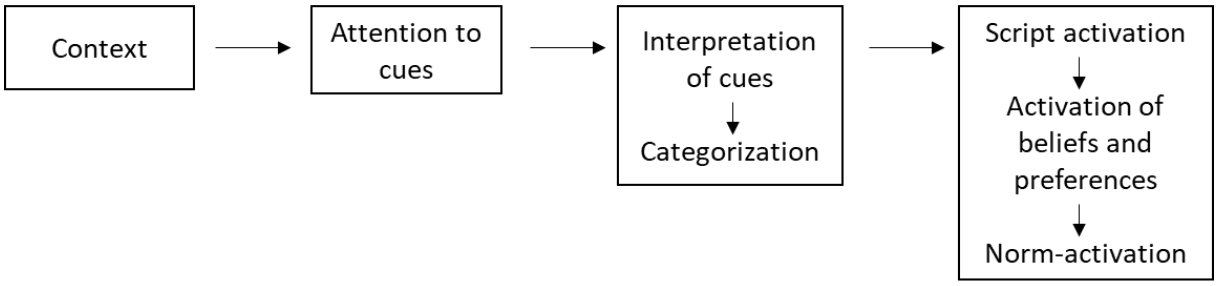
Altogether, this illustrates how a conditional follower is affected by empirical and normative expectations, which may be updated due to observations of peers' behavior. How agents' empirical and normative expectations are invoked in a given situation and guide behavior will be explained in the next section.

2.2.2 The Role of Situational Cues

According to Bicchieri's social norm theory, conditional followers actually follow a social norm when they recognize that a behavioral rule applies to a given situation and their empirical and normative expectations conditions are fulfilled (Bicchieri, 2006, p. 11). A particular strength of her theory is that it explains when a social norm becomes active (Blay et al., 2018; Davidson & Stevens, 2013). Activating a social norms means that individuals recognize that a certain behavioral rule applies to the situation and form empirical and normative expectations motivating them to follow the social norm.

Bicchieri (2006, p. 59) describes this process of social norm activation in the following way: "To 'activate' a norm means that the subjects involved recognize that the norm applies: They infer from some situational cues what the appropriate behavior is, what they should expect others to do, and what they are expected to do themselves and act upon those cues. It is the cues one focuses on that govern the mapping from context to interpretation and, ultimately, the activation of social norms". In contrast to stable preferences, as a common assumption in traditional economic theory (e.g., Fehr & Schmidt, 1999), her model assumes that individuals have a conditional preference to comply with a social norm and that such preference is activated by situational cues present in the social setting. This also means that although a social norm applies to a given situation, there will be no conforming behavior if there are not enough cues to activate it. Figure 7 shows the process from context to social norm activation.

Figure 7: Mapping From Context to Beliefs and Preferences



Note. From *The Grammar of Society: The Nature and Dynamics of Social Norms* (p. 56), by C. Bicchieri, 2006, Cambridge University Press (https://doi.org/10.1017/CBO97805 11616037).

Every day, individuals face social situations that they must interpret to behave appropriately. The behavior is the result of a set of mental operations of interpreting, encoding, and inferring. We perceive a cue like a person or an event, focus our attention on particular cues, and categorize the situation by assessing similarities and differences with past periods stored in our memory, which finally invokes a cognitive schemata in which beliefs and expectations are embedded. Although the described process is an idealization, because some cognitive operations may overlap and information may flow in both directions (McClelland, 1979), it is useful to distinguish the general process of categorization (e.g., defining something as a "negotiation situation") from the specific activation of cognitive schemata (e.g., recognizing a problem as involving "the honest reporting of private information in the budgeting process").

A category is a collection of instances that have a similarity (Rosch, 1978). To categorize something describes the mental activity of recognizing that something belongs to an already known category. Categorization involves comparing the event, person, or object with category prototypes and assessing the number of relevant attributes both share. The more similar something is to the category's prototype, the more likely it is to assign something to a given category. For example, a cabriolet is assigned to the car category. The reason is that a cabriolet shares many important features, although a prototypical car has a roof. Each event, person, or object individuals face will have a variety of cues, and any cue has an infinite number of dimensions. Therefore, it is important to understand on which cues individuals focus their attention and on which dimension category membership is based. Empirical studies demonstrate that, for example, background knowledge and goals will affect the salience of cues and the judgment of relevance. This restrains the number of cue dimensions one uses to categorize a given situation (Barsalou, 1982; Lamberts, 1994; Roth & Shoben, 1983).

Once an individual categorizes a situation as being of a certain type, a script is activated together with beliefs and expectations, which may support and justify individuals' norm conformity. Knowledge about people, events, and roles is stored in cognitive structures called schemata (Bartlett, 1932; Fiske & Taylor, 1991). Most important for the activation of social norms are schemata for events. These schemata for events are called scripts and are the basis of understanding and making sense of events. Scripts store knowledge about appropriate sequences of events in known situations. For example, a "restaurant script" contains roles (guests, waiter) and sequence rules (the guest enters the restaurant, the waiter brings the guests to the table, the guests order food, the waiter brings food, the guests eat and pay, the guests leave the restaurant). When individuals categorize the situation as being of a certain type, a script is activated together with beliefs and expectations about other individuals. These beliefs and expectations are stored experiences from similar situations in the past. When scripts are activated, individuals know what to expect of each other, although they have not met before. In Section 2.2.1, the conditional follower's decision to follow the social norm of cooperation is described as a Bayesian game where the conditional follower has to assess the probability of being matched with norm followers. These probabilities are the result of mental scripts eliciting empirical and normative expectations when activated (Bicchieri, 2006).

Understanding the organization of social knowledge by means of scripts explains why an activated script lets one expect that others behave in the same way as experienced in the past. The reason is humans' propensity to interpret social interactions as "natural kinds" that have potentially more stable, invariant characteristics. Thus, one can project experiences from past interactions to future interactions (Bicchieri, 2006). Scripted interactions categorized as "natural kinds" are perceived as more stable and projectible but also "right." As Bicchieri (2006, p. 96) describes: "If leaving a tip is part of the restaurant script, then tipping is the normal, appropriate thing to do. We predict its occurrence, and our expectation is legitimized by the very existence of the script."

Overall, the activation of social norms is context-specific and depends on experiences made in the past and the perception of the present situation. If the specific situation does not elicit the necessary expectations about others' behavior and beliefs, a norm does not become active. Even if a norm applies to a situation, norm compliance will not be observed if there are no cues to elicit the relevant expectations about others (Bicchieri, 2006).

2.2.3 The Role of Peer Sanctioning

The normative expectations with sanctions condition (Condition 2b') in Bicchieri (2006) social norm theory states that some individuals are only motivated to follow a social norm when they expect that their peers also prefer them to conform and are willing to socially sanction norm violations. The reason is that most individuals experience disutility through psychological costs like shame, discomfort, or loss of self-respect when being sanctioned (Blau, 1964; Fischer & Huddart, 2008; Williams, 1997). For example, at the supermarket, most individuals will stand in line at the checkout due to expecting social sanctions like embarrassing or insulting comments when jumping the queue. Sanctions do not need to be negative to motivate norm compliance. It could also be the case that individuals are motivated to follow the social norm by the desire to please others. In this case, expectations of a positive sanction like social approval would be the reason for compliance (Bicchieri, 2006).

The important role of peer sanctioning in enforcing norm compliance stems from the susceptibility of social norms to erode over time. There are two reasons why social norms are prone to erosion. First, as shown in the example from Section 2.2.1, norm compliance, in general, is costly in material terms. Therefore, individuals have a material incentive to violate the social norm (Bicchieri, 2006). Second, norm compliance is dynamic because it depends on expectations about peers' behavior and beliefs. When expectations change due to observing unexpected behavior from peers, individuals may stop or start complying with the social norm that, in turn, affects others' expectations and norm compliance. However, experimental studies show that individuals respond asymmetrically to observable peer behavior, such that they strongly reduce norm compliance when receiving information about others' transgression but only weakly increase norm compliance as a response to others' norm compliance (Bicchieri et al., 2022; Dimant, 2019). This asymmetric updating of expectation in response to observable peer behavior would suggest that norm compliance will inevitably decline over time. Therefore, social norms must be enforced by peer sanctioning, especially if they are not well established (Bicchieri, 2017; Falk et al., 2005; Fehr & Fischbacher, 2004).

To illustrate how peer sanctioning affects the decision of a conditional norm-follower, I continue the example from Section 2.2.1. Player i expects that 100% of the population have a norm-sensitivity $k > 1$ (i.e., 100% of the population are conditional norm-followers) but expects

that only 70% follow the cooperation norm. Therefore, Player *i* assesses a probability of 70% to be matched with a norm-follower.

$$EU(C) = p(C)*U(C, C) + (1- p(C))*U(C, D)$$
$$EU(D) = p(C)*U(D, C) + (1- p(C))*U(D, D)$$

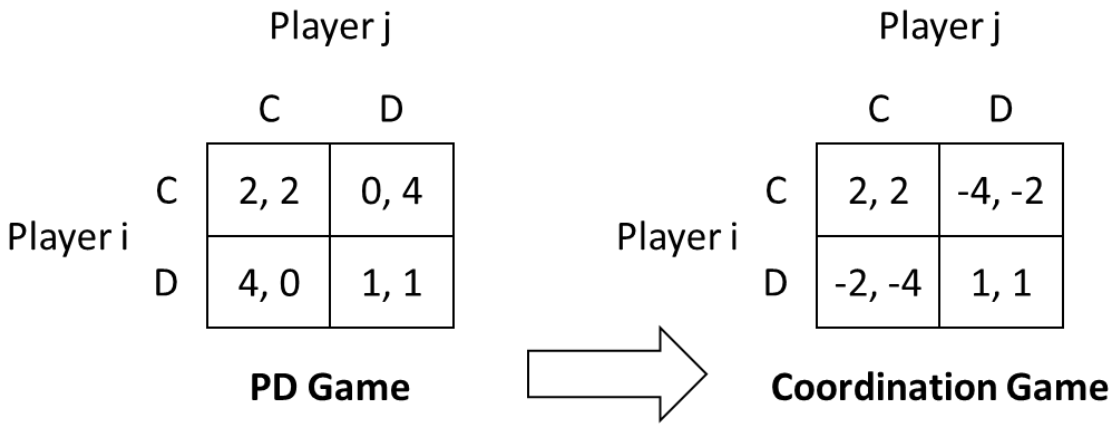
$$EU(C) = 0.7*(2) + 0.3*(-4) = 0.2$$
$$EU(D) = 0.7*(0) + 0.3*(1) = 0.3 \quad (5)$$

Given the payoff structure of the original PD game and Player *i*'s estimated probability to be matched with a norm-follower, Player *i* would choose strategy *D* because EU(*D*) > EU(*C*) (see Equation 5). This situation might change if Player *i* expects social sanctions from Player *j* when violating Player *j*'s personal normative beliefs. Thus, if Player *i* considers choosing *D*, he/she has not only to compare the respective payoff obtained from choosing *D* against the disutility from norm transgression but also against the disutility from the risk of being sanctioned.

The disutility from the risk of being sanctioned depends on an individual's risk perception and risk sensitivity. Risk perception refers to the expected disapproval response when violating the social norm in a particular situation and varies across individuals. For example, some individuals expect that cutting the queue at the supermarket would, at most, induce some angry looks from other customers, while other individuals expect verbal attacks. An individual's risk perception can be understood as a distribution of possible disapproval reactions from others with different likelihoods of occurrence. In well-known situations with established social norms, this distribution will be less dispersed because people have often experienced which reaction will follow a norm violation. Further, individuals are heterogeneous regarding the disutility they experience from facing risks, which is defined as risk sensitivity. Together, one's subjective risk perception and risk sensitivity determine the disutility from the risk of being sanctioned (Bicchieri, 2017). For simplicity, I assume that Player *i* and Player *j* experience a disutility of 2 from the risk of being sanctioned and only perceive a risk of being sanctioned when they choose *D* while the other Player chooses *C* (i.e., they also sanction the other Player when choosing *C* and the other chooses *D*). This changes overall payoffs, as shown in Figure 8.[7]

[7] For example: $U_i(D,C) = \pi(D, C) – k_i(\pi(C,C) - \pi(D,C))$ – Disutility from risk of being sanctioned $= 4 – 2(2-0) - 2 = -2$

Figure 8: Payoffs in the Coordination Game (With Sanctions)



Note. Adapted from *The Grammar of Society: The Nature and Dynamics of Social Norms* (p. 53), by C. Bicchieri, 2006, Cambridge University Press (https://doi.org/10.1017/CBO97805 11616037).

Next, the expected payoffs are calculated considering sanctions. Again, Player *i* assesses a probability of 70% to be matched with a norm-follower. Therefore, the expected utility for *C* and *D* would change, as shown in Equation 6:

$$EU(C) = 0.7*(2) + 0.3*(-4) = 0.2$$
$$EU(D) = 0.7*(-2) + 0.3*(1) = -1.1 \quad (6)$$

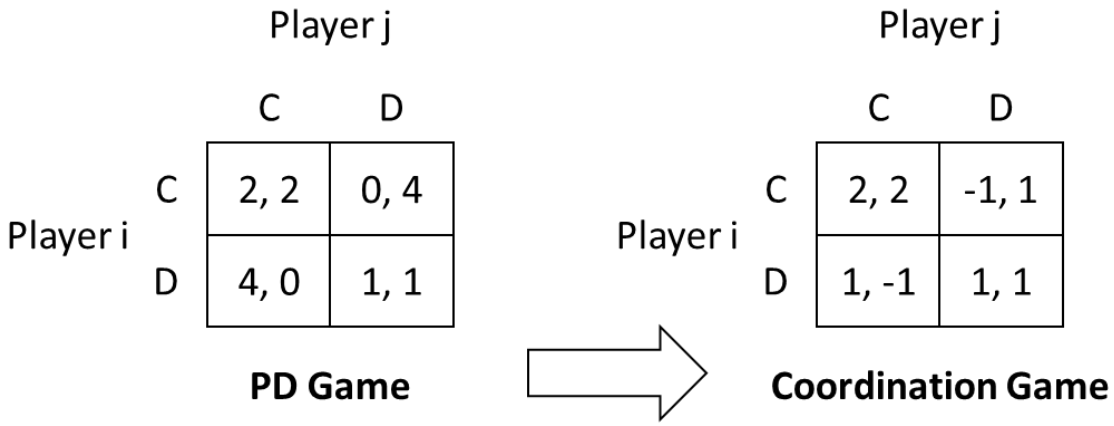
The risk of being sanctioned in the case of violating the social norm of cooperation changed Player *i*'s preferred strategy from *D* to *C* given the norm-sensitivity, risk perception, risk sensitivity, assessed probability to be matched with a norm follower, and the payoff structure of the original PD game. Importantly, Player *i* would still choose strategy *C* over *D* even if Player *i* reassesses the probability of being matched with a norm-follower to 60% since EU(*C*) = -0.2 and EU(*D*) = -0.8.[8] Thus, for a conditional follower, the risk of being sanctioned decreases the necessary probability of being matched with a norm follower to follow the social norm.

In addition, expecting social sanctions in the case of norm violations increases the number of individuals for whom the social norm of cooperation transforms the original PD game into a

[8] EU(*C*) = 0.6*(2) + 0.4*(-4) = -0.2 and EU(*D*) = 0.6*(-2) + 0.4*(1) = -0.8

coordination game. For example, we assume that Player *i* has a norm-sensitivity of 0.5 and again experiences a disutility of 2 from the risk of being sanctioned. Then, the social norm of cooperation would transform the payoff structure of the original PD game (Figure 9).[9]

Figure 9: Payoffs in the Coordination Game (With Sanctions & Norm Sensitivity of 0.5)



Note. Adapted from *The Grammar of Society: The Nature and Dynamics of Social Norms* (p. 53), by C. Bicchieri, 2006, Cambridge University Press (https://doi.org/10.1017/CBO9780511616037).

Since $U_i(C, C)$ is higher than $U_i(D, C)$, Player *i* has no longer a dominant strategy and becomes a conditional norm-follower. This explains why Bicchieri (2006, p. 11) states in her framework that some individuals only follow a norm if they expect that others believe they should follow the norm and are willing to sanction norm violation (i.e., Condition 2b'). Thus, sanctions also increase the subset of conditional norm followers in a population. Nevertheless, Player *i* will only cooperate if he/she assesses a sufficiently high probability of being matched with a norm follower. Player *i* and Player *j* may differ regarding their norm sensitivity, risk perception, and risk sensitivity. Then, they perceive different payoff structures of the coordination game and thus are heterogeneous regarding the probability of being matched with a norm follower necessary to follow the norm.

In summary, the possibility of peer sanctioning affects the dynamics of norm compliance in two ways. First, as shown in Equation 6, expecting sanctions motivates some individuals to follow the social norm who would transgress otherwise because expected sanctions decrease

[9] For example: $U_i(D, C) = \pi(D, C) - k(\pi(C, C) - \pi(D,C))$ – Disutility from the risk of being sanctioned = 4 – 0.5*(2-0) - 2 = 1.

individuals' threshold for empirical expectations necessary to prefer following the norm. This is crucial for the dynamics of social norms since norm-followers may encounter observation of norm-violation, and although this decreases their empirical expectations regarding norm-followers, their empirical expectations may still be sufficiently high to follow the norm due to expected sanctions. More norm followers provide more observations of norm compliance that others use to update their empirical expectations. This shows how peer sanctioning makes a social norm more resilient against norm transgressions and prevents the quick decline of norm compliance. Second, as shown in Figure 9, when expecting peer sanctioning, some individuals who initially choose to maximize their material payoff independent of others' behavior (i.e., play the original PD game) become conditional norm-followers and follow the norm on the condition that the probability of being matched with a norm follower is sufficiently high. This may further decrease the observations of norm transgressions and increase the observations of norm compliance.

3 SOCIAL NORMS IN PARTICIPATIVE BUDGETING

3.1 INTRODUCTION

In this chapter, I show how experimental studies in participative budgeting use the social norm theory from Bicchieri (2006) to explain managers' reporting behavior. Using their key results and measured variables, I map these studies to the conditions of Bicchieri's formal model (i.e., contingency, conditional preference, empirical expectations, normative expectations, and normative expectations with sanctions). Thereby, I want to show that the normative expectations with sanctions condition, despite its importance in preventing norm erosion, has received less attention in participative budgeting.

Since most studies that examine social norms in participative budgeting conduct laboratory experiments, I also focus on experimental studies in my overview. Wibbeke and Lachmann (2020) conducted a systematic literature review investigating the psychological theories used in management accounting research. They analyzed articles from nine leading accounting journals[10] between 2000 and 2019 and identified 125 psychological-based articles. They find that the number of psychological-based articles has increased over time, especially between 2015 and the first half of 2019. Further, their results show that articles using psychology-based theories frequently investigate budget slack and honesty in budgeting. Most of these articles use laboratory experiments to investigate participative budgeting and use social norm theory to explain how different aspects of the participative budgeting process can reduce budget slack.

This focus on social norms in participative budgeting can be traced back to Brown et al.'s (2009) call to use experimental settings with a strong agency prediction and a contradicting behavioral prediction to improve agency theory. A participative budgeting setting is suitable for this purpose as agency theory predicts that managers in this situation will maximize their wealth by creating the highest amount of budget slack. This strong agency prediction allows for a powerful test for an alternative behavioral theory. To provide an alternative behavioral prediction, the participative budgeting literature finds Bicchieri's social norm theory useful (Blay et al., 2018). On the one hand, Bicchieri's definition of a social norm is based on an

[10] In alphabetical order: Accounting, Organizations and Society, Behavioral Research in Accounting, Contemporary Accounting Research, European Accounting Review, Journal of Accounting and Economics, Journal of Accounting Research, Journal of Management Accounting Research, Management Accounting Research, and The Accounting Review.

individual's preferences and expectations that can be measured empirically. This operational definition allows researchers to make testable predictions because factors that will change individuals' expectations should have a measurable effect on individuals' behavior. On the other hand, her theory describes conditions under which social norms become "active" and emphasizes the role of situational cues in the activation process. This is important for firms since there are several cues in a business setting (e.g., organizational controls, pay schemes, evaluation schemes) determining which social norm is activated (Blay et al., 2018).

In addition to mapping the studies to the different conditions in Bicchieri's social norm model, I also differentiate whether the study addresses social norm activation or social norm dynamics. The reason is that social norms are dynamic phenomena (Conte et al., 2014) since individuals' norm compliance depends on expectations about peers' behavior and beliefs. Thus, although initially complying with an activated social norm, individuals may stop complying when their expectations change. Therefore, it is important that the participative budgeting literature considers both the activation and dynamic perspective of social norms.

All studies in Chapter 3 are concerned with the effect of social norms on budget slack. In their experimental setting, budget slack is created when managers do not report their private information honestly (e.g., misreport their production costs). Therefore, some studies use honesty instead of budget slack as their main dependent variable and are interested in how to activate a social norm of honesty. Besides wealth maximization, budget slack might be motivated by managers' desire to hedge against uncertainty (Baiman & Demski, 1980). However, in the following studies, cost uncertainty is eliminated by providing managers with the true costs when preparing a budget (Rankin et al., 2008). Thus, any budget slack can be interpreted as dishonest reporting. For better comprehensibility, I use honesty as the main dependent variable from here on. The reason is that honesty and budget slack are related to each other (100% honesty equals 0% budget slack and vice versa), and the focus of this thesis is how a social norm of honesty affects managers' reporting behavior.

3.2 EXPERIMENTAL FINDINGS ON SOCIAL NORM ACTIVATION

In the following section, I provide an overview of experimental studies that focus on how situational cues can activate social norms in participative budgeting. To this end, I present the experimental manipulation, map the studies to the different conditions in Bicchieri's social

norm model, and state the key results regarding social norms in participative budgeting. To map the studies to the different conditions (i.e., contingency, conditional preference, empirical expectations, normative expectations, and normative expectations with sanctions), I focus on the measured variables in each study.

The following studies primarily employ one-period experimental setups to investigate how a situational cue affects honesty. In some of the studies, participants must complete the one-period setting several times. Nevertheless, all studies have in common that participants do not receive any information about other participants' behavior. Thus, the focus of these studies is on how participants interpret different situational cues that invoke empirical and normative expectations. For ease of understanding, I grouped the studies by the type of situational cue used. I start with studies that activate a social norm by framing the budgeting setting (see Table 2).

Table 2: Studies Investigating Norm Activation Through the Framing of the Budgeting Setting

Study	Manipulation	Condition	Key results
Rankin et al. (2008)	Factual assertion, Rejection of authority	Contingency	Reporting costs as a statement of fact activates a social norm of honesty when the superior has no rejection authority.
Hobson et al. (2011)	Pay scheme	Contingency, Conditional preference	A slack-inducing pay scheme activates a social norm of honesty and responsibility. Depending on their personal values, managers are differently affected by social norms.
Douthit & Stevens (2015)	Factual assertion, Rejection authority, Salary authority	Contingency	Providing relative pay information in participative budgeting can make a social norm of fairness salient, which reduces the salience of a social norm of honesty.
Brown et al. (2016)	Budget request frames, Budgeting-setting authority	Contingency	A social norm of fairness can be activated depending on who has the authority to set the budget.
Blay et al. (2019)	Factual assertion	Contingency, Conditional preference	Managers' negative affect intensity increases the effect of a social norm of honesty on managers' honesty.

Rankin et al. (2008) investigate whether the mode of budget communication affects honesty. Therefore, they manipulate whether the manager[11] must make a factual assertion about the true costs or can avoid an explicit misrepresentation by proposing the corresponding profit to the superior. They find that a factual assertion significantly increases honesty, but only when the superior cannot reject the proposed budget. Answers from the post-experimental questionnaire indicate that the factual assertion increases managers' concerns about honest reporting. Thus, they show that a factual assertion can increase managers' awareness that honest reporting is the appropriate behavior in participative budgeting. Regarding the social norm model of Bicchieri, I, therefore, identify the contingency condition as the focus of this study.

Hobson et al. (2011) investigate budget slack under two different pay schemes. They measure how managers judge budget slack under a slack-inducing pay scheme compared to a truth-inducing pay scheme. Results show that under a slack-inducing pay scheme, managers judge budget slack to be unethical on average, whereas managers under a truth-inducing pay scheme do not. The authors conclude that a slack-inducing pay scheme, which motivates managers to create budget slack, generates a moral dilemma by activating social norms of honesty and responsibility that go against material self-interest. The authors conclude that the activation of social norms explains why managers do not maximize budget slack under a slack-inducing pay scheme. In the post-experimental questionnaire, the Jackson Personality Inventory-Revised (Jackson, 1994) is used to measure managers' personal values. Results show that managers are more likely to judge budget slack as unethical when they score high on the *Traditional Values* and *Empathy* scale. The authors conclude that personal values determine how managers respond to an activated social norm. Therefore, I identify the contingency and conditional preference conditions as the focus of this study.

Douthit and Stevens (2015) further test the effect of budget communication on honesty when the superior can reject budget requests. In the first experiment, they reduced the fairness norm's salience by making the superior's pay private. They find that the mode of budget communication affects honesty more strongly when keeping the superior's pay private as compared to when it is common knowledge. In a second experiment, they increase the salience of a reciprocity norm by manipulating the superior's ability to set the manager's salary while

[11] Studies vary in the terminology they use to reflect the different hierarchies involved in participative budgeting (e.g., superior and subordinate, manager and employee, or principal and agent). For ease of understanding, I constantly refer to the subordinate manager who has private information about the local business environment as "manager", while I refer to the manager who is part of the central management and approves budgets as "superior".

also keeping the superior's pay private. They find that the mode of budget communication has a significant effect on honesty in both situations (no salary authority/salary authority). In sum, Douthit and Stevens (2015) show that in participative budgeting, several social norms can influence managers' behavior. Therefore, the salience of situational cues determines which social norm is more important in the presence of conflicting social norms. In the post-experimental questionnaire, the authors measure managers' perceived norm salience. Regarding the social norm model, I therefore conclude that the contingency condition is the focus of this study.

Brown, Fisher, Peffer, and Sprinkle (2016) investigate whether the frame of the budget request influences honesty. In addition to a factual assertion, like in Rankin et al. (2008), they frame the budget request as the manager's preferred budget or fair budget but find no significant differences between the three different budget request frames. Further, they show that when the superior sets the budget, managers have higher strategic concerns and report less honesty compared to when the manager sets the budget. Their results suggest that budget-setting authority is an important cue in the budgeting process, determining which social norm is activated. In the post-experimental questionnaire, they measure the salience of a social norm of fairness. Thus, I identify the contingency condition as the focus of this study.

Blay et al. (2019) also provide evidence for the effect of budget communication on honesty and further find that the effect increases as managers more intensely experience negative affective reactions (i.e., individuals' negative affect intensity). The authors argue that a factual assertion activates a social norm of honesty, and diverging from a social norm creates negative affective reactions. Therefore, managers with a higher negative affect intensity are more strongly affected by the activated social norm of honesty. Regarding the social norm model, this study focuses on how a situational cue makes a social norm salient (i.e., contingency condition) but also on which managers are sensitive to social norms (i.e., conditional preference condition).

Table 3 shows the results of experimental studies that use information asymmetry to activate social norms. Stevens (2002) investigates the effect of information asymmetry on honesty under a pay scheme that provided an economic incentive to report maximum dishonestly (i.e., slack-inducing pay scheme). He finds that honesty increases as information asymmetry decreases (i.e., the superior receives information about managers' budget slack). Answers from the post-experimental questionnaire suggest that this effect is due to managers' desire to appear

consistent with social norms in front of the superior (i.e., fulfill normative expectations). In addition, the study finds that managers report more honestly the higher they score on the *Responsibility* scale from the Jackson Personality Inventory-Revised (Jackson, 1994). The authors conclude that these managers report more honestly as they are more sensitive to moral obligations. Thus, regarding the social norm model, this study focuses on the conditional preference and normative expectations condition.

Table 3: Studies Investigating Norm Activation Through Information Asymmetry

Study	Manipulation	Condition	Key results
Stevens (2002)	Information asymmetry	Conditional preference, Normative expectations	Managers have a desire to appear honest in front of their superiors when information asymmetry is low.
Abdel-Rahim & Stevens (2018)	Precision and accuracy of an information system	Contingency, Normative expectations	Managers have a desire to appear honest in front of their superiors when the information system is accurate and precise (i.e., low information asymmetry).
Maas & Van Rinsum (2013)	Openness of information policy	Empirical expectations	Managers report more dishonest when they expect others to do the same. Expectations about others' dishonesty are lower under an open than a closed information policy.

Abdel-Rahim and Stevens (2018) also use factual assertion as a cue to activate a social norm of honesty and find that most managers perceive dishonesty as unethical in their budgeting setting. Further, they investigate how information asymmetry between superior and manager affects honesty. They find that honesty increases as the information system gets more precise and accurate. Abdel-Rahim and Stevens (2018) argue that in the presence of an accurate and precise information system it is more transparent for the superior what the true costs are. Answers from the post-experimental questionnaire indicate that in the situation of a precise and accurate information system, more managers desire to appear honest in front of their superior. This desire to fulfill others' expectations can be mapped to the normative expectations condition. Further,

they also measure the salience of the social norm of honesty. Therefore, I identify the contingency and the normative expectations condition as the focus of this study.

Maas and Van Rinsum (2013) investigate whether an open information policy in which managers' performance reports are made public to their peers influences managers' honesty. In line with Hannan et al. (2006) and Abdel-Rahim and Stevens (2018), the authors argue that managers are motivated to appear honest to get social approval when they can be observed by others. However, the authors did not measure managers' desire to appear honest in front of others (i.e., normative expectations). Instead, they measure managers' empirical expectations regarding others' honest reporting in the post-experimental questionnaire. They find that an open compared to a closed information policy significantly increases managers' expectations that others will report honestly. Thus, I identify the empirical expectations condition as the focus of this study.

Next, I show the results of studies that investigate whether a superior's endogenous choice can be a situational cue that activates a social norm (see Table 4).

Table 4: Studies Investigating Norm Activation Through the Superior

Study	Manipulation	Condition	Key results
Cardinaels & Yin (2015)	Superior's contract change choice	Conditional preference, Empirical expectations	Superior's endogenous contract choice leaks information about others' behavior that affects managers' perception of the social norm.
Davidson (2019)	Superior's hire choice	Contingency	Superior's endogenous choice to hire a manager activates a social norm of reciprocity.
Douthit & Majerczyk (2013)	Superior's role legitimacy	Contingency	Superior's role legitimacy can activate a norm of property rights that leads managers to report more honesty.
Douthit et al. (2022)	Superior's contract choice	Contingency, Normative expectations with sanctions	Superior's endogenous choice to select a discretion contract that allows to reject budgets activates a social norm of trustworthiness.

Cardinaels and Yin (2015) use a setting in which superiors receive information in Stage 1 about managers' reporting behavior. In Stage 2, superiors must choose whether to keep the trust contract (i.e., a slack-inducing contract) or change to an incentive contract that encourages honesty. They find that the superior's decision to change from the trust to the incentive contract after Stage 1 decreases managers' empirical expectations regarding others' honesty. The reason is that managers perceive the superior's choice as a reaction to the low honesty of others in Stage 1. Managers use this information to form low empirical expectations about others' honesty, which has a negative effect on their honesty in Stage 2. Besides managers' empirical expectations, the authors also measure managers' susceptibility to interpersonal influence using the scale from Bearden, Netemeyer, and Teel (1989). They chose four items from the scale that are related to conformity in ethical decision contexts. Results show that the higher managers' scores on these four items, the more managers' reporting is affected by their empirical expectations. Thus, regarding the social norm model, I identify the conditional preference and empirical expectations condition as the focus of this study.

Further, Davidson (2019) investigates whether a superior's choice to hire or not to hire has an effect on honesty. Results show that the choice to hire the manager activates a social norm of reciprocity, which increases managers' honesty. This is similar to the reciprocity norm activated in the study by Douthit and Stevens (2015) through the superior's authority to set the manager's salary. Therefore, I identify the contingency condition as the focus of this study.

Douthit and Majerczyk (2019) investigate whether the perceived role legitimacy of the superior can activate a social norm of property rights that affects managers' honesty. In the experiment, participants perform a real-effort task before role assignment. The role legitimacy is manipulated by assigning participants to the role of the superior in line with their real-effort task performance (legitimate treatment) or contrary to their performance (illegitimate treatment). They find that managers report more honestly when superiors are perceived as legitimate compared to when superiors are perceived as illegitimate. The reason is that when managers perceive their superior as legitimate in their role, a social norm of property rights is activated. In this situation, managers report more honestly because they perceive that the profits belong to the superior. Regarding the social norm model, I identify the contingency condition as the focus of this study.

Douthit et al. (2022) investigate the potential for a superior's endogenous contract selection to increase honesty by communicating empirical and normative expectations regarding trustworthiness (i.e., activating a social norm of trustworthiness). They use a trust contract where the superior always accepts the manager's budget and a discretion contract where the superior can reject the budget. The authors find that honesty is always higher for both contracts when they are endogenously selected by the superior compared to when they are exogenously determined. Answers in the post-experimental questionnaire support their theoretical explanation that endogenous contract selection activates a social norm of trustworthiness in both cases. In the case of the trust contract, managers feel trusted and express greater concerns about treating the superior fairly by reporting lower costs. In the case of the discretion contract, managers view the superior's choice as a signal to enforce trustworthiness and indicate greater concerns regarding budget rejection. This desire to fulfill others' expectations to avoid rejection is similar to Bicchieri's normative expectations with sanctions condition. The difference is that in Bicchieri's model, the sanctions are carried out by peers and, therefore, of an informal nature and not by the superior. In sum, this study focuses on the contingency and normative expectations with sanctions conditions.

Next, I show studies that want to activate a social norm by increasing managers' awareness about others (see Table 5). Cardinaels and Jia (2016) provide managers with descriptive statements about peers' behavior from a previous experiment. These descriptive statements indicate that either a minority or majority reported honestly in the previous experiment. They find that managers are affected by the statements only when the firm uses an audit system to detect misreporting. They argue that the presence of an audit system makes it salient that dishonest reporting is not acceptable. Then, descriptive statements indicating that most others report honestly increase managers' honesty. Although not mentioned by the authors, their finding is in line with social norm theory by Bicchieri (2006), suggesting that individuals follow a social norm conditionally on their empirical and normative expectations. The presence of audits may have increased managers' normative expectations and thus enabled the descriptive statements to affect managers' behavior. In the post-experimental questionnaire, the authors measure the salience of honesty as the appropriate behavior. In line with Bicchieri and Xiao (2009), they manipulate managers' empirical expectations through descriptive statements. As a result, I conclude that the contingency and empirical expectations conditions are the focus of this study.

Using descriptive statements to increase empirical expectations, Chen, Nichol, and Zhou (2017) investigate internal whistleblowing in a budgeting setting. They find that the descriptive statements about others' behavior only affect managers' reporting when the incentive for whistleblowing is framed as a penalty compared to a reward. They argue that compared to framing the incentive for whistleblowing as a reward, framing the incentive for whistleblowing as a penalty increases managers' normative expectations. Similar to the audit system in the study by Cardinaels and Jia (2016), this enables the descriptive statements to affect managers' behavior by increasing empirical expectations. In the post-experimental questionnaire, the saliency of the norm of whistleblowing, as well as managers' empirical and normative expectations, are measured. Thus, I identify the contingency, empirical, and normative expectations conditions as the focus of the study.

Table 5: Studies Investigating Norm Activation Through the Presence of Others

Study	Manipulation	Condition	Key results
Cardinaels & Jia (2016)	Audits, Statements about peer's behavior	Contingency, Empirical expectations	The effect of information about peers' behavior on managers' reporting depends on the presence of an audit system.
Chen et al. (2017)	Incentive Framing, Statements about peer's behavior	Contingency, Empirical expectations, Normative expectations	The effect of information about peers' behavior on managers' reporting depends on the framing of incentives.
Cannon & Thornock (2019)	Similarity of peers' decision environment	Contingency	Managers form biased expectations about others' behavior when they face similar circumstances without direct observation.
Fisher et al. (2019)	Incentive sharing	Contingency, Normative expectations	Making managers eligible to participate in superior's incentives for accurate forecasting activates a social norm of other-regarding behavior that increases honesty.

Cannon and Thornock (2019) do not provide managers with information about peers' behavior but with information about the similarity of peers' decision environments. They find that

managers report less honestly when they expect another peer to be in a similar compared to a different decision environment. The reason is that they project their own desired behavior on the unseen peer to rationalize their desired behavior. The information that other peers make their decisions in a similar environment functions as a cue to focus managers on their expectations about others' behavior affecting their behavior. Regarding the social norm model, I conclude that the contingency condition is the focus of the study.

Fisher, Mitchell, Peffer, and Webb (2019) study whether managers' eligibility to share in incentives available to their superior increases honesty by activating a social norm of other-regarding behavior.[12] They find that when managers are aware and eligible to share in superior's forecast incentives, they report significantly more honestly than when they are not eligible. Answers from the post-experimental questionnaire indicate this difference is attributable to managers' increased awareness of honesty as the appropriate behavior and increased normative expectations. Thus, I conclude that the contingency condition and normative expectations conditions are the focus of this study. Before reflecting on these studies investigating social norm activation, I show experimental studies that examine the dynamics of social norms in participative budgeting.

3.3 EXPERIMENTAL FINDINGS ON SOCIAL NORM DYNAMICS

In this section, I provide an overview of experimental studies using the social norm theory by Bicchieri (2006) to explain how honesty changes over time when managers repeatedly receive information about peers' behavior. While the studies differ in whether managers are re-grouped after each period or remain in a group with the same managers the entire experiment, they have in common that managers interact in a multi-period setting and repeatedly receive information about others' behavior. Therefore, these studies focus on how managers update their empirical and normative expectations when receiving information about peers' behavior.

Table 6 provides an overview of the experimental manipulations, identified social norm conditions, and key results.

[12] Although J. G. Fisher, Brown, Peffer, and Sprinkle (2016) use the term "personal norm of other-regarding behavior", I refer to a social norm as the authors use social norm theory from Bicchieri (2006) to develop their hypotheses.

Table 6: Studies Investigating the Dynamics of Social Norms

Study	Manipulation	Condition	Key results
Paz et al. (2014)	Disclosure of peer behavior	Empirical expectations, Normative expectations	Honesty decreases over time when managers can observe peers due to an asymmetric effect of observable peer behavior.
Schwering (2017)	Disclosure of peer behavior and identity	Normative expectations	Honesty decreases over time because managers feel pressure to meet peers' expectations.
Brunner & Ostermaier (2019)	Degree of transparency	Empirical expectations	The effect of observable peer behavior on managers' reporting is asymmetric. The reason is that managers are more influenced by peers who unexpectedly report dishonestly than honestly.
Guo et al. (2020)	Peer observability, Pay dispersion	Contingency, Empirical expectations, Normative expectations	The effect of observable peer behavior on managers' reporting is asymmetric. The direction of the asymmetric influence depends on the level of vertical pay dispersion.
Lill et al. (2023)	Openness of internal reporting environment, Organizational identity	Conditional preference, Empirical expectations, Normative expectations	The effect of observable peer behavior on honesty depends on managers' organizational identity. The effect of observable peer behavior on honesty is mediated by managers' empirical expectations.

Paz et al. (2014) examine the effect of observable peer behavior on honesty. They vary whether managers receive no information about others (no disclosure), receive only information about peers with the lowest honesty (partial disclosure), or receive information about all peers (full disclosure). They find that in both disclosure conditions, honesty decreases over time. Importantly, honesty also decreases in the full disclosure condition, although managers initially observe honest and dishonest peers. Therefore, the authors conclude that the effect of peer behavior is asymmetric in the sense that observations of norm-violating behavior are more contagious than observations of norm-compliance. In the post-experimental questionnaire, they

measure managers' empirical and normative expectations and find evidence that the observed differences in honesty are due to decreasing empirical expectations about honesty in the disclosure conditions. Thus, managers revise their perception of appropriate reporting behavior when they observe peers reporting dishonestly and report dishonestly themselves. Regarding the social norm model, I conclude that the empirical and normative expectations conditions are the focus of this study.

Schwering (2017) examines whether the effect of peer disclosure on honesty differs when peers' behavior is disclosed together with peers' identity. She argues that in practice, managers most likely receive information about peers' behavior together with their identity. Results show that honesty remains constant over time only when peers' reporting is not disclosed. When peer reporting is disclosed, honesty decreases over time, irrespective of whether peers' identity is revealed or not. In the post-experimental questionnaire, the author measures managers' perceived pressure to conform to observed peer behavior. Results suggest that this pressure to imitate peers' behavior (i.e., meet peers' expectations) partially explains the decrease in honesty over time. Thus, I identify the normative expectations condition as the focus of the study.

Brunner and Ostermaier (2019) study the effect of observable peer behavior on honesty under different levels of transparency. They use a setting where two managers report costs to one superior. Depending on the transparency, managers observe the other's cost report and true cost (full transparency) or only the other's cost report but not the true cost (partial transparency). The authors find that in both conditions, managers are influenced by their peer's behavior. Further, they show that the effect of peer observable is asymmetrical in the sense that managers react more strongly when peers' honesty is lower than expected, while the opposite is not the case. In addition, partial transparency amplifies this asymmetry as managers use ambiguity about peers' honesty in a self-serving manner and interpret high reports as dishonesty to justify their own dishonest reporting. Although superiors and managers are randomly rematched in each period, their results also show a significant, negative effect of period on honesty. Thus, when managers can observe peers' behavior, honesty decreases over time. Regarding the social norm conditions, managers must state their expectations about their peer's reports in each period. Therefore, I identify the empirical expectation condition as the focus of this study.

Guo et al. (2020) studied the effect of vertical pay dispersion and peer observability on honesty in a setting where two managers report to one superior. They argue and find support that there

are two competing social norms (i.e., honesty vs. fairness) in this setting. The activation of the particular social norm depends on the level of vertical pay dispersion between the superior and the two managers. When vertical pay dispersion is low, managers report more honestly due to honesty concerns. When vertical pay dispersion is high, managers report less honestly due to concerns for distributional fairness. Further, peer observability leverages the effect of vertical pay dispersion on honesty. Under low vertical pay dispersion, honesty is higher when peer observability is present compared to when it is absent. The reason is that managers are more influenced by observable peer behavior that is consistent with the activated social norm. As a result, the direction of the asymmetric effect of observable peer behavior depends on the salient social norm. Nevertheless, their results show a significant negative effect of period on honesty. Thus, in line with the previous studies, honesty decreases over time when managers can observe peers' behavior. To support their theory, the authors measure the salience of both social norms as well as managers' empirical and normative expectations. Therefore, I identify the contingency condition, as well as the empirical and normative expectation conditions, as the focus of this study.

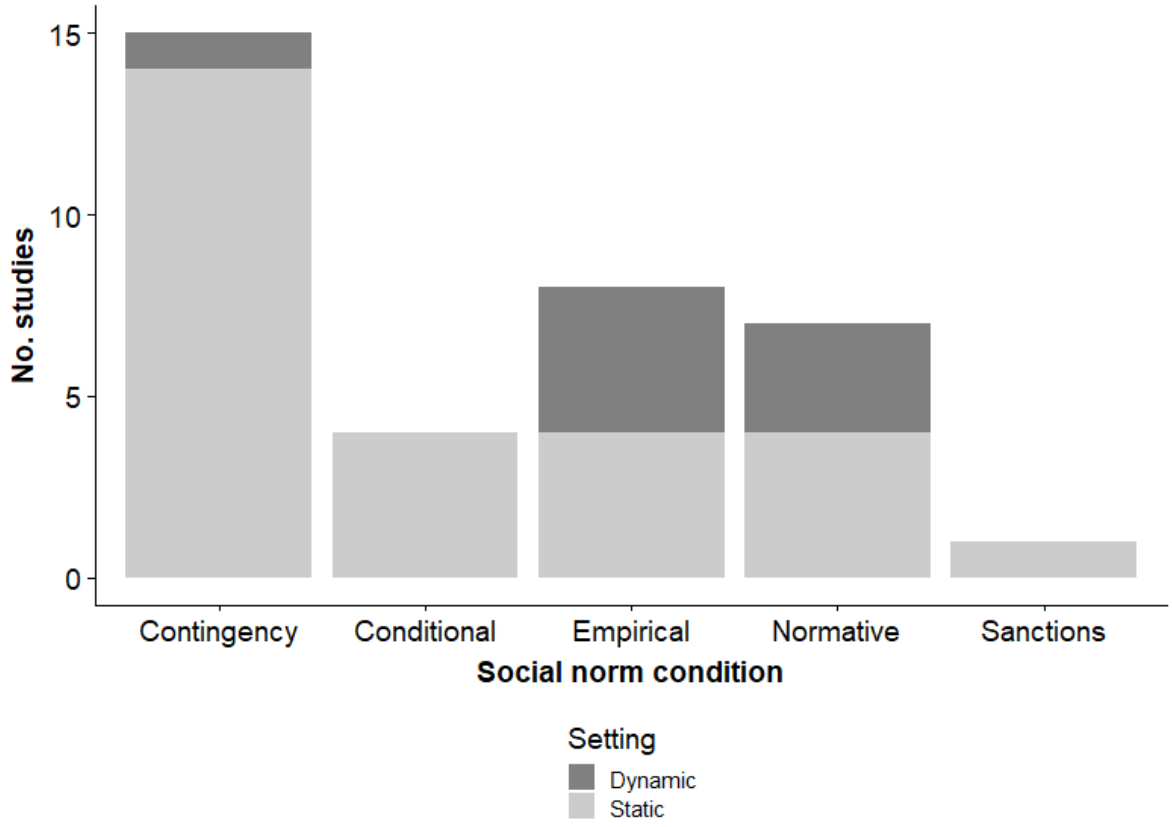
Lill et al. (2023) examine whether organizational identity can mitigate the negative effect of observable peer behavior on honesty. They manipulate organizational identity by varying whether the peer manager works for another academic institution (weak organizational identity) or for the manager's home academic institution (strong organizational identity). They find that honesty is lower in the open compared to the closed internal reporting condition when organizational identity is weak but do not find a significant difference when organizational identity is strong. Nevertheless, the results of Lill et al. (2023) show that in both open internal reporting conditions, honesty decreases over time. Answers in the post-experimental questionnaire support their theory that the results are due to managers' empirical expectations. Managers' empirical expectations regarding honesty are lower in the open compared to the closed internal reporting condition when organizational identity is weak but not when it is strong. Regarding the social norm model, I identify the empirical expectations condition as the focus of the study.

3.4 CONCLUSION

In this section, I summarize the findings of the above studies on social norms in participative budgeting. The aim is to support my claim that the normative expectation with sanction

condition, despite its importance to prevent norm erosion, has received less attention. Figure 10 shows the number of studies per social norm condition.

Figure 10: Focus of Budgeting Studies Regarding Social Norm Conditions



Considering all 21 studies, Figure 10 reveals a strong tendency of the participative budgeting literature on social norms to focus on the contingency condition. Besides studies that investigate managers' sensitivity to social norms (i.e., conditional preference[13]), several studies focus on how managers' empirical and normative expectations affect honesty. The normative expectations with sanction conditions received the least attention. Only the study from Jeremy Douthit et al. (2022) addresses the normative expectations with sanctions condition. Still, this condition is differently addressed in their study as described by Bicchieri (2006), since sanctions in their study are carried out in a formal way by the superior (i.e., budget rejection) and not informal by peers.

Regarding the experimental setting, Figure 10 shows that most studies investigate social norms in participative budgeting in a static setting (i.e., 16 out of 21). Not surprisingly, these studies

[13] See Section 2.2.1. for the connection between conditional preference and norm sensitivity.

focus mostly on the contingency condition but also address other conditions. Fewer studies investigate social norms in a dynamic setting (i.e., 5 out of 21). These studies employ a multi-period setting in which managers can repeatedly update their expectations due to observable peer behavior. Thus, these studies mostly address the empirical and normative expectations conditions.

The results of the studies using dynamic settings agree that honesty decreases over time. The reason is that managers react asymmetrically to the observation of peers' behavior. This is in line with studies from behavioral economics suggesting that individuals tend to make a self-serving use of empirical information by responding more strongly to observations of norm-violating behavior than norm-compliant behavior (Bicchieri et al., 2022; Dimant, 2019). This questions whether the findings of the studies investigating social norm activation in static settings are robust over time. In this regard, some of the studies investigating social norm activation suggest that the robustness of their results should be tested in settings where managers repeatedly interact with peers (Douthit & Majerczyk, 2019; Douthit & Stevens, 2015; Maas & Van Rinsum, 2013).

The studies by Guo et al. (2020) and Lill et al. (2023) show ways to mitigate the decrease in honesty over time. Nevertheless, their results also suggest further investigation of how to prevent a decline of norm compliance over time in participative budgeting. Social norms literature (Bicchieri, 2006, 2017) and behavioral economics literature (Falk et al., 2005; Fehr & Fischbacher, 2004) emphasize that social norms must be socially enforced as social sanctions make a social norm more resilient against norm violations (see also Chapter 2.2.3). However, as shown in Figure 10, the normative expectations with sanctions condition has received less attention because experimental studies in participative budgeting do not consider the possibility of peer sanctioning. The aim of my thesis is to fill this gap in the participative budgeting literature on social norms. Therefore, I conducted two experiments that investigate how the possibility of peer sanctioning affects honesty in participative budgeting. The two experiments and their results are presented in Chapter 4.

4 TWO EXPERIMENTS

4.1 INTRODUCTION

In Chapter 3, I summarized the findings of experimental studies investigating social norms in participative budgeting. Some studies employed a dynamic setting in which managers interact and repeatedly receive information about others' behavior. These studies all agree that honesty decreases over time when peers' behavior is observable (Brunner & Ostermaier, 2019; Guo et al., 2020; Lill et al., 2023; Paz et al., 2014; Schwering, 2017). The reason is that managers have an incentive to interpret peers' dishonest reporting as the prevalent social norm. Despite its importance for the enforcement of social norms, I show in Chapter 3 that the normative expectations with sanctions condition has received less attention in the participative budgeting literature on social norms. The reason is that experimental studies in participative budgeting focus on the effect of peer observability on honesty but do not consider the possibility of peer sanctioning.

This chapter addresses this gap in knowledge by conducting two experiments. Experiment 1 starts by reproducing prior results that an open compared to a closed internal reporting environment decreases honesty in participative budgeting. Against this benchmark, the possibility of peer sanctioning is added to investigate how peers' influence overall affects honesty in an open internal reporting environment (i.e., peer observability and the possibility of peer sanctioning). In Experiment 2, I investigate whether the effect of the possibility of peer sanctioning on honesty can be amplified. Specifically, I consider whether the implementation of a pooled profit-sharing plan can increase honesty in an open internal reporting environment through increased sanctioning of dishonest managers.[14] Finally, I use the results of both experiments to evaluate whether peers' influence on managerial honesty can be attributed to its effect on a social norm of honesty. Chapter 4 also aims to identify the type of individuals who are willing to sanction norm violators in participative budgeting and, thus, are most important for the robustness of a social norm of honesty.

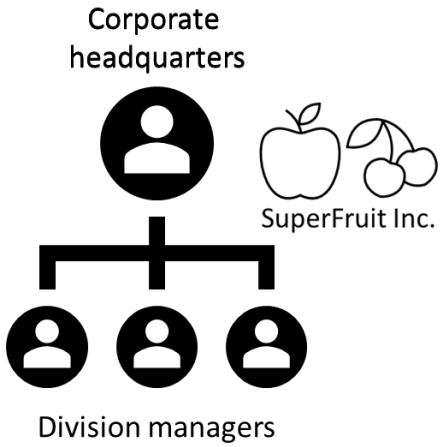
[14] It should be noted that Section 4.3 and 4.4 (Experiment 1 and 2) are based on joint work with Lucia Bellora-Bienengräber, Matthias Meyer and Kai G. Mertens.

4.2 SETTING AND DEPENDENT VARIABLE

Setting

This section describes the basic setting and the dependent variable in both experiments. Following Boster, Majerczyk, and Tian (2018), each participant acts as a manager of one division in the organization "SuperFruit Inc." which comprises three divisions (see Figure 11).[15]

Figure 11: Organizational Structure of Super Fruit Inc.



Participants must complete 10 periods in the experiment. Each period depicts a budgeting period in which division managers receive information about the costs of their division, which represents the private information they have because they are closer to the production process. Next, division managers participate in the budgeting process by reporting their division's costs to corporate headquarters. Following prior literature (Rankin et al., 2008), cost uncertainty is eliminated by providing division managers with the true costs when preparing a budget request. Thus, any cost overstatement can be interpreted as dishonest reporting. In line with the trust contract as in Evans et al. (2001), corporate headquarters only knows that divisions have a possible range of costs (i.e., between 4,000 and 5,500 Lira) and accepts any budget request within this range. The information asymmetry in this setting leads to the agency prediction that the division manager will always report 5,500 Lira regardless of what the true costs actually are (Baiman & Evans, 1983). In each period, each division manager earns a fixed salary of 500 Lira and keeps any difference between reported and true costs:

[15] Instead of "manager" and "superior", I use the terms "division manager" and "corporate headquarters" throughout both experiments. The reason is that I used these terms in the description of the experiment that participants received before they started the experiment.

Division manager's earnings: 500 (*Division manager's salary*) + *Cost surplus* (*Reported costs – True costs*) (7)

Further, in each period, each division yields revenues of 6,000 Lira. If the division manager chooses to overstate the true costs, the division's profit decreases to the point where the division manager reports the highest possible costs of 5,500 Lira, resulting in a division's profit of 0 Lira:

Division's profit: 6,000 (*Revenues*) – *Reported costs* – 500 (*Division manager's salary*) (8)

Most experimental studies investigating social norm activation in participative budgeting use a dyadic setting of a superior and a manager (Abdel-Rahim & Stevens, 2018; Blay et al., 2019; Douthit & Stevens, 2015). In contrast, most experimental studies focusing on how peers influence social norms and honesty over time employ a setting in which two managers interact and report to the same superior (Brunner & Ostermaier, 2019; Guo et al., 2020; Lill et al., 2023). In both experiments described in this thesis, three managers interact and report to the same superior. Since social norms and the role of sanctions in enforcing social norms are the focus of both experiments, this design choice is important. The reason is that social norms represent an aggregate phenomenon beyond the context of bilateral interactions, and peer pressure typically prevails in groups with at least three members (Falk et al., 2005).

Dependent variable

The dependent variable in both experiments is the participant's level of honesty, HONESTY.[16] In line with Evans et al. (2001), I use the participant's budget slack as a measure of honesty.

Honesty = 1 – (*Reported costs – True costs*) / (*Maximum cost report – True costs*) (9)

In each period, HONESTY can range from 0 (i.e., 100% dishonest) if the participant's cost report equals the maximum cost report of 5,500 Lira to 1 (i.e., 100% honest) if the participant's cost report equals the true costs in that period. A higher value of HONESTY indicates that participants reported the true costs more honestly and vice versa.

[16] I measure and use participants' honesty as dependent variable instead of budget slack because I investigate whether a social norm of honesty affect participants' reporting behavior. Further, there is no uncertainty about costs, thus budget slack depends on participants' honesty.

Since both experiments employ a multi-period setting, the results contain multiple responses per participant, which are not independent. To control for participants' multiple responses, I employ two different approaches. First, I average participants' honesty across the 10 periods and treat it as a single observation, resulting in the first main dependent variable, called AVERAGE HONESTY.[17] Second, I utilize a mixed-model regression using the participant's honesty in each period as the dependent variable. The reason is that a mixed-model regression can account for the within-subject dependency of the observations with random effects on the participant level (Brunner & Ostermaier, 2019; Lill et al., 2023). Thus, the second main dependent variable is HONESTY, as calculated in Equation 9.

4.3 EXPERIMENT 1: OPENNESS AND PEER SANCTIONING

4.3.1 INTRODUCTION

Organizational openness, which is the degree of transparency among employees, is identified as one of five critical human capital trends in a recent Deloitte survey on global human capital trends (Deloitte, 2019). Organizational openness is suggested to be positively associated with several positive outcomes, such as employee engagement (Jiang & Luo, 2018), firm flexibility (Ahrens & Chapman, 2004), and innovative practices (Jørgensen & Messner, 2009). Therefore, firms have increased organizational openness to foster communication, information sharing, and collaboration (Bernstein & Turban, 2018; Evans III et al., 2016; Waber et al., 2014). One way to foster organizational openness is to open the firm's internal reporting environment (Evans III et al., 2016). Increasing the openness of the internal reporting environment, managers receive more information about their peers' reports to the superior. For example, in participative budgeting, managers may receive information about others' budgets when the internal reporting environment is open.

An open internal reporting environment, however, may lead to increased agency costs in participative budgeting in the form of more dishonest reporting. Several experimental studies in participative budgeting find that transparency among managers has a negative effect on honesty (Brunner & Ostermaier, 2019; Emett et al., 2019; Paz et al., 2014; Schwering, 2017). In repeated settings, managers observe the reporting behavior of their peers and use the information to justify their dishonest reporting in future periods (Guo et al., 2020; Lill et al.,

[17] This approach was also used by other participative budgeting studies (e.g., J. Douthit & Majerczyk, 2019; Rankin et al., 2008)

2023). Thus, lower honesty in participative budgeting may reduce the benefits of organizational openness.

However, in an open internal reporting environment, peers affect managers' reporting behavior not only by providing information about their behavior but also by potentially sanctioning managers. Therefore, the negative effect of an open internal reporting environment on honesty may be smaller than suggested by previous studies if the possibility of being sanctioned by peers provides a reason for managers to report honestly. In this study, the informal act in which a manager's behavior is disapproved by other peers is defined as peer sanctioning. For example, after the budget meeting, managers confront another manager who is granted unduly more budget.

This study examines peers' influence on honesty in two steps: First, as a benchmark, this study aims to reproduce results from prior experimental studies that honesty is lower in an open compared to a closed internal reporting environment (e.g., Brunner & Ostermaier, 2019; Lan Guo et al., 2020; Lill et al., 2023). Second, this study adds the possibility of peer sanctioning and examines how peers overall affect honesty in participative budgeting when the internal reporting environment is open. Specifically, I investigate whether peer sanctioning in open internal reporting environments can increase honesty by increasing the salience and robustness of a social norm of honesty.

4.3.2 Hypotheses Development

Background

The findings of experimental studies, as presented in Chapter 3, show that managers' reporting behavior is often not consistent with the prediction from agency theory.[18] One reason is that managers do not act in social isolation and feel pressure to act against their material self-interest to conform to social norms (Blay et al., 2019; Douthit & Stevens, 2015; Guo et al., 2020; Maas & Van Rinsum, 2013) According to social norm theory (Bicchieri, 2006), a social norm is an informal rule that is collectively perceived as appropriate behavior in a certain situation. Individuals' preference to follow such a social norm is conditional on their expectation that most other peers will follow the social norm (i.e., empirical expectations), that most other peers

[18] See Section 2.1.3 for the agency prediction in participative budgeting.

also expect them to follow (i.e., normative expectations), and that peers are willing to sanction norm violation (i.e., normative expectations with sanction).

However, managers' empirical and normative expectations regarding a social norm of honesty may decrease, and thus, honest reporting when managers get unexpected information about peers' dishonest reporting. The studies in Chapter 3 that employ a dynamic setting find that honesty decreases over time when peer behavior is observable (e.g., Brunner & Ostermaier, 2019; Paz et al., 2014; Schwering, 2017). These studies attribute the decrease in honesty to an asymmetric effect of observable peer behavior on honesty. This asymmetric effect stems from managers' tendency to make a self-serving use of empirical information by responding more strongly to observations of dishonest reporting than honest reporting. As individuals are more inclined to change their behavior after observing examples of peers' dishonest rather than honest reporting, this results in a contagion effect of peers' dishonest reporting over time (Brunner & Ostermaier, 2019; Emett et al., 2019; Paz et al., 2014; Schwering, 2017).

The asymmetric effect of observable peer behavior suggests an inevitable decline of norm-compliant behavior (i.e., compliance with the social norm of honesty) in open organizations. However, in open organizations, managers are not only affected by observable peer behavior (i.e., managers receive empirical information about peers' behavior) but also by peers' possibility to observe and sanction managers' behavior (i.e., peers disapprove of managers' reporting behavior). This distinction between the two ways of peers' influence is prominent in economic studies by Georganas et al. (2015) and Mas and Moretti (2009). Using data from a field experiment in a supermarket chain, Mas and Moretti (2009) show that workers are more productive and show less free-riding when workers can be observed by their peers. The authors argue that less free-riding occurs because workers want to avoid utility losses from being sanctioned by their peers. This is very similar to Bicchieri's normative expectations with sanctions condition. According to social norm theory (Bicchieri, 2006, 2017), some individuals only have a preference to follow a social norm on the condition that they expect peers to believe one should follow the social norm and are willing to sanction norm violations. These individuals have a low norm-sensitivity towards a specific social norm, e.g., they personally do not think that honest reporting is appropriate in participative budgeting. Thus, these individuals are only motivated to follow the social norm to avoid sanctions from peers. Without the threat of peer sanctioning, these individuals would violate the social norm suggesting that peer sanctioning is

crucial for a social norm to sustain (Ernst Fehr & Schurtenberger, 2018; Sutter, Haigner, & Kocher, 2010).

As shown in Chapter 3, the normative expectations with sanctions condition has received less attention in the participative budgeting literature. Since the possibility of peer sanctioning may potentially increase honesty, this study helps fill this gap by investigating how peers affect managers' honesty when peer observability and peer sanctioning are possible.

Possibility of Peer sanctioning

While formal sanctions like fines or restrictions are implemented by a legal system, informal sanctions such as gossip, peer pressure, or social ostracism are expressions of social disapproval and often occur in daily human interactions (Bicchieri, 2006; Masclet et al., 2003). In line with Bicchieri (2006), I define peer sanctioning in this study as the informal act in which an individual's behavior is disapproved by peers. These informal sanctions do not impose tangible costs on the norm-violators but decrease their utility through psychological costs like shame, discomfort, or loss of self-respect or through social costs like social ostracism (Blau, 1964; Fischer & Huddart, 2008; Williams, 1997).

A more open organization might already increase the possibility of peer sanctioning because managers more often observe and are observed by their peers. Further, firms have additional ways to increase the possibility of peer sanctioning. Mas and Moretti (2009) find that the effect of being observed by peers is increased when workers frequently interact (i.e., they work frequently on the same shift) and attribute this increased effect to more opportunities to be sanctioned when frequently interacting. In line with this finding, I propose that the possibility of peer sanctioning in a firm is a continuum that depends–among other things–on the frequency with which managers interact. For example, firms can increase the amount of interaction among managers through increasing task interdependence (Lam & Chin, 2004). When task interdependence is high, managers typically are closer together and must communicate more often (Somech, Desivilya, & Lidogoster, 2009), resulting in more opportunities to be sanctioned by other peers.

Many experimental studies in the behavioral economics literature provide evidence that the possibility of peer sanctioning can effectively deter opportunistic behavior (Fehr & Gächter, 2000; Masclet et al., 2003; Noussair & Tucker, 2005). The possibility of peer sanctioning

unfolds its effect on individuals in two ways. First, individuals experience disutility when being sanctioned by their peers and, therefore will ex-ante avoid behavior that they expect will trigger peer sanctioning (Bicchieri, 2006; Fehr & Gächter, 2002). Second, the behavioral economics literature emphasizes the norm-expressing function of peer sanctioning (Cooter, 1998; Kahan, 1998; Sunstein, 1996). Being sanctioned by other peers influences individuals' behavior by indicating that there are individuals who view their behavior as norm-violation, which increases individuals' empirical and normative expectations (Chen, Zeng, & Ma, 2020). Next, I develop hypotheses on how peers affect honesty in participative budgeting, considering the openness of the internal reporting environment and the possibility of peer sanctioning.

Hypotheses development

First, I develop a hypothesis regarding the effect of the openness of the internal reporting environment on honesty. Drawing on social norm theory (Bicchieri, 2006), I predict that honesty will be lower in an open compared to a closed internal reporting environment. Since many firms have codified honesty as an important value in their code of conduct,[19] most managers will believe that honest reporting is the appropriate behavior in participative budgeting. This results in managers expecting that most others report honestly (i.e., empirical expectations regarding a social norm of honesty) and expecting that others believe that honest reporting is the appropriate behavior (i.e., normative expectations regarding a social norm of honesty) in participative budgeting. If managers expect that most others follow the social norm of honesty, managers trade off the utility of additional wealth from dishonest reporting against the disutility from norm violation when making their reporting decisions.

However, in an open internal reporting environment, managers get information about the reporting behavior of their peers that may be unexpected and change their empirical and normative expectations. For example, if managers observe others reporting dishonestly, they may revise their empirical expectations that most others report honestly. This decreases their disutility from violating the social norm of honesty. Experiencing less disutility from norm violation, more managers decide to report dishonestly. Although managers may also observe others' honest reporting, honesty will still decline over time due to the asymmetric effect of observable peer behavior.

[19] For example, see the standards of business conduct from Starbucks (2011).

Since complying with a social norm of honesty in participative budgeting is costly in terms of material self-interest (i.e., forego wealth in the form of additional budget), managers will react stronger to peers violating the social norm of honesty than peers complying with it. In line with previous studies (Brunner & Ostermaier, 2019; Emett et al., 2019; Paz et al., 2014; Schwering, 2017), I predict that this asymmetric effect of observable peer behavior results in a negative effect of an open internal reporting environment on honesty. This is summarized with the following hypothesis:

H1: Honesty is lower under an open versus closed internal reporting environment.

Second, I develop a hypothesis about how the possibility of peer sanctioning affects honesty in an open internal reporting environment. Drawing again on social norm theory (Bicchieri, 2006), I predict that honesty in an open internal reporting environment will be higher when the possibility of peer sanctioning is present compared to when the possibility of peer sanctioning is absent. As individuals' empirical and normative expectations regarding a social norm of honesty increase, individuals will report more honestly because they experience higher disutility from violating the social norm (see Section 2.2.1). When the possibility of peer sanctioning is present, managers not only have to trade off the utility of additional wealth from misreporting against the expected disutility from norm violation but also against the expected disutility from being sanctioned (i.e., psychological costs like guilt or shame). Since a social norm of honesty is important in most human societies (Akerlof, 1983; Bicchieri, 2006), I argue that managers will expect that some peers value honesty and are willing to sanction dishonest reporting. Thus, some managers will report honestly to avoid peers' sanctions. Compared to an open internal reporting environment without the possibility of peer sanctioning, this will lead to more observations of honest reporting. More observation of honest reporting further increases managers' empirical and normative expectations and slows down the contagion effect of peers' dishonest reporting over time.

Besides the nonexecuted sanctioning threat, being actually sanctioned increases the level of honesty. The reason is that being sanctioned when reporting dishonestly gives managers a clear signal that peers view dishonest reporting as a norm-violation, which increases managers' empirical and normative expectations regarding the social norm of honesty (Andrighetto et al., 2013; Chen et al., 2020; Dimant, Bicchieri, & Xiao, 2021). However, norm violations often do not directly hurt other people. Thus, there may be no motivation to inflict sanctions (Fehr &

Fischbacher, 2004). The same may be true in participative budgeting, where managers creating budget slack for their division may impose little costs on other managers if the division's budget is small in relation to the firm's funding. Thus, there must be managers who sanction others' misreporting, although their economic payoff has not been directly harmed by the norm violation. Behavioral economics literature refers to this situation as third-party sanctioning, i.e., sanction of a party whose economic payoff is not harmed by the norm violation and shows that third-party sanctioning is common (Fehr & Fischbacher, 2004). The reason for third-party sanctioning is that negative emotions (e.g., anger) cause disutility independent of any material loss and thereby trigger sanctions (Fehr & Fischbacher, 2004; Jordan, McAuliffe, & Rand, 2016). In participative budgeting, managers who report honestly and receive less budget than others who overstate their costs may feel treated unfairly and thus are motivated to sanction dishonest managers.

Overall, compared to an open internal reporting environment without the possibility of peer sanctioning, managers in an open internal reporting environment with the possibility of peer sanctioning will have higher empirical and normative expectations due to both effects of peer sanctioning (i.e., the threat of being sanctioned and norm-expressing function) that results in higher honesty. This hypothesis is stated as follows:

H2: In an open internal reporting environment, honesty will be higher when the possibility to sanction is present compared to when it is absent.

4.3.3 METHOD

Experimental setting

To test the hypotheses, I adapt the participative budgeting setting from Evans et al. (2001) to a multi-agent context. Each participant acts as a division manager in an organization consisting of three divisions. In each period, each division yields revenues of 6,000 Lira, and each division manager receives a fixed salary of 500 Lira. The division managers receive information about their division's true costs and must report their true costs to corporate headquarters to get funding. Following the trust contract from Evans et al. (2001), corporate headquarters only knows that divisions' costs range between 4,000 and 5,500 Lira and accepts any budget request within this range. Thus, when the division manager chooses to report the highest possible costs of 5,500 Lira, the division's profit for that period will be 0 Lira. The dependent variable is the

participant's level of honesty, HONESTY. In line with Evans et al. (2001), I use the participant's budget slack as a measure of honesty. In each period, HONESTY can range from 0 (i.e., 100% dishonest) if the participant's cost report equals the maximum cost report of 5,500 Lira to 1 (i.e., 100% honest) if the participant's cost report equals the true costs in that period. In line with prior literature, cost uncertainty is eliminated by providing participants with the true costs when preparing a budget request. Thus, any cost overstatement can be interpreted as dishonest reporting (Douthit & Stevens, 2015; Rankin et al., 2008).

Experimental manipulations

I employ a mixed experimental design where I manipulate the openness of the internal reporting environment (closed/open), and nested within the open internal reporting environment, I manipulate the possibility of peer sanctioning (absent/present). Further, period (1 – 10) is used as a within-subject factor such that each participant completes 10 budget periods. The experiment is programmed using the software from SophieLabs[20] and conducted via the online platform Prolific.[21] The openness of the internal reporting environment is manipulated by varying the information participants receive about others' true costs and their submitted budget reports to corporate headquarters.[22] In the closed reporting environment condition, participants do not get any information about others' true costs and submitted budget reports. In the open reporting environment condition, participants observe others' true costs and submitted budget reports; thus, participants can infer others' level of honesty. This proxies the situation in a company in which managers have similar tasks, chat about budgets, exchange thoughts during budget meetings in the planning process, or can see reported budgets in a shared information system (Brunner & Ostermaier, 2019; Evans III et al., 2016).

Within the open reporting environment condition, I manipulate the possibility of peer sanctioning. Peer sanctioning is operationalized as the combination of material punishment following experiments in behavioral economics (Fehr & Gächter, 2000; Masclet et al., 2003; Noussair & Tucker, 2005) and peer communication (i.e., a text message from peers) following social norm literature (Andrighetto et al., 2013; Dimant et al., 2021). This combination of material punishment and peer communication is used because when peer sanctioning occurs in the real world, it is usually associated with a message indicating what should not be done

[20] https://www.sophielabs.com
[21] https://www.prolific.co
[22] For a detailed description of the experimental instructions, see Appendix A.

(Bicchieri, 2017). Further, peer sanctioning as the combination of material punishment and a normative message about appropriate behavior more directly communicates that the punishment is the reaction of a norm-violation rather than the self-interest of the sanctioning party (Dimant et al., 2021; Fehr & Williams, 2017). When the possibility of peer sanctioning is absent, and the internal reporting environment is open, participants only observe others' true costs and submitted budget reports. When the possibility of peer sanctioning is present, participants observe others' true costs and submitted budget reports and afterward can assign an integer amount of 0 to 10 sanction points to each of the other two participants in their organization in each period. Each sanction point received decreases the payoff of the sanctioned participant by 10% with a maximum of 100% but is also costly for the sanctioning participant as each sanction point assigned decreases the sanctioning participant's payoff.[23] For example, when participants decide to assign eight sanction points in total to the other two participants, their costs for assigning sanction points equal their fixed salary of 500 Lira (see Table 7). When assigning sanction points, participants must also communicate to the sanctioned participant a normative message (i.e., that they disapprove of the other's decision and indicate what they think an appropriate cost report would have been in this period) by completing the following sentence: "I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been X (indicating the appropriate cost report) Lira."

Table 7: Costs of Assigning Sanction Points

No. sanction points	0	1	2	3	4	5	6	7	8	9	10
Costs (in Lira)	0	25	50	100	150	225	300	400	500	625	750

Procedure

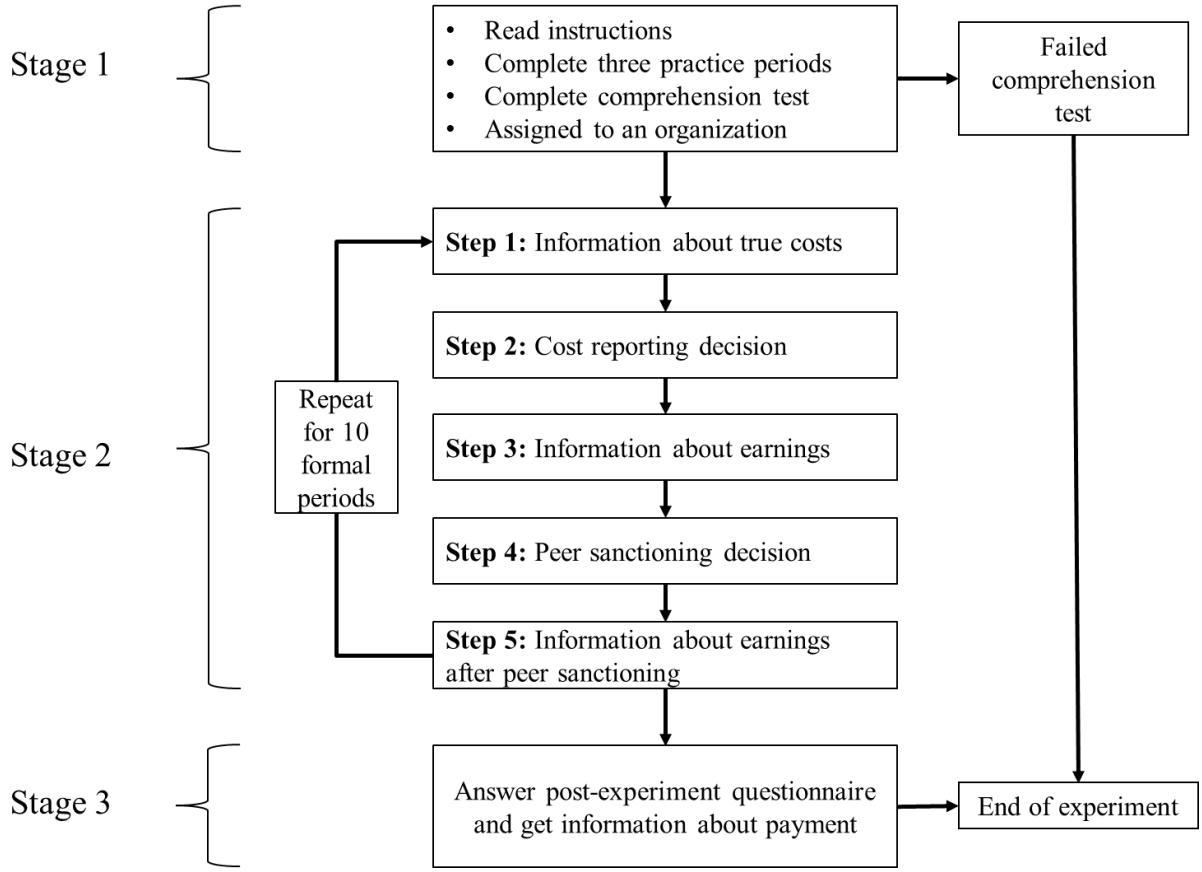
The procedure of the experiment is described in Figure 12. Before participants can proceed to the experiment, they must read and agree to the consent form.[24] The experiment consists of three stages. In Stage 1, participants must rate their agreement with several statements. The first

[23] Although informal sanctions between managers do not have monetary consequences in practice, I operationalize peer sanctioning as an option to reduce other participants' payoff in line with experiments in behavioral economics (Fehr & Gächter, 2000; Masclet et al., 2003; Noussair & Tucker, 2005). The reason is that similar to monetary costs in this experiment, informal sanctions impose psychological costs on the norm violator through shame or guilt that decrease the norm violator's utility (Bicchieri, 2006; Blau, 1964; Masclet et al., 2003). As it is difficult to create these feelings in an anonymous online experiment, I consider monetary costs in combination with a message about appropriate behavior as a sufficient approximation.

[24] This study is approved by the Institutional Review Board of the University of Groningen.

statements are from Murphy, Wynes, Hahn, and Devine (2020), measuring individuals' internal and external motivation to report honestly.

Figure 12: Procedure in Experiment 1



Note. This figure shows the procedure if peer sanctioning is possible. If peer sanctioning is not possible, Steps 4 and 5 are omitted.

The last statements are from the risk propensity scale by Meertens and Lion (2008), which measures the tendency of individuals to take risks. After participants rate their agreement with these statements, they are randomly assigned to one of the three conditions and read the instructions for the cost reporting task in Stage 2. Then, participants engage in three practice periods to understand how their decisions affect their payoffs. Decisions in these periods are not compensated. In the three practice decision periods, the other two division managers are represented by bots with predefined behavior to show participants a variety of different situations that can occur in the formal periods of the cost reporting task. At the end of Stage 1, participants must pass a comprehension test to proceed to Stage 2. After submitting their answers to the single-choice questions for the first time, participants get the information on

which questions they answered incorrectly and have one chance to correct the wrong answers. Participants are excluded from the experiment if any question is answered incorrectly twice.

At the beginning of Stage 2, participants are randomly assigned to groups of three, which will stay together as an organization throughout all 10 periods. Within each organization, each participant acts as a division manager. Depending on the assigned condition, participants must complete the same three steps (possibility of peer sanctioning absent) or five steps (possibility of peer sanctioning present) in each of the 10 periods. When the possibility of peer sanctioning is absent, participants complete three steps each period. First, they receive information about the true costs of their division (closed internal reporting environment) and additionally information about the true costs of the other two divisions (open internal reporting environment).[25] Second, they report costs to corporate headquarters to request funding. Third, they receive information about their payoffs for that period (closed internal reporting environment) and information about the reported costs and payoffs of the other two participants (open internal reporting environment).

When the possibility of peer sanctioning is present, Steps 4 and 5 are added. Fourth, participants can sanction the observed reporting behavior of the other two participants by assigning sanction points together with a message about what they think an appropriate cost report would have been. Fifth, participants get information about the number of sanction points and messages they received and the resulting payoff after peer sanctioning. After all 10 periods are complete, participants proceed to the post-experimental questionnaire (Stage 3). The post-experimental questionnaire includes manipulation checks, questions regarding participants' norm perception, participants' drivers of reporting behavior and sanctioning behavior, personal traits, and demographic questions. Participants then receive the message that they have completed the experiment and are guided back to the interface of the online platform Prolific, where they are anonymously paid.

Participants and payoff

A total of 126 participants are recruited via the online recruiting platform Prolific and completed the entire experiment.[26] Participants are located in the USA and have at least some experience

[25] Prior to the experiment, I randomly generated a cost sequence for 10 periods, which I used in each experimental condition for each group to make behavior across groups and conditions comparable.

[26] Of the 269 participants who started the experiment on Prolific, 74 participants were excluded due to inactivity (27.51%) and 69 participants (25.65%) due to errors in the comprehension test.

being in a management position.[27] The age of participants ranges from 23 to 74, with an average of 41.80 years. All participants have work experience which ranges from 1 to 55 years, with an average of 19.78 years. In addition, 57 participants (45.23%) have gained experience in a budgeting process with an average of 3.72 years. Finally, four participants describe their gender as diverse (3.20%), 76 as male (60.30%), and 46 as female (36.50%). There are no significant differences across the three conditions for age, work experience, budgeting experience, or proportion of gender (untabulated, all $p > 0.27$, two-tailed). Therefore, I can exclude that results are due to differences regarding these characteristics.

Participants' payoffs consist of Lira (our experimental currency) that participants earned in the cost reporting task (i.e., Stage 2) and incentivized questions in the post-experimental questionnaire (i.e., Stage 3). In the cost reporting task, participants' earnings include a fixed salary of 500 Lira for their role as division manager and the budget slack retained (i.e., the difference between reported and true costs). When the possibility of peer sanctioning is present, participants' earnings from their reporting decision are reduced by 10% for each sanction point they received from the other two division managers, with a maximum of 100%. Further, participants' earnings are reduced through the costs of assigning sanction points to the other two division managers. Figure 13 shows the calculation scheme:

Figure 13: Calculation of Earnings (Experiment 1)

Fixed salary + Cost surplus (i.e., reported costs – true costs)	Possibility of peer sanctioning ABSENT
= Earnings from reporting decision	
- Earnings reduction through sanction points - Costs for assigning sanction points	Possibility of peer sanctioning PRESENT
= Earnings after peer sanctioning	

After participants completed all 10 periods in Stage 2 and the post-experimental questionnaire in Stage 3, one period from Stage 2 is randomly selected to determine participants' earnings in Lira, which are converted to GBP at the rate of 200 Lira = 1.00 GBP. In addition, participants receive up to 1.50 GBP if they correctly guess others' personal normative beliefs about cost

[27] I use Prolific's prescreening function for the experiment: „Do you have any experience being in a management position?" All participants answered this question with „Yes".

reporting in the post-experimental questionnaire[28] and 4.00 GBP for completing the entire experiment. Participants' payment for Stage 2 ranges from 0.00 GBP to 10.00 GBP, with an average of 4.37 GBP. Participants' total payment for the experiment ranged from 5.00 GBP to 14.25 GBP, with an average of 8.80 GBP. Participants needed approximately 34 min to complete the experiment.

4.3.4 RESULTS

Manipulation checks

To evaluate whether the manipulation of the openness of the internal reporting environment is successful, I asked participants in the post-experimental questionnaire to indicate their agreement with the statement, "In each period, I received information about the reported costs of the other two division managers in my organization" (7-point Likert scale, 1 = *strongly disagree* to 7 = *strongly agree)*. Participants in the closed internal reporting environments agreed significantly less than participants in the open internal reporting environment without the possibility of peer sanctioning ($M = 1.50$ vs. 6.81, $p < 0.01$) [29] [30] and participants in the open internal reporting environment with the possibility of peer sanctioning ($M = 1.50$ vs. 6.96, $p < 0.01$). There is no significant difference between participants in the two conditions with open internal reporting environments ($M = 6.81$ vs. 6.96, $p = 0.52$). Thus, I evaluate the manipulation of the openness of the internal reporting as successful. Similarly, to evaluate whether the manipulation of the possibility of peer sanctioning was successful, I asked participants to indicate their agreement with the statement, "I had the possibility to reduce the earnings of the other two division managers in my organization." Participants in the open internal reporting environment with the possibility of peer sanctioning agreed significantly more than participants in the open internal reporting environment without the possibility of peer sanctioning ($M = 6.83$ vs. 1.61, $p < 0.01$) and participants in the closed internal reporting environment ($M = 6.83$ vs. 1.98, $p < 0.01$). Further, there is no significant difference between the two conditions where peer sanctioning is not possible ($M = 1.98$ vs. 1.61, $p = 0.83$). Therefore, I evaluate the manipulation of the possibility of peer sanctioning as successful.

[28] According to Bicchieri (2017, p. 97) normative expectations are expectations about the personal normative beliefs of others and should be incentivized to counteract a social desirability bias.
[29] To compare means in the manipulation check, I use a non-parametric test (Wilcoxon's test) because the data is not normally distributed.
[30] All p-values are two-tailed unless indicated otherwise.

Descriptive statistics

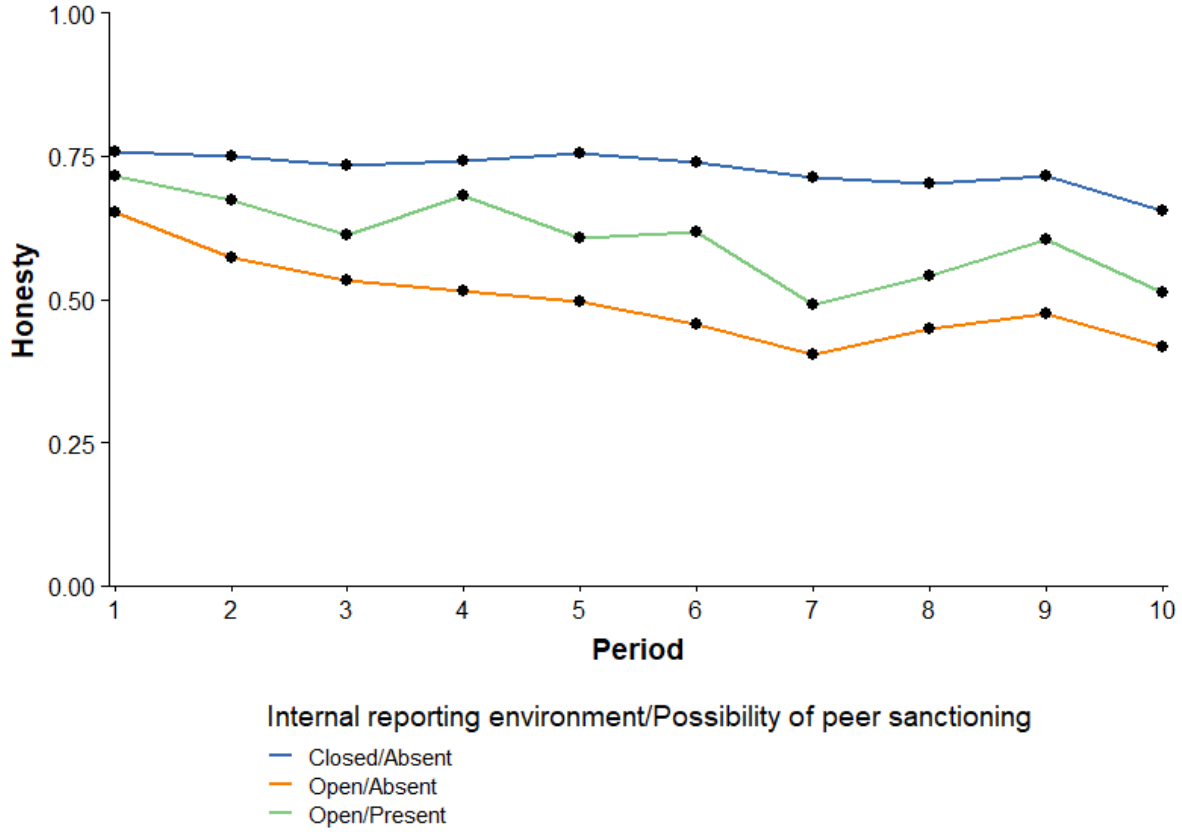
Table 8 shows descriptive statistics for honesty per condition. HONESTY is highest in the closed internal reporting environment (M = 0.73 vs. 0.50 and 0.61). Within the open internal reporting environments, HONESTY is higher when peer sanctioning is possible than when it is not possible (M = 0.61 vs. 0.50). Figure 14 shows HONESTY per period and condition and shows that the pattern from Table 8 is consistent over time. Further, Figure 14 shows that, especially in the two conditions with open internal reporting environments, HONESTY decreases over time.[31]

Table 8: Descriptive Statistics of Honesty per Condition

	Possibility of Peer Sanctioning		
	Absent	Absent	Present
Internal reporting environment	Closed	Open	Open
Mean	0.73	0.50	0.61
SD	0.36	0.42	0.43
No. participants	42	36	48
Total	126		

[31] Although the honesty pattern from Table 8 is consistent in Figure 14 (honesty ranking of the three conditions is the same in each period), we see that honesty varies between periods. This variation can be partially explained by varying true costs per period and thus varying absolute potentials of budget slack.

Figure 14: Honesty per Condition and Period (Experiment 1)



Hypotheses testing

H1 states that honesty will be higher when the internal reporting environment is closed compared to when it is open. In line with prior experiments in budgeting (Douthit & Majerczyk, 2019; Rankin et al., 2008), I use the AVERAGE HONESTY for each participant over all 10 periods as a single observation to control for participants' multiple reporting decisions. Participants in the closed reporting environment reported more honestly ($M = 0.73$, $SD = 0.36$) than participants in the open reporting environments (untabulated, M = 0.56, $SD = 0.43$). As shown in Table 9, this difference is significant ($t = 2.47$, $p < 0.01$, one-tailed) and represents a small-sized effect ($r = 0.25$) providing support for H1. H2 states that within open internal reporting environments, honesty is higher when peer sanctioning is possible than when it is not possible. AVERAGE HONESTY is higher in an open internal reporting environment when the possibility of peer sanctioning is present ($M = 0.61$, $SD = 0.43$) than when it is absent ($M = 0.50$, $SD = 0.42$). As shown in Table 9, this difference is significant ($t = -1.36$, $p < 0.10$, one-tailed) and represents a small-sized effect ($r = 0.15$), providing support for H2. To provide further support for H2, I use a mixed-model regression. Only participants from the two

conditions with open internal reporting environments are considered, and the mixed-model regresses HONESTY on the POSSIBILITY OF PEER SANCTIONING, which was dummy coded (0 = ABSENT, 1 = PRESENT). Table 10 shows that the POSSIBILITY OF PEER SANCTIONING has a significant, positive effect on HONESTY ($\beta = 0.10$, $t = 2.89$, $p < 0.01$), further supporting H2. In addition, the within-subject factor PERIOD has a significant, negative effect on HONESTY ($\beta = -0.02$, $t = -3.13$, $p < 0.01$), which is in line with the decline of honesty over time shown in Figure 14.

Table 9: Test of H1 and H2 (Experiment 1)

	Hypothesis	*t*	*df*	*p*
H1	Difference between open and closed reporting environment (Condition 1 vs. Condition 2, 3)	2.47	88.20	<0.01
H2	Difference between absent and present possibility of peer sanctioning in open reporting environment (Condition 2 vs. Condition 3)	-1.36	75.92	0.09

Note. Welch's t-test is used due to unequal sample sizes and variances. All *p* values in this table are one-tailed.

Table 10: Test of H2 (Experiment 1)

Effect	Estimate	*SE*	*df*	*t*	*p*
Intercept	0.61	0.02	827.72	21.53	<0.01
Possibility of peer sanctioning	0.10	0.04	776.46	2.89	<0.01
Period	-0.02	0.01	121.73	-3.13	<0.01
Random effect	Variance	SD			
Participant (period)	0.00	0.05			
Residual	0.06	0.26			

Note. All *p* values in this table are two-tailed.

Evidence of Theory

I argue that compared to an open internal reporting environment without the possibility of peer sanctioning, managers in an open internal reporting environment with the possibility of peer sanctioning will have higher empirical and normative expectations due to both effects of peer sanctioning (i.e., the threat of being sanctioned and norm-expressing function), ultimately resulting in higher honesty. To test whether a social norm of honesty is the underlying process of participants' reporting behavior (i.e., empirical and normative expectations have an effect on participants' reporting behavior), participants' empirical expectations, normative expectations, and personal normative beliefs about honest reporting are measured in the post-experimental questionnaire. To measure empirical expectation, participants are asked to think about the completed 10 periods and answer the following question: "Did you expect that the other two division managers would report the true costs to corporate headquarters?" To measure personal normative beliefs, participants are asked to answer the following question: "Do you personally believe that one should report the true costs to corporate headquarters?" To measure normative expectation, participants are then asked to guess what the other two division managers answered on average to the question about personal normative beliefs. The reason is that normative expectations are expectations about others' personal normative beliefs (Bicchieri, 2017; Bicchieri & Xiao, 2009).[32] To answer the three questions, participants have to state their agreement on a 7-point Likert scale (1 = *not at all* to 7 = *very much*). Table 11 shows the descriptive statistics of the answers to these three questions:

Table 11: Social Norm Measurement (Experiment 1)

	Possibility of peer sanctioning		
	Absent	Absent	Present
Internal reporting environment	Closed	Open	Open
Empirical expectations	3.95 (2.15)	2.67 (1.69)	3.98 (1.78)
Personal normative beliefs	5.90 (1.71)	5.42 (1.56)	5.19 (1.96)
Normative expectations	4.90 (1.36)	4.53 (1.66)	4.88 (1.63)

Note. Means per belief and condition are shown. Standard deviations are presented in parentheses.

[32] According to Bicchieri (2017) normative expectations are second order beliefs in the sense that they represent individuals' beliefs about others' beliefs what they consider appropriate behavior.

The results show that, on average, participants expect the lowest honesty from others when the internal reporting environment is open and the possibility of sanctioning is absent. Supporting my theoretical argumentation, empirical expectations in the open internal reporting conditions are significantly higher when the possibility of peer sanctioning is present than when it is absent ($p < 0.01$, effect size $r = 0.36$).[33] There are no significant differences between conditions for personal normative beliefs or normative expectations (all $p > 0.11$).

In the next step, these measures are used to construct a moderated mediation model. The social norm measurements from Table 11 show that in conditions with an open internal reporting environment, only empirical expectations are significantly higher when peer sanctioning is present than when it is absent. Therefore, I focus on participants' empirical expectations as mediator. This is in line with social norm literature suggesting that normative expectations are needed to constitute a social norm, but individuals only act on these normative expectations as they expect others to do the same (Bicchieri et al., 2022; Bicchieri & Xiao, 2009). Further, I use participants' personal normative beliefs as a moderator for the effect of empirical expectations on honesty. The reason is that personal normative beliefs can be used as a proxy for an individual's norm sensitivity (see Section 2.2.1).

Only the open reporting environment conditions are considered to test the effect of peer sanctioning on the emergence of a social norm of honesty. POSSIBILITY OF PEER SANCTIONING is used as the independent variable, participants' EMPIRICAL EXPECTATIONS as the mediator, participants' PERSONAL NORMATIVE BELIEFS as the moderator, and participants' AVERAGE HONESTY as the dependent variable. [34] I use Model 14 of Hayes' PROCESS macro in R with a 95% confidence interval and 10,000 bootstrap samples, as shown in Figure 15 (Hayes, 2022).

[33] A non-parametric test (Wilcoxon's test) is used because the data is not normally distributed.
[34] I also include participant's gender, age, and years of work experience as control variables in the model. Only AGE has a significant but small effect on AVERAGE HONESTY ($b = - 0.02$, $p < 0.01$). Therefore, I do not show control variables in the model.

Figure 15: Moderated Mediation Model (Experiment 1)

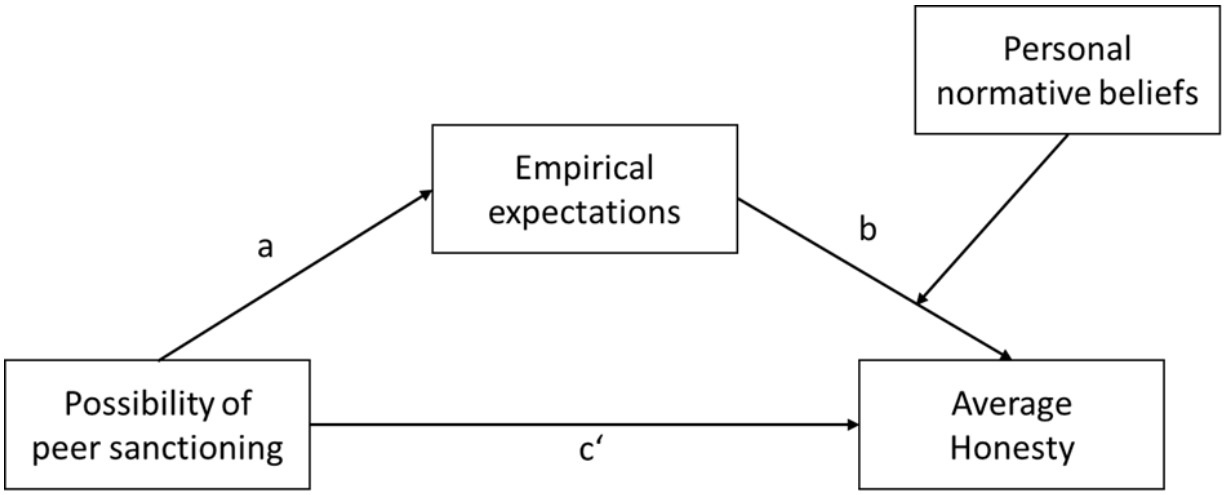


Table 12 shows the results. There is a significant a-path from POSSIBILITY OF PEER SANCTIONING to EMPIRICAL EXPECTATIONS ($a = 0.64$, $p < 0.05$). For the b-path from EMPIRICAL EXPECTATIONS to AVERAGE HONESTY, there is a significant interaction between EMPIRICAL EXPECTATIONS and PERSONAL NORMATIVE BELIEFS ($b_3 = 0.03$, $p < 0.01$, $\Delta R^2 = 0.07$). The conditional effect of EMPIRICAL EXPECTATIONS on AVERAGE HONESTY is strongest for high values (+ 1 *SD*) of PERSONAL NORMATIVE BELIEFS ($b_1 = 0.11$, $p < 0.01$), it was weaker for medium values (mean) of PERSONAL NORMATIVE BELIEFS ($b_1 = 0.05$, $p < 0.01$), and not significant for low values (- 1 *SD*) of PERSONAL NORMATIVE BELIEFS ($b_1 = -0.01$, $p = 0.63$). The direct effect of POSSIBILITY OF PEER SANCTIONING on AVERAGE HONESTY (c'-path) is not significant ($c' = -0.01$, p = 0.84). Finally, the index of moderated mediation is significant, with an index of 0.02 and a 95% confidence interval not including zero [0.01, 0.04], providing support for a moderated mediation. The positive indirect effect of POSSIBILITY OF PEER SANCTIONING via EMPIRICAL EXPECTATIONS on AVERAGE HONESTY is strongest for high values (+ 1 *SD*) of PERSONAL NORMATIVE BELIEFS (untabulated, $b = 0.07$, 95% confidence interval [0.02, 0.12]), it is weaker but still significant for medium values (mean) of PERSONAL NORMATIVE BELIEFS (untabulated, $b = 0.03$, 95% confidence interval [0.01, 0.07]), but not significant for small values of PERSONAL NORMATIVE BELIEFS (untabulated, $b = -0.01$, 95% confidence interval [-0.04, 0.30]). Overall, these results provide evidence that, especially when peer sanctioning is possible, participants' behavior is affected by their empirical expectations regarding a social norm of honesty.

Table 12: Regression Results of the Moderated Mediation Model (Experiment 1)

Independent variables	Dependent variable	
	Empirical expectations (M)	Average Honesty (Y)
Constant	i_M = -1.66 (1.45)	i_Y = 1.06*** (0.21)
Possibility of peer sanctioning (X)	a = 0.64** (0.20)	c' = -0.01 (0.03)
Empirical expectations (M)		b_1 = 0.05*** (0.02)
Personal normative beliefs (W)		b_2 = 0.15*** (0.02)
M X W		b_3 = 0.03*** (0.01)
Model F	3.09	15.29
R^2	0.14	0.58

Note. Standard errors are presented in parentheses.
*p < 0.10. **p < 0.05. ***p < 0.01.

Since social norm theory states that individuals follow a social norm conditionally on their empirical and normative expectations (Bicchieri, 2006), an additional model with normative expectation as mediator is estimated. Here, the POSSIBILITY OF PEER SANCTIONING is used as the independent variable, NORMATIVE EXPECTATIONS as the mediator, PERSONAL NORMATIVE BELIEFS as the moderator, and AVERAGE HONESTY as the dependent variable. Again, Model 14 of Hayes' PROCESS macro in R is utilized with a 95% confidence interval and 10,000 bootstrap samples (Hayes, 2022). Untabulated results show that there is no significant a-path from POSSIBILITY OF PEER SANCTIONING to NORMATIVE EXPECTATIONS (a = 0.19, p = 0.31), indicating that participants in both conditions do not differ regarding their normative expectations, which is in line with the descriptives from Table 11. There is also no significant b-path from NORMATIVE EXPECTATIONS to AVERAGE HONESTY as the confidence interval includes zero [-0.08, 0.01] (Hayes, 2022). Finally, the index of moderated mediation is not significant as the confidence interval contains zero with an index of 0.0019 [-0.01, 0.01].

Overall, the two moderated mediation models suggest that participants have similar normative expectations about honesty as the appropriate behavior in the participative budgeting setting but only act on these normative expectations as they expected others to report honestly, which

is in line with prior results from social norm literature (Bicchieri et al., 2019; Bicchieri & Xiao, 2009).

Participants' Sanctioning Behavior

Next, participants' sanctioning behavior and reactions are analyzed in more detail to further support the argumentation that the possibility of peer sanctioning increases honesty because participants sanction less honest participants, which increases their honesty in the next period. To this end, I first investigate in which situation participants sanction others and, second, whether sanctioned participants increase their honesty in the next period. Table 13 shows the descriptives of participants' sanctioning.

Table 13: Participants' Sanctioning Behavior in Different Situations (Experiment 1)

Reaction	Potentially sanctioned participant is…		
	Less honest than the sanctioning participant	Equally honest than sanctioning participant	More honest than the sanctioning participant
Sanctioned [a]	$n = 139$	$n = 10$	$n = 21$
Not Sanctioned [b]	$n = 178$	$n = 299$	$n = 301$
Total	$n = 317$	$n = 309$	$n = 322$

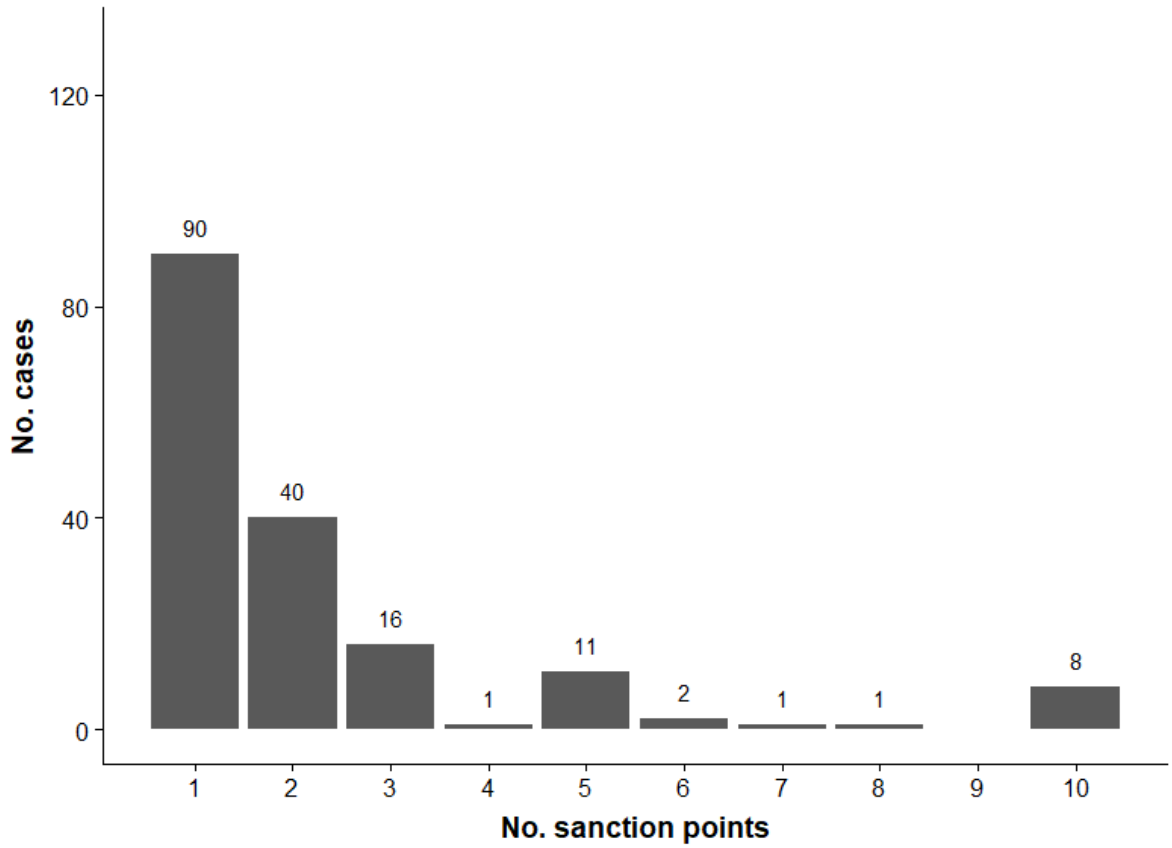
[a] Assigned at least one sanction point. [b] Assigned no sanction point.

Participants have 20 opportunities (10 periods x 2 other division managers in their organization) to sanction another participant, which gave 948 sanctioning opportunities for all 48 subjects.[35] Table 13 shows that participants receive sanction points in 17.93% of all cases (170 out of 948). To provide support that participants mostly sanction less honest participants, the sanctioning opportunities are differentiated by considering whether the potentially sanctioned participant is less honest (317), equally honest (309), or more honest than the potentially sanctioning participant (322). Results support our argumentation that mostly participants receive sanction points who are less honest than the sanctioning participant. When participants report less

[35] In two period participants missed to give their input in time, reducing the number of sanctioning opportunities from 960 to 948.

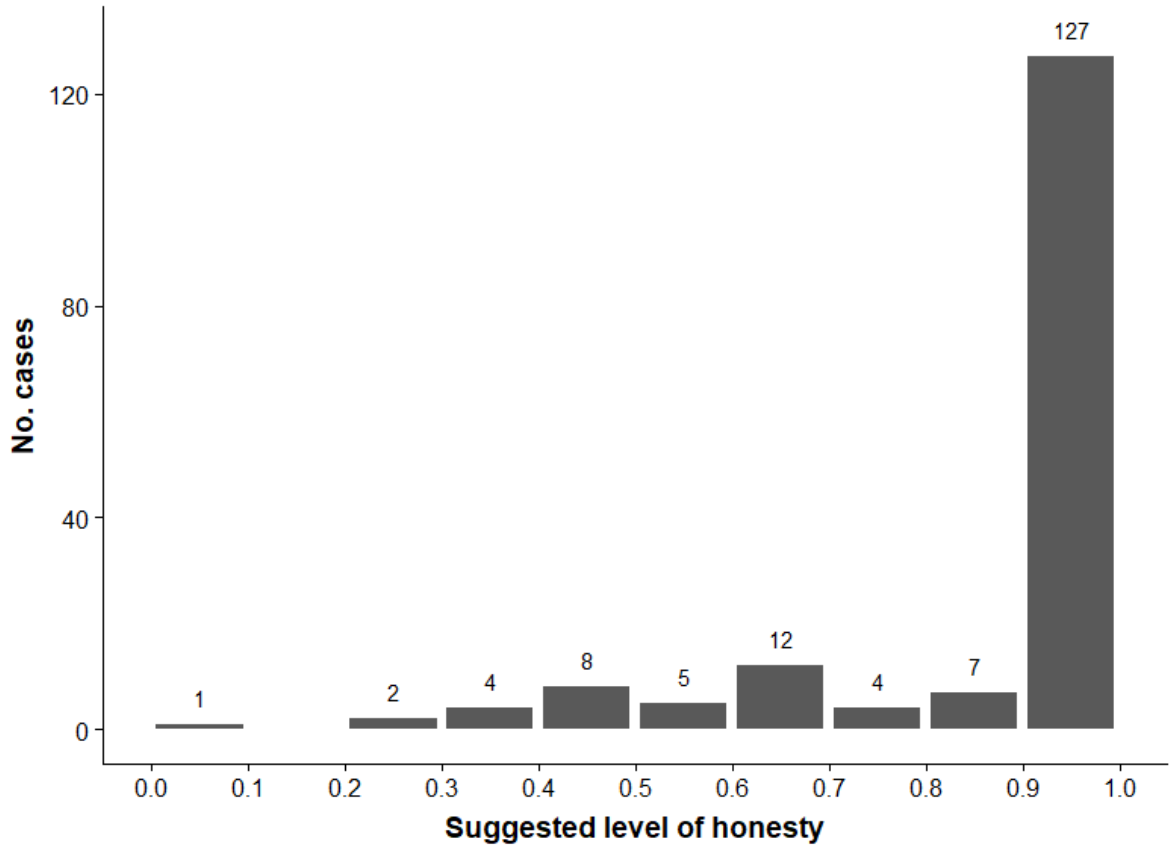
honestly than the sanctioning participant, they receive sanction points in 43.85% of these cases (139 out of 317). On the contrary, when they report equally honestly as the sanctioning participant, they receive sanction points only in 3.24% of these cases (10 out of 309). This is like the situation where participants report more honestly than the sanctioning participant, in which they also only receive sanctions in 6.52% of these cases (21 out of 322). Table 13 shows how frequently participants are sanctioned depending on their honesty in comparison to the honesty of the potentially sanctioning participant. In Figure 16 and Figure 17, the distribution of sanction points is shown, which participants assigned, and the level of honesty they suggested as appropriate behavior to others via message. In both figures, I consider all 170 cases where peer sanctioning occurred. In Figure 16, the distribution of sanction points is depicted. Participants assign one sanction point to another participant in their organization in 52.94% of the cases (90 out of 170), assign two sanction points in 23.53% of the cases (40 out of 170), and assign three sanction points in 9.41% of the cases (16 out of 170). Thus, these three categories account for over 85% of all cases and show that participants mostly decide to assign a low to moderate amount of sanction points.

Figure 16: Severity of Peer Sanctioning (Experiment 1)



In Figure 17, the distribution of the appropriate honesty level is shown, which sanctioning participants suggested via message. In 74.71% of all cases (127 out of 170), participants suggested that the appropriate level of honesty would be 0.90 or higher (i.e., report with an honesty of 90% or higher). Since participants had to assign at least one sanction point to send a message to another participant, the results of Figure 16 and Figure 17 show that to affect others' honesty, participants used less the monetary punishment aspect of the sanctioning option and much more the possibility to suggest an appropriate level of honesty by message.

Figure 17: Level of Honesty Recommended by Message



To provide further support for our argumentation that the possibility of peer sanctioning increases honesty because participants sanction less honest participants, I use a mixed-model regression with random effects. I use the number of sanction points a participant received from another participant in one period as the dependent variable, labeled RECEIVED SANCTION POINTS, and the difference in honesty between the sanctioning and sanctioned participant to construct two independent variables. HONESTY DIFFERENCE (LESS HONEST) equals the

absolute difference between the sanctioning and sanctioned participant's honesty if the sanctioned participant has reported less honestly than the sanctioning participant in that period and is zero otherwise. The variable HONESTY DIFFERENCE (MORE HONEST) is constructed analogously. Further, I include PERIOD and the third participant's HONESTY THIRD MANAGER to control for potential time and group effects.

The results of the mixed-model regression (Table 14) support the sanctioning pattern in Table 13. Participants receive significantly more sanction points as they report less honestly than the potentially sanctioning participant ($\beta = 0.45$, $t = 2.13$, $p < 0.05$). Further, PERIOD has a significantly negative effect on RECEIVED SANCTION POINTS ($\beta = -0.05$, $t = -3.68$, $p < 0.01$). There may be two reasons. On the one hand, participants in one organization may agree upon a social norm of honesty over time, which makes sanctioning unnecessary. On the other hand, participants may get tired of sanctioning as sanctioning is costly, and others do not react to them. Overall, Table 13 and Table 14 provide strong support for the argumentation that despite the costs of assigning sanction points and without any monetary incentive, some participants sanction others who report less honestly.

Table 14: Determinants of Getting Sanctioned (Experiment 1)

Effect	Estimate	*SE*	*df*	*t*	*p*
Intercept	0.66	0.22	212.90	3.02	<0.01
Period	-0.05	0.01	870.87	-3.68	<0.01
Honesty difference (Less honest)	0.45	0.21	754.16	2.13	<0.05
Honesty difference (More honest)	0.29	0.19	627.20	1.51	0.13
Honesty third manager	-0.24	0.22	624.87	-1.14	0.25
Random effect	Variance	SD			
Participant (intercept)	0.67	0.82			
Residual	1.07	1.03			

Note. Results of a linear mixed-model regression are shown. All *p* values in this table are two-tailed.

Participants' Reaction to Sanctions

After showing that participants sanction other participants who report less honestly, I investigate next whether participants report more honestly after being sanctioned in a previous period. Again, I use a mixed-model regression with random effects and only consider participants who have received sanction points and, therefore, also a message in the previous period. In the model, HONESTY is regressed on the total sum of sanction points participants received from the other two participants in their organization in the previous period, labeled SANCTIONED PREVIOUS PERIOD. Further, HONESTY is regressed on the average level of honesty suggested in the messages received from the other two participants in the previous period, labeled SUGGESTED HONESTY BY MESSAGE PREVIOUS PERIOD. The TRUE COSTS and PERIOD are included as covariates to control for differences in honesty due to varying true costs in each period and time effects. Further, the participant's honesty in the previous period and the average honesty of the other two participants in the previous period are included as covariates to control for anchoring effects and different group dynamics, labeled HONESTY PREVIOUS PERIOD and HONESTY GROUP PREVIOUS PERIOD.

Table 15 shows that SANCTIONED PREVIOUS PERIOD has a significant, positive effect on HONESTY ($\beta = 0.02$, $t = 2.02$, $p < 0.10$). As predicted, participants report more honestly after being sanctioned by the other two participants in the previous period. Further, SUGGESTED HONESTY BY MESSAGE PREVIOUS PERIOD has a significant, positive effect on HONESTY ($\beta = 0.35$, $t = 2.07$, $p < 0.05$). As predicted, participants report more honestly when they receive an explicit signal from the other two participants that honesty is the appropriate behavior in the previous period. In addition, TRUE COSTS has a significant, negative effect on HONESTY ($\beta = -0.01$, $t = -2.31$, $p < 0.05$). Thus, when higher true costs decrease the possible budget slack in absolute terms, participants tend to report more dishonestly. Further, HONESTY PREVIOUS PERIOD has a significant, positive effect on HONESTY ($\beta = 0.66$, $t = 7.73$, $p < 0.01$); thus, it seems that participants orient themselves on past behavior and try to behave consistently over time. Finally, there is no significant effect of HONESTY GROUP PREVIOUS PERIOD on HONESTY ($\beta = -0.07$, $t = -0.60$, $p = 0.56$), suggesting that participants who have received sanctioned points are less affected by the group's previous honesty.[36]

[36] Additionally, a mixed-model regression with random effects is run to determine how participants' honesty is affected by the group's previous honesty when the possibility of peer sanctioning is absent (i.e., Condition 2). Untabulated results show that in Condition 2 group's previous honesty has a positive, significant effect on honesty ($\beta = 0.35$, $t = 4.87$, $p < 0.01$).

Table 15: Determinants of Honest Reporting (Experiment 1)

Effect	Estimate	*SE*	*df*	*t*	*p*
Intercept	0.96	0.51	102.10	1.91	<0.10
True costs	-0.01	0.00	83.20	-2.31	<0.05
Period	0.02	0.02	93.91	1.13	0.26
Honesty (previous period)	0.66	0.08	13.23	7.73	<0.01
Honesty group (previous period)	-0.07	0.13	30.00	-0.60	0.56
Sanctioned (previous period)	0.02	0.01	9.09	2.02	<0.10
Suggested honesty by message (previous period)	0.35	0.17	86.23	2.07	<0.05
Random effect	Variance	SD			
Participant (intercept)	0.01	0.06			
Residual	0.08	0.28			

Note. Results of a linear mixed-model regression are shown. All *p* values in this table are two-tailed.

Against this backdrop, I analyze the characteristics of these participants who feel responsible for bearing the cost of sanctioning and enforcing honesty. The behavioral economics literature suggests that in situations of third-party sanctioning, i.e., sanction of a party whose economic payoff is not harmed by the norm violation, sanctions are driven by negative emotions because these emotions cause disutility on its own independent of any material loss (Ernst Fehr & Fischbacher, 2004; Jordan et al., 2016). Arguably, participants in Experiment 1 may perceive it as unfair that others increase their earnings by reporting dishonestly, which may trigger sanctions. Therefore, participants' unfairness perceptions about the budgeting process and others' dishonest reporting are measured in the post-experimental questionnaire.

First, to measure participants' unfairness perception regarding the fixed salary, I asked participants to think about the completed 10 periods and state their agreement on a 7-point

Likert scale (1 = *not at all* to 7 = *Very much*) regarding the following statement: "I perceived the fixed salary as unfair (i.e., not high enough)." Second, to measure participants' unfairness perceptions regarding the budgeting process, participants are asked to state their agreement regarding the following statement: "I perceived it as unfair that the budgeting process allowed the other participants to generate higher earnings by reporting dishonestly." Third, to measure participants' unfairness perceptions regarding others' dishonest reporting and corresponding earnings, participants are asked to state their agreement regarding the following statement: "I perceived it as unfair that the other participants reported dishonestly and received, as a result, potentially more earnings." To determine whether perceived unfairness triggers sanctions, the 48 participants are divided into two groups. The group "sanctioning" has at least once sanctioned one participant in the experiment. The group "non-sanctioning" never sanctioned another participant in the experiment. Table 16 shows the descriptive statistics of responses.

Table 16: Participants' Unfairness Perceptions (Experiment 1)

Perception	Group [a]	
	Sanctioning	Non-sanctioning
Unfairness salary	3.42 (1.98)	3.12 (1.96)
Unfairness budgeting process	4.75 (1.98)	3.08 (2.10)
Unfairness dishonest reporting	5.04 (1.78)	2.71 (2.29)

Note. Means per perception and condition are shown. Standard deviations are presented in parentheses.

[a] n = 24 for each group.

Results show that there is no significant difference between sanctioning and non-sanctioning participants regarding the perceived unfairness of the fixed salary ($M = 3.42$ vs. 3.12, $p = 0.49$). In contrast, I find that sanctioning participants perceived the budgeting process as significantly more unfair than sanctioning participants ($M = 4.75$ vs. 3.08, $p < 0.01$).[37] Further, sanctioning participants perceived others' increased earnings due to dishonest reporting as significantly more unfair than non-sanctioning participants ($M = 5.04$ vs. 2.71, $p < 0.01$). These results suggest that participants sanction dishonest reporting because they perceive dishonest reporting

[37] To compare perceptions of unfairness, I use a non-parametric test (Wilcoxon's test) because the data is not normally distributed.

as unfair. This finding is in line with the behavioral economics literature suggesting that negative emotions such as negative fairness judgments towards norm-violators are drivers of sanctions (Fehr & Fischbacher, 2004). In addition, untabulated results show that there is no significant difference between sanctioning and non-sanctioning participants regarding personal normative beliefs ($M = 4.79$ vs. 4.96, $p = 0.52$). Accordingly, personal normative beliefs do not appear to be the drivers of sanctions. This is interesting because social norm theory assumes that individuals with strong personal normative beliefs have several reasons why a social norm should be followed and enforced (Bicchieri, 2006).

4.3.5 Discussion

The results of Experiment 1 are now discussed in view of the research questions of this thesis and how they contribute to the participative budgeting literature on peers' influence and social norms. Further, I discuss limitations and avenues for further research.

Results in the View of Research Question 1 (RQ1)

RQ1 asks how honesty in an open internal reporting environment changes when the possibility of peer sanctioning as the second effect of peers' influence is added. As a first step to answer this question, I reproduce the negative effect of an open internal reporting environment on honesty, only considering peer observability. The results show that honesty is higher in a closed compared to an open internal reporting environment, independently from the possibility of peer sanctioning. In Period 1, honesty is similar in all three conditions but decreases over time in both conditions with open internal reporting environments. This happens although there are initially more observations of peers' honest reporting than dishonest reporting (i.e., average honesty is approximately 0.65 in Condition 2 and in approximately 0.71 Condition 3). Thus, these results suggest that participants tend to react stronger to observations of peers' dishonest reporting than to honest reporting. Both findings are in line with results from previous experimental studies that peer observability has a negative effect on honesty due to the asymmetric effect of observable peer behavior (Brunner & Ostermaier, 2019; Guo et al., 2020; Lill et al., 2023; Paz et al., 2014; Schwering, 2017).

As a second step, I examine how honesty in an open internal reporting environment changes when the possibility of peer sanctioning is added. The results show that in an open internal reporting environment, honesty is higher when the possibility of peer sanctioning is present

than when it is absent. The reason is that some participants are willing to sanction participants who report less honestly. Then, these sanctioned participants report more honestly in the subsequent period. There is an additional aspect of how the possibility of peer sanctioning mitigates the decline in honesty in participative budgeting. The results show that sanctioned participants are not significantly affected by the reporting behavior of their group (see Table 15). In contrast, participants in open internal reporting environments without the possibility of peer sanctioning are significantly affected by the reporting behavior of their group (i.e., the lower group's previous honesty, the lower participant's honesty in the current period). In prior studies (e.g., Brunner & Ostermaier, 2019; Guo et al., 2020; Lill et al., 2023), the asymmetric effect of observable peer behavior on honesty is depicted as the main reason why honesty decreases over time in open organizations. Observable peer behavior seems to be less important for participants who have been sanctioned. To answer RQ1, results suggest that the possibility of peer sanctioning increases honesty in open internal reporting environments. As a reaction to being sanctioned, managers report more honestly in future periods and are less affected by observable peer behavior.

Overall, this study contributes to the participative budgeting literature on peers' influence (Brunner & Ostermaier, 2019; Evans III et al., 2016; Guo et al., 2020; Paz et al., 2014; Schwering, 2017). Prior studies focus on the effect of observable peer behavior on managers' reporting. In contrast, this study provides evidence for peer sanctioning as another important mechanism of how peers affect managers' reporting behavior in open organizations through social norms. Thus, future studies should consider the effect of the possibility of peer sanctioning when theorizing how peers affect honesty in open organizations. Since the possibility of peer sanctioning depends on various organizational factors, this also has implications for practice. For example, when opening the internal reporting environment, the findings of Experiment 1 suggest that firms should increase the possibility of peer sanctioning to increase honesty in participative budgeting. While a more open organization might already increase the possibility of peer sanctioning because managers more often observe and are observed by their peers, firms have further ways to increase the possibility of peer sanctioning. As already mentioned, firms can increase the frequency with which managers interact and communicate through higher task interdependence (Lam & Chin, 2004).

Results in the View of Research Question 2 (RQ2)

RQ2 asks which managers sanction norm violators in participative budgeting. It is important to answer this question because sanctioning is typically costly for the sanctioning party as it requires time and effort (Balafoutas et al., 2016; Fehr & Fischbacher, 2004). Further, managers in participative budgeting have little incentive to sanction others' dishonesty because budget slack primarily harms the organization and imposes little material costs on other managers' wealth. In the face of costs for peer sanctioning but little material incentives, it is important to understand which managers, if any, bear the costs to sanction norm violators.

First, results show that participants assign sanction points to other participants in a participative budgeting setting. Importantly, participants receive significantly more sanction points as they report less honestly than the potentially sanctioning participant (see Table 13 and Table 14). Thus, there are participants who are willing to sanction norm-violators in a participative budgeting setting, although they have no monetary incentive to do so.

Second, I find that participants who sanction norm-violators perceive the violation of a social norm of honesty (i.e., dishonest reporting) significantly more unfair than participants who do not sanction dishonest participants. In line with the behavioral economics literature (Ernst Fehr & Fischbacher, 2004), the results suggest that participants' negative emotions from perceived unfairness are drivers of sanctions. Social norm theory assumes that individuals with strong personal normative beliefs have several reasons why a social norm should be followed and enforced (Bicchieri, 2006). However, there is no significant difference between non-sanctioning and sanctioning participants regarding personal normative beliefs. Thus, personal normative beliefs do not appear to be the drivers of sanctions. Individuals' personal normative beliefs can be used as a proxy for individuals' norm sensitivity. The reason is that norm sensitivity embodies the individual's personal reasons to conform to the social norm (Bicchieri, 2017). Therefore, different from norm sensitivity, managers' willingness to sanction is another important personal trait for the emergence of a social norm. As an answer to RQ2, the results of the experiment suggest that managers who strongly perceive dishonest reporting as unfair will enforce the social norm of honesty in participative budgeting.

This study also contributes to the participative budgeting literature on social norms. In Chapter 3, there are some studies presented that show that depending on different personal traits (e.g., negative affect intensity or interpersonal susceptibility), managers are differently affected by

social norms (e.g., Blay et al., 2019; Cardinaels & Yin, 2015). Social norm theory attributes a central role to individuals' norm sensitivity because it determines whether an individual has a conditional preference to follow a social norm (see Section 2.2.1). Besides managers' norm sensitivity, this study shows that managers' willingness to sanction norm violators is another personal trait that is important for the emergence and robustness of a social norm of honesty in participative budgeting. Thus, when theorizing the effect of the possibility of peer sanctioning in participative budgeting, future studies should also consider managers' willingness to sanction norm violators.

Results in the View of Research Question 4 (RQ4)

I skip Research Question 3 (RQ3) for now since the effect of the possibility of peer sanctioning on honesty under a pooled profit-sharing plan is not considered until Experiment 2. RQ4 asks whether a social norm of honesty is the underlying mechanism of peers' influence in participative budgeting. This is important because, in the case of a social norm of honesty, firms know that changing managers' empirical and normative expectations will change behavior. The results of Experiment 1 provide support for the notion that a social norm of honesty is the underlying mechanism of peers' influence in participative budgeting.

First, the moderated mediation model shows that the positive effect of the possibility of peer sanctioning on honesty is fully mediated by participants' empirical expectations. In contrast, the effect of the possibility of peer sanctioning on honesty is not mediated by participants' normative expectations because participants in both open conditions have similarly high normative expectations. Since average normative expectations are above the midpoint of the 7-point Likert scale in both open conditions (i.e., the majority perceives honest reporting as the appropriate behavior), empirical expectations become the driver of participants' reporting behavior. These results are in line with social norm literature suggesting that normative expectations are needed to constitute a social norm, but individuals only act on these normative expectations as they expect others to do the same (Bicchieri et al., 2022; Bicchieri & Xiao, 2009).

Second, the moderated mediation model shows that the effect of empirical expectations on honesty is moderated by participants' personal normative beliefs about honesty. That is, the higher personal normative beliefs, the greater the effect of empirical expectations on honesty. While this finding that the effect of empirical expectation on honesty is moderated by personal

normative beliefs is generally in line with social norm theory, the direction of the moderation is, to some extent, counterintuitive. The reason is that according to social norm theory, the more sensitive one is to a social norm, the less affected one is by empirical and normative expectations regarding this social norm. A highly norm-sensitive individual (i.e., high personal normative beliefs) has several important reasons in mind why a social norm should be followed and worries less about what others do and believe (Bicchieri, 2017). However, to consider empirical expectations in the decision process, individuals need to be, to some extent, norm-sensitive, such as dishonest reporting is no longer their dominant strategy, and they play a coordination game.[38] The results of the moderated mediation results show that the effect of empirical expectations on honesty is not significant for participants with low personal normative beliefs (p = 0.63). In line with social norm theory (Bicchieri, 2006), for these participants, dishonest reporting is the dominant strategy, and therefore, empirical expectations do not matter because these participants are not motivated to coordinate with others. Accordingly, the results are only surprising in that participants with high personal normative beliefs are more affected by their empirical and normative expectations than participants with moderate personal normative beliefs. The finding that participants with low personal normative beliefs are not affected by their empirical and normative expectations is in line with social norm theory.

Finally, the amount of assigned sanction points and reactions of sanctioned participants provide support for the presence of a social norm of honesty. Figure 16 shows that in most cases in which participants are sanctioned, they receive one to three sanction points. Even in Period 10, where participants faced the highest true costs of 4,850 and thus the lowest potential of budget slack in absolute terms, one to three sanction points would not be enough to make honest reporting the wealth-maximizing decision.[39] Nevertheless, sanctioned participants reported more honestly in the subsequent period, suggesting that sanctioned participants consider not only the monetary consequences of being sanctioned but also the explicit signal that others view dishonest reporting as a norm violation. As being sanctioned increases expectations regarding a social norm of honesty, more participants comply with the social norm.

[38] See Chapter 2.2.1 for an example how a norm-sensitive individual no longer has a dominant strategy when a social norm is present.

[39] When true costs are 4,850 Lira, an agent can earn 500 + (5,500 – 4,850) = 1,150 Lira when reporting dishonestly. Receiving three sanction points in this situation would leave the agent with 1,150 * 0.7 = 805 Lira, which is still higher than the fixed salary of 500 Lira.

Overall, these findings extend the participative budgeting literature on social norms (e.g., Abdel-Rahim & Stevens, 2018; Cardinaels & Jia, 2016; Douthit & Majerczyk, 2019; Douthit & Stevens, 2015; Guo et al., 2020; Hobson et al., 2011; Lill et al., 2023). These studies show that social norms, activated under different control environments, increase managerial honesty in participative budgeting. However, in open organizations, initial norm compliance may erode over time. The reason is that managers update their empirical and normative expectations in a self-serving manner when observing peers (i.e., the asymmetric effect of observable peer behavior) (Bicchieri et al., 2022; Dimant, 2019). Some studies show possibilities for how to mitigate the erosion of social norm of honesty over time. For example, Lill et al. (2023) show that the negative effect of observable peer behavior on honesty can be mitigated when managers strongly identify with the organization in which they work. Further, Lan Guo et al. (2020) find that peer observability does not have a negative effect on honesty when pay dispersion between the superior and managers is low. The findings of Experiment 1 add to this stream by providing empirical evidence that in open organizations, the suggested erosion of norm compliance over time can be mitigated when managers are present who are willing and able to sanction norm-violators. This has also implication for practice. Specifically, identifying these managers and allocating them across groups within the organization has the potential to benefit from the associated positive outcomes of organizational openness while maintaining honesty in participative budgeting.

Limitations and Further Research

The results are subject to limitations. First, some limitations that are typically when conducting experiments concern the external validity of the findings. For example, I recruit participants for Experiment 1 via the online platform Prolific. Using their prescreening function, all participants indicate that they have experience being in a management position and at least one year of work experience. Further, 45.23% of all participants indicate that they have experience in a budgeting process with an average of 3.72 years. However, all data is self-reported by the participants. Thus, the quality of the data depends on the honesty of the participants, who have an incentive to overclaim to be admitted to more studies. Farrell, Grenier, and Leiby (2017) investigate the behavior of online participants and find that online participants are suitable for investigating the decisions of non-experts in accounting research. Connecting to these findings, I argue that online participants are suitable for my study. The reason is that the budgeting setting and reporting tasks in Experiment 1 are not very complex and do not require expert accounting

knowledge. Thus, I assume that the findings are generalizable to participative budgeting in practice.

Second, the operationalizations used in Experiment 1 are subject to limitations. For example, I operationalize the possibility of peer sanctioning as an option to reduce others' earnings, although informal sanctions between managers do not have monetary consequences in the real world. In addition, I also operationalize the physical and psychological costs of sanctioning (e.g., effort, fear of retaliation) as monetary costs. I argue that, like monetary costs in our experiment, informal sanctions in the real world impose psychological costs on the norm violator through shame or guilt that decrease the norm violator's utility (Bicchieri, 2006; Blau, 1964; Masclet et al., 2003). Since it is difficult to create these feelings in an anonymous online experiment, I follow experiments in behavioral economics (Fehr & Gächter, 2000; Masclet et al., 2003; Noussair & Tucker, 2005) and consider monetary costs as a reasonable approximation. Additionally, when assigning sanction points, participants must also communicate to the sanctioned participant a normative message by completing the following sentence: "I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been X (indicating the appropriate cost report) Lira." While participants can decide for themselves what they communicate as an appropriate cost report, the sentence is basically worded toward honesty. This could have inhibited participants who personally think one should report dishonestly from using the possibility to sanction honest participants. Outside of the experiment, managers are not restricted in informal conversations. Thus, the possibility of peer sanctioning may affect honesty differently in the real world. Future studies should address these limitations. It would be interesting to investigate whether the possibility of peer sanctioning has a positive effect on honesty when managers have more freedom in formulating their normative text messages. A related issue is that peer sanctioning in my study occurs in an anonymous setting. In practice, it is likely that managers know each other. This might affect their willingness to sanction others but also the effect of being sanctioned. Schwering (2017) used a setting in which peers' honesty is disclosed with peers' identities. Since there is no possibility of peer sanctioning in her study, it would be interesting to investigate whether revealing peers' identities changes the effect of the possibility of peer sanctioning on honesty.

Third, I investigate whether peers affect honesty in participative budgeting through a social norm of honesty. Therefore, I measure participants' empirical and normative expectations

regarding a social norm of honesty. Results show that participants' empirical expectations regarding honesty significantly affect participants' honesty. However, I do not measure whether other social norms are activated by the possibility of peer sanctioning. For example, some experimental studies show that besides honesty, there might also be a social norm of fairness present in participative budgeting (e.g., Douthit & Stevens, 2015; Guo et al., 2020). Since sanctioning participants perceive dishonest reporting as significantly more unfair than non-sanctioning participants, it is possible that a social norm of fairness might be even more important than honesty in this setting. Thus, future studies are encouraged to investigate whether the possibility of peer sanctioning activates and enforces a social norm different from honesty.

Finally, this study shows that honesty in an open internal reporting environment still decreases over time, even when the possibility of peer sanctioning is possible. This might suggest that honesty always decreases over time in open internal reporting environments. Current literature investigates how open internal reporting environments affect honesty under different organizational contexts, such as vertical pay dispersion (Guo et al., 2020) or organizational identity (Lill et al., 2023). Understanding how the effect of an open internal reporting environment on honesty is moderated by contextual factors is important for theory development. Since current literature has not yet considered peer sanctioning as another important mechanism in open internal reporting environments, future studies might investigate how peers' willingness to sanction norm violations is affected by organizational factors (e.g., corporate culture, pay dispersion, or compensation systems). In a different organizational context, the possibility of peer sanctioning might be able to completely prevent the decline of honesty in an open internal reporting environment. One organizational factor that potentially increases peers' willingness to sanction dishonest managers will be examined in Experiment 2.

4.4 EXPERIMENT 2: OPENNESS AND POOLED PROFIT-SHARING

4.4.1 INTRODUCTION

In Experiment 1, the effect of the openness of the internal reporting environment on honesty is investigated, varying the possibility of peer sanctioning. First, the results show that transparency among managers has a negative effect on honesty, which is in line with prior studies (Brunner & Ostermaier, 2019; Emett et al., 2019; Paz et al., 2014; Schwering, 2017). Second, the negative effect of an open internal reporting environment on honesty is mitigated

when managers can sanction each other. When peer sanctioning is possible, managers not only have to think about whether they should imitate peers' reporting but also how other peers react to their reporting behavior. Thus, peer sanctioning is another important aspect of peers' influence in participative budgeting when the internal reporting environment is open.

However, the results of Experiment 1 show that honesty in an open internal reporting environment still decreases over time despite the possibility of peer sanctioning. An explanation might be that participants received sanction points only in 17.93% of all cases (170 out of 948) and mostly received one to three sanction points. Thus, participants still report dishonestly despite the possibility of peer sanctioning because they perceive a low risk of being sanctioned by their peers.

Therefore, the focus of Experiment 2 is to examine whether the effect of the possibility of peer sanctioning on honesty can be amplified through organizational factors. The possibility of peer sanctioning affects managers' reporting behavior in two ways. First, managers may be affected by the nonexecuted sanctioning threat (Fehr & Gächter, 2002). When peer sanctioning is possible, managers not only have to trade off the utility of additional wealth from misreporting against the disutility from norm violation but also against the expected disutility from being sanctioned (i.e., psychological costs like guilt or shame). Thus, organizational factors that increase managers' expectations that dishonest reporting will be sanctioned (i.e., increase their perceived risk of being sanctioned) will increase honesty. Second, sanctions can have a norm-expressing function when it is clear that the sanction is the reaction of a norm-violation rather than the self-interest of the sanctioning party (Dimant et al., 2021; Enst Fehr & Williams, 2017). In this case, managers who are actually sanctioned for reporting dishonestly get a signal that peers view dishonest reporting as a norm-violation, increasing managers' empirical and normative expectations and their motivation to comply with the social norm of honesty (Andrighetto et al., 2013; Chen et al., 2020; Dimant et al., 2021). Thus, organizational factors that increase the number of sanctions for managers' reporting dishonestly and make clear that the sanction is the reaction of a norm violation will increase honesty when peer sanctioning is possible.

Connecting to Experiment 1, the openness of the internal reporting environment is considered as an organizational factor, arguably increasing managers' perceived risk of being sanctioned by making their behavior observable to others. As the focus of Experiment 2, I argue that

another organizational factor is the presence of a pooled profit-sharing plan. Many firms implement pooled profit-sharing plans in which managers get a percentage of the pooled profits from multiple divisions (Boster et al., 2018). This introduces interdependency among managers because, in this situation, managers' reporting behavior affects not only their division's profit but also the pooled profit of all divisions and, thereby, other managers' profit share. Therefore, this study examines specifically whether the presence of a pooled profit-sharing plan increases managers' perceived risk of being sanctioned and the frequency of being sanctioned when reporting dishonestly. Therefore, a pooled profit-sharing plan would decrease the negative effect of an open internal reporting environment on honesty.

4.4.2 Hypotheses Development

Background

Experiment 2[40] investigates the problem of increased agency costs in the form of more budget slack in participative budgeting due to organizational openness. Again, the role of peer sanctioning in activating a social norm of honesty and thereby increasing managerial honesty and decreasing budget slack is examined.[41] Experiment 1 shows that the possibility of peer sanctioning can decrease the negative effect of an open internal reporting environment on honesty. Experiment 2 examines how the positive effect of the possibility of peer sanctioning on honesty can be amplified through organizational factors. Specifically, I examine whether the presence of a pooled profit-sharing plan increases managers' perceived risk of being sanctioned and the number of sanctions for managers reporting dishonestly, thereby decreasing the negative effect of an open internal reporting environment on honesty.

Profit-Sharing Plans

Kruse (1992) defines any system that links the profits of the firm to the compensation of the employee as profit sharing. According to Blasi, Freeman, and Kruse (2013), in the US, full-time workers in about 47% of the private sector have some share in the company. Further, 40% of these full-time workers receive profit-sharing. Many firms use pooled profit-sharing plans in which managers receive a percentage of the pooled profits of multiple divisions as compensation (Boster et al., 2018). In practice, these plans are widely used to motivate

[40] Parts of section 4.4.2, 4.4.3 and 4.4.4 will be published in Plähn, Bellora-Bienengräber, Mertens, and Meyer (forthcoming).
[41] For a more detailed description of the background see Chapter 4.3.2.

managers to act congruently with the organization's goals (Bonner & Sprinkle, 2002; Luft & Shields, 2003).

Adopting a compensation contract like a pooled profit-sharing plan introduces interdependency among managers in the sense that a division manager's payoff is contingent upon other division managers' decisions. For example, if a division manager overstates the division's true costs in the budgeting process and spends an inflated budget, the division's profits will decrease more than necessary. Thereby, the division manager decreases the pooled profits of all divisions, resulting in a lower profit share in absolute terms for all division managers.

Boster et al. (2018) investigate how profit-sharing plans affect honesty without any form of peer observability or peer sanctioning. They find that an individual profit-sharing plan in which participants only get a profit share from their own division (i.e., there is no interdependency among participants) decreases honesty compared to a situation with no profit-sharing plan. The reason is that participants may perceive the presence of a profit-sharing plan, which incentivizes honesty, as a signal of distrust and may feel justified to engage in behavior they would otherwise consider inappropriate (Frey & Jegen, 2001). In contrast, when a pooled profit-sharing plan is used, there is no significant difference in honesty compared to the situation with no profit-sharing plan. The authors argue and find support in the post-experimental questionnaire that participants felt more pressure from others to report honestly when a pooled profit-sharing plan is present compared to the situation with an individual profit-sharing plan or no profit-sharing plan.

The construction of a pooled profit-sharing plan is similar to a public good game, and experimental studies in the behavioral economics literature provide evidence that the possibility of peer sanctioning can increase cooperation in public good games (Fehr & Gächter, 2000; Masclet et al., 2003; Noussair & Tucker, 2005). Thus, the possibility of peer sanctioning may also increase honesty in participative budgeting when a pooled profit-sharing plan is present. However, the return from reporting honestly in a participative budgeting setting with a pooled profit-sharing plan is smaller than the return from cooperation in public good games. In public good games, the return from cooperation or the multiplier is larger than one,[42] which would be

[42] In a public good game, the multiplier is larger than one but less than the number of players (i.e., for the individual player it is below one), thus cooperation maximizes collective payoff but is not high enough to motivate a contribution from a player who is self-interested in purely material terms.

unplausible for a profit-sharing plan as the company would pay out more than it earns in profits. Thus, unlike in public good games, where cooperation maximizes collective payoffs, participants in this setting still maximize their collective payoffs by maximizing budget slack. Therefore, findings from public good games are not necessarily representative of managers' reporting decisions in the presence of a pooled profit-sharing plan, and the possibility of peer sanctioning might have a different effect on managers‘ reporting. Next, I develop a theory on how the presence of a pooled profit-sharing plan affects honesty when peer sanctioning is possible.

Hypothesis Development

First, the effect of an open internal reporting environment on honesty is predicted when a pooled profit-sharing plan is absent. As in Experiment 1, the argumentation is based on social norm theory. According to social norm theory, individuals' behavior is influenced by their empirical expectations, normative expectations, and their normative expectations with sanctions (Bicchieri, 2006). In an open internal reporting environment, managers get information about their peers' reporting behavior and may use this observation to update their expectations about others' behavior and beliefs. As described before, several experimental studies in the participative budgeting literature have highlighted an asymmetric effect of observable peer behavior, favoring dishonest reporting behavior (Altenburger, 2017; Brunner & Ostermaier, 2019; Emett et al., 2019; Guo et al., 2019; Schwering, 2017). In the absence of a pooled profit-sharing plan, Experiment 2 has the same setting as Experiment 1. Thus, some sanctions will be imposed on dishonest managers, but this will not be sufficient to prevent the decline of honesty over time. In contrast, when the internal reporting environment is closed, managers do not receive information about others' behavior. Thus, there is no possibility of rationalizing their own dishonesty through others' misreporting.

However, when a pooled profit-sharing plan is present, the negative effect of an open versus closed internal reporting environment on managers' reporting behavior will be mitigated. This is due to the increased number of sanctions imposed by peers on managers who are reporting dishonestly when a pooled profit-sharing plan is present. The reason is that sanctions are driven by negative emotions like the feeling of being exploited by others or unfairness (Fehr & Fischbacher, 2004; Fehr & Gächter, 2000). When a pooled profit-sharing plan is present, division managers receive a smaller profit share in absolute terms when others report dishonestly. Directly harming others' wealth may amplify negative emotions by the victim of

the norm violation, triggering more sanctions. Being sanctioned after reporting dishonestly, managers may interpret this as a signal that peers view dishonest reporting as a norm violation, increasing managers' empirical and normative expectations (Andrighetto et al., 2013; Chen et al., 2020; Dimant et al., 2021). As managers' empirical and normative expectations regarding a social norm of honesty increase, managers will report more honestly because they experience higher disutility from violating the social norm (Bicchieri, 2006). To summarize, the presence of a pooled profit-sharing plan will mitigate the negative effect of an open internal reporting environment on honesty by increasing the number of sanctions for dishonest managers and making clear that the sanction is the reaction of a norm violation. In a closed internal reporting environment, managers do not observe others' reporting behavior and thus do not know whom to sanction. Since sanctioning is costly, and peers have no reason to sanction other managers without information about their reporting, I expect that peer sanctioning and, therefore, the presence of a pooled profit-sharing plan will have less to no effect in a closed internal reporting environment. Therefore, I state the following hypothesis:

Hypothesis: Honesty will be lower in open internal reporting environments than in closed internal reporting environments when a pooled profit-sharing plan is absent, but the difference in honesty between an open and closed internal reporting environment will diminish when a pooled profit-sharing plan is present.

4.4.3 METHOD

Experimental Setting

The experimental setting, experimental manipulations, and experimental procedure in Experiment 2 are like Experiment 1. Therefore, to ensure readability but also to avoid unnecessary repetition, the essential features of the experimental design are outlined with a focus on the difference between Experiment 1 and Experiment 2. In Experiment 2, each participant acts as a division manager in an organization consisting of three divisions. In each period, each division yields revenues of 6,000 Lira, and each division manager receives a fixed salary of 500 Lira. The division managers receive information about their division's true costs and must report their true costs to corporate headquarters to get funding. Corporate headquarters only knows that divisions' costs can range between 4,000 and 5,500 Lira and accepts any budget request within this range. Thus, when the division manager chooses to report the highest possible costs of 5,500 Lira, the division's profit for that period will be 0 Lira. The dependent

variable is the participant's level of honesty, labeled HONESTY, which can range from 0 (i.e., 100% dishonest) if the participant's cost report equals the maximum cost report of 5,500 Lira to 1 (i.e., 100% honest) if the participant's cost report equals the true costs in that period.

Experimental Manipulations

To test the hypothesis, I employ a mixed design where the openness of the internal reporting environment (closed/open) and the presence of a pooled profit-sharing plan (absent/present) are used as between-subject factors. Further, period (1 – 10) is used as a within-subject factor such that each participant completes 10 budget periods. The experiment is programmed using the software from SophieLabs and conducted via the online platform Prolific.

As in Experiment 1, the openness of the internal reporting environment is manipulated by varying the information participants receive about others' true costs and their submitted budget reports to corporate headquarters.[43] In conditions with a closed internal reporting environment, participants do not get any information about others' true costs and submitted budget reports. In the condition with an open internal reporting environment, participants observe others' true costs and submitted budget reports; thus, participants can infer others' level of honesty. When a pooled profit-sharing plan is absent, participants only receive a fixed salary of 500 Lira. In contrast, when a pooled profit-sharing plan is present, participants receive their fixed salary of 500 Lira, the difference between reported and true costs and 5% of the joint profits of all three divisions in their organization (i.e., 5% share of the organization's profits) as presented in Equation 9:

$$\begin{aligned} Payoff_i = 500 &+ (Reported\ cost_i - True\ cost) \\ &+ 5\%(6{,}000 - Reported\ cost_i - 500) \\ &+ 5\%(6{,}000 - Reported\ cost_j - 500) \\ &+ 5\%(6{,}000 - Reported\ cost_k - 500) \end{aligned} \tag{10}$$

Where *i* represents the given division manager, and the other two division managers are represented as *j* and *k*. In line with Boster et al. (2018), the pooled profit-sharing plan is designed in such a way that dishonest reporting always maximizes the participants' payoffs. Further, peer sanctioning is possible in all conditions. Peer sanctioning is operationalized as monetary costs

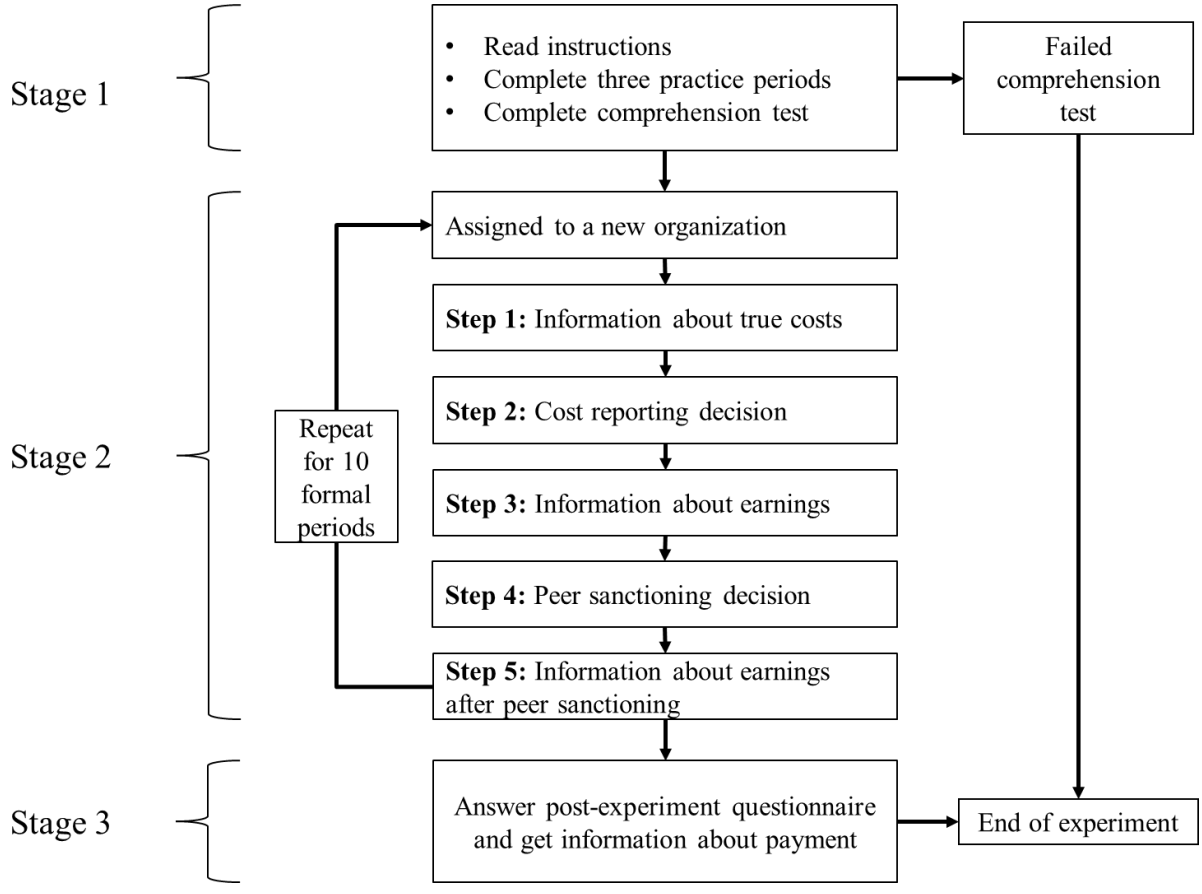
[43] For a detailed description of the experimental instructions, see Appendix B.

following experiments in behavioral economics (Fehr & Gächter, 2000; Masclet et al., 2003; Noussair & Tucker, 2005). After observing others' true costs and submitting budget reports, participants can assign an integer amount of 0 to 10 sanction points to each of the other two participants in their organization in each period. Each sanctioning point assigned decreases the payoff of the sanctioned participant by 10% with a maximum of 100% but is also monetary costly for the sanctioning participant, like in Experiment 1.

Procedures

The procedure of Experiment 2 is described in Figure 18. Before participants can proceed to the experiment, they must read and agree to the consent form.[44] The experiment consists of three stages. In Stage 1, participants are randomly assigned to one of the four conditions and read the instructions for the cost-reporting task in Stage 2. Then, participants engage in three practice periods to understand how their decisions affect their payoff. The decisions in these periods are not compensated.

Figure 18: Procedure in Experiment 2



[44] This study is approved by the Institutional Review Board of the University of Groningen.

In the three practice decision periods, the other two participants are represented by bots with predefined behavior to show participants a variety of different situations that can occur in the formal periods of the cost reporting task. At the end of Stage 1, participants must pass a comprehension test to proceed to Stage 2. After submitting their answers to the single-choice questions for the first time, participants get the information on which questions they answered incorrectly and have one chance to correct the wrong answers. Participants are excluded from the experiment if any question is answered incorrectly twice. At the beginning of each of the 10 periods in Stage 2, participants are randomly assigned to groups of three representing an organization. Within each organization, each participant acts as one of three division managers. All participants must complete the same five steps in each of the 10 periods. First, they receive information about the true costs of their division (closed internal reporting environment) and additionally information about the true costs of the other two divisions (open internal reporting environment).[45] Second, they report costs to corporate headquarters to request funding. Third, they receive information about their payoff for that period (closed internal reporting environment) and information about the reported costs and payoffs of the other two participants (open internal reporting environment). When the pooled profit-sharing plan is present, participants receive information about the 5% profit share from the organization's profit for each participant. When the internal reporting environment is open, participants also receive information on how each division contributed to the organization's profit, as shown in Figure 19.

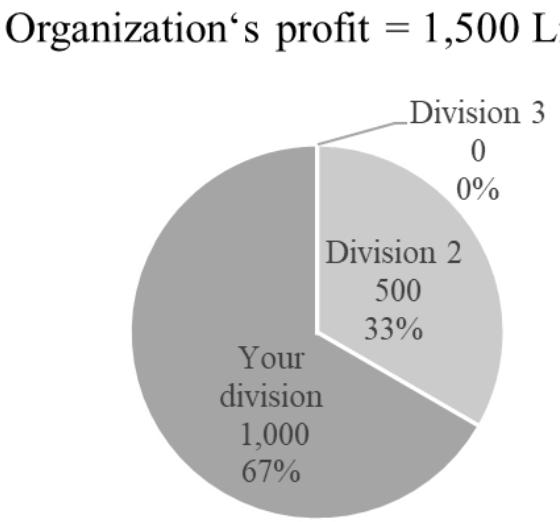
Fourth, participants can sanction the other two participants by assigning sanction points to them. While participants in the open internal reporting environment observe others' behavior before they decide to assign sanction points, participants in the closed internal reporting environment do not have any information about others' behavior. Fifth, participants get information about the number of sanction points they received and the resulting payoff after peer sanctioning.

After all 10 periods are completed, participants proceed to the post-experimental questionnaire (Stage 3) that includes manipulation checks, participants' perception regarding the social norm of honesty, participants' drivers of sanctioning behavior, personal traits, and demographic questions. Participants then receive the message that they have completed the experiment and

[45] Prior to the experiment, I randomly generated a cost sequence for 10 periods which we used in each experimental condition for each group to make behavior across groups and conditions more comparable.

are guided back to the interface of the online platform Prolific, where they are anonymously paid.

Figure 19: Division's Contribution to the Organization's Profit



Participants and Payoff

A total of 129 participants are recruited via the online recruiting platform Prolific and completed the entire experiment.[46] Participants are located in the USA or UK and have at least some experience being in a management position and having decision-making responsibilities regarding accounts and finance.[47] The age of participants ranges from 22 to 84, with an average of 41.74 years. In addition, 76 participants (58.91%) have gained experience in the typical budgeting process with an average of 10.05 years. Regarding participants' gender, one participant answered "diverse" (0.78%), 75 participants answered "male" (58.14%), and 53 participants answered "female" (41.08%). There are no significant differences between conditions for age, the proportion of participants with budgeting experience, or proportions of different genders (untabulated, all $p > 0.08$, two-tailed).

Participants' payoffs consist of Lira (our experimental currency), which participants earned during the cost reporting task (i.e., in Stage 2). In the cost reporting task, participants' earnings

[46] Of the 233 participants who started the experiment on Prolific, 65 participants are excluded due to inactivity (27.90%) and 39 participants (16.38%) due to errors in the comprehension test.
[47] I use Prolific's prescreening function for the experiment. Participants were asked: „Do you have any experience being in a management position?" All participants answered this question with „Yes". Further, participants were asked: "What decision-making responsibilities do you have at work?" All our participants answered chose the answer option: "Accounts/finance".

include a fixed salary of 500 Lira for their role as division manager and the budget slack retained (i.e., the difference between reported and true costs). When the pooled profit-sharing plan is present, participants also receive a 5% share of the organization's profits. Participants' earnings from their reporting decision are reduced by 10% for each sanction point they received from the other two division managers, with a maximum of 100%. Finally, participants' earnings are reduced through the costs of assigning sanction points to the other two participants in their organization. Figure 20 shows the resulting calculation scheme.

Figure 20: Calculation of Earnings (Experiment 2)

Fixed salary	
+ Cost surplus (i.e., reported costs – true costs)	
= Earnings from reporting decision	Pooled Profit-Sharing Plan ABSENT
+ 5% share of the organization's profit	
= Earnings from reporting decision	Pooled Profit-Sharing Plan PRESENT
- Earnings reduction through sanction points	
- Costs for assigning sanction points	
= Earnings after peer sanctioning	

After participants completed all 10 periods in Stage 2 and the post-experimental questionnaire in Stage 3, one period is randomly selected to determine participants' earnings in Lira, which are converted to GBP at the rate of 200 Lira = 1.00 GBP. In addition, participants receive 4.00 GBP for completing the entire experiment. Participants' payment for Stage 2 ranges from 0.00 GBP to 9.50 GBP, with an average of 4.75 GBP. Participants' total payment for the experiment ranges from 4.00 GBP to 13.50 GBP, with an average of 8.75 GBP. Participants needed approximately 36 min to complete the experiment.

4.4.4 Results

Manipulation Checks

To evaluate whether the manipulation of the openness of the internal reporting environment was successful, participants in the post-experimental questionnaire are asked to indicate their agreement on a 7-point Likert scale with the statement, "In each period, I received information about the reported costs of the other two division managers in my organization" (1 = *strongly*

disagree to 7 = *strongly agree*). On average, participants in the closed internal reporting environments agreed significantly less than participants in the open internal reporting environment (M = 1.58 vs. 6.62, $p < 0.01$).[48] Therefore, I evaluate the manipulation of the openness of the internal reporting as successful. To test whether participants understand the consequences of the pooled profit-sharing plan, participants are asked to indicate their agreement with the statement, "My cost reporting decisions affected the earnings of the other two division managers in my organization." On average, participants in the two conditions without a pooled profit-sharing plan agreed significantly less than participants in the two conditions with a pooled profit-sharing (M = 1.79 vs. 5.76, $p < 0.01$). Therefore, I also consider the manipulation of the presence of a pooled profit-sharing plan as successful. Finally, I examine participants' comprehension of the possibility of decreasing others' earnings by assigning sanction points. Therefore, I asked participants to indicate their agreement with the statement, "By assigning sanction points, I could have affected the earnings of the other two division managers in my organization." Average responses per condition indicate strong agreement ranging from 6.73 to 6.97. There is a significant difference between Condition 1 (Closed internal reporting environment/Profit-sharing plan absent) and Condition 2 (Open internal reporting environment/Profit-sharing plan absent) (M = 6.97 vs. 6.73, p = 0.03). This difference is due to some participants in Condition 2 who generally agree but not to the maximum extent (i.e., they entered a value of 6, not 7). Since all other differences between conditions are not significant (all $p > 0.67$), I consider this manipulation as successful. Overall, I conclude that all manipulations are successful, and participants understand the possibility and consequence of sanctioning.

Descriptive Statistics

Table 17 shows descriptive statistics for honesty per condition. In the conditions where the pooled profit-sharing plan is absent, HONESTY is higher when the internal reporting environment is open than when the internal reporting environment is closed (M = 0.30 vs. 0.13). Similarly, in the condition where the pooled profit-sharing plan is present, HONESTY is higher when the internal reporting environment is open than when the internal reporting environment is closed (M = 0.43 vs. 0.27). In addition, HONESTY in the two conditions where a pooled profit-sharing plan is present is higher than in the two conditions where a pooled profit-sharing plan is absent (untabulated, M = 0.34 vs. 0.21). These results indicate that changing from a

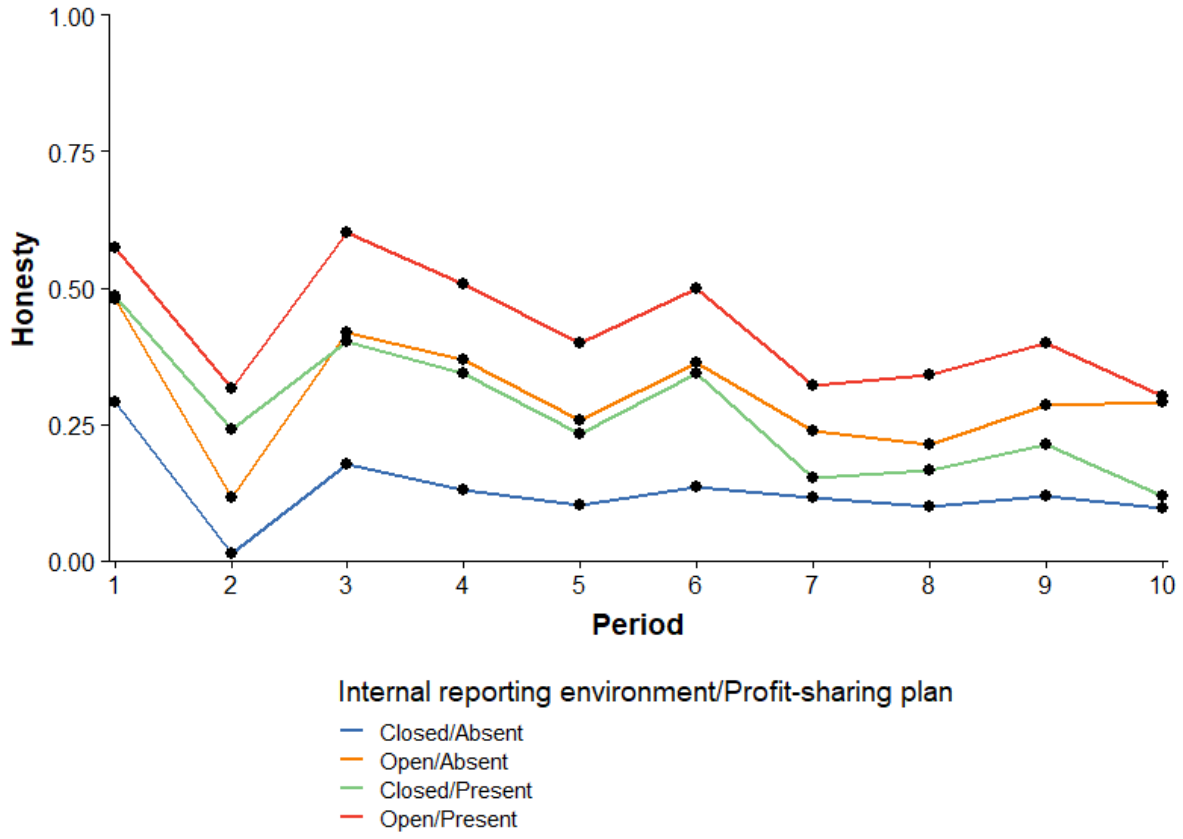
[48] To compare conditions pairwise in the manipulation check, I use a non-parametric test (Wilcoxon's test) because the data is not normally distributed.

closed to an open internal reporting environment and implementing a pooled profit-sharing plan both increase honesty in participative budgeting. Figure 21 shows HONESTY per period and condition and reveals that the pattern from Table 17 is consistent over time. Further, Figure 21 shows that HONESTY in all conditions decreases over time.

Table 17: Descriptive Statistics of Honesty (Experiment 2)

	Pooled Profit-Sharing Plan			
	Absent		Present	
Internal Reporting Environment	Closed	Open	Closed	Open
Mean	0.13	0.30	0.27	0.43
SD	0.27	0.39	0.37	0.41
No. participants	36	30	33	30
Total	129			

Figure 21: Honesty per Condition and Period (Experiment 2)



Hypothesis Testing

The hypothesis states that more dishonest reporting will occur in the open than in the closed internal reporting environment when a pooled profit-sharing plan is absent, but the negative effect of an open internal reporting environment on honesty will diminish when a pooled profit-sharing plan is present. In line with prior experiments in budgeting (J. Douthit & Majerczyk, 2019; Rankin et al., 2008), participants' honesty is averaged over all 10 periods, called AVERAGE HONESTY, and used as a single observation to control for participants' multiple reporting decisions. To test the hypothesis, I use an ANOVA with AVERAGE HONESTY as the dependent variable, INTERNAL REPORTING ENVIRONMENT and POOLED PROFIT-SHARING, and their interaction as independent variables. As shown in Table 18, the results of the ANOVA do not show a significant interaction effect ($F = 0.03$, $p = 0.85$), but a significant main effect of REPORTING ENVIRONMENT ($F = 11.34$, $p < 0.01$) and a significant main effect of POOLED PROFIT-SHARING ($F = 7.07$, $p < 0.01$) on AVERAGE HONESTY.

Table 18: Results ANOVA (Experiment 2)

Variables	*SS*	*df*	*MS*	*F*	*p*
Internal reporting environment	0.92	1	0.92	11.34	<0.01
Pooled profit-sharing plan	0.57	1	0.57	7.07	<0.01
Internal reporting environment * Pooled profit-sharing plan	0.01	44	0.01	0.03	0.85
Residual	10.09	125	0.08		

Note. All *p* values in this table are two-tailed.

To understand the direction of the significant main effects, a mixed-model regression is utilized with random effects. The mixed-model regresses HONESTY in INTERNAL REPORTING ENVIRONMENT and POOLED PROFIT-SHARING and their interaction. Further, to control for potential time effects, PERIOD is included. Table 19 shows that INTERNAL REPORTING ENVIRONMENT and POOLED PROFIT-SHARING have a significant, positive effect on HONESTY. Thus, honesty increases by approximately 0.18 when the internal reporting environment changes from closed to open ($\beta = 0.18$, $t = 2.50$, $p < 0.05$). Similarly, honesty increases by approximately 0.14 when a pooled profit-sharing plan is present compared to when a pooled profit-sharing plan is absent ($\beta = 0.14$, $t = 2.08$, $p < 0.05$). Again, Table 19 shows that the interaction of INTERNAL REPORTING ENVIRONMENT and POOLED PROFIT-

SHARING is not significant (β = -0.02, t = -0.19, p = 0.85). Further, the within-subject factor PERIOD has a significant, negative effect on HONESTY (β = -0.02, t = -8.10, p < 0.01), which is in line with the decline of honesty over time shown in
Figure 21.

Table 19: Hypothesis Test Using Mixed-Model Regression (Experiment 2)

Effect	Estimate	*SE*	*df*	*t*	*p*
Intercept	0.23	0.05	142	4.64	<0.01
Internal reporting environment	0.18	0.07	125	2.50	<0.05
Profit-sharing plan	0.14	0.07	125	2.08	<0.05
Internal reporting environment * Pooled profit-sharing plan	-0.02	0.10	125	-0.19	0.85
Period	-0.02	0.01	1157	-8.10	<0.01
Random effect	Variance	SD			
Participant (Intercept)	0.08	0.27			
Residual	0.05	0.23			

Note. All p values in this table are two-tailed.

Overall, the ANOVA and the mixed-model regression do not provide support for the hypothesized interaction. Nevertheless, the results show two significant main effects. Therefore, further analyses are conducted to understand how the openness of the internal reporting environment and the presence of the pooled profit-sharing plan increase honesty in participative budgeting.

Evidence of Theory

The prediction that honesty is highest in Condition 4 (i.e., open internal reporting environment/ pooled profit-sharing present) is based on the argumentation that in Condition 4 there will be the highest number of sanctions against dishonest participants. Being sanctioned gives a clear signal that peers view dishonest reporting as a norm violation, thus increasing participants' empirical and normative expectations regarding the social norm of honesty. Therefore, participants' empirical expectations, normative expectations, and personal normative beliefs about honest reporting are measured in the post-experimental questionnaire.

Following Bicchieri (2006), participants are asked to think about the completed 10 periods and answer the following question to measure empirical expectations: “To what extent did you expect the other two division managers would report the true cost to corporate headquarters?” To measure personal normative beliefs, participants are asked to answer the following question: “To what extent do you believe that one should report the true cost to corporate headquarters?” To measure normative expectations, participants are asked to answer the following question: “To what extent did you believe the other two division managers expected you to report the true cost to corporate headquarters?” To measure the perceived risk of being sanctioned (i.e., normative expectations with sanctions), participants are asked to answer the following question: “To what extent did you believe the other two division managers would assign you sanction points if you overstated your true cost?” To answer the four questions, participants must state their agreement on a 7-point Likert scale (1 = *not at all* to 7 = *very much*). Table 20 shows the descriptive statistics of the responses.

Table 20: Social Norm Measurement (Experiment 2)

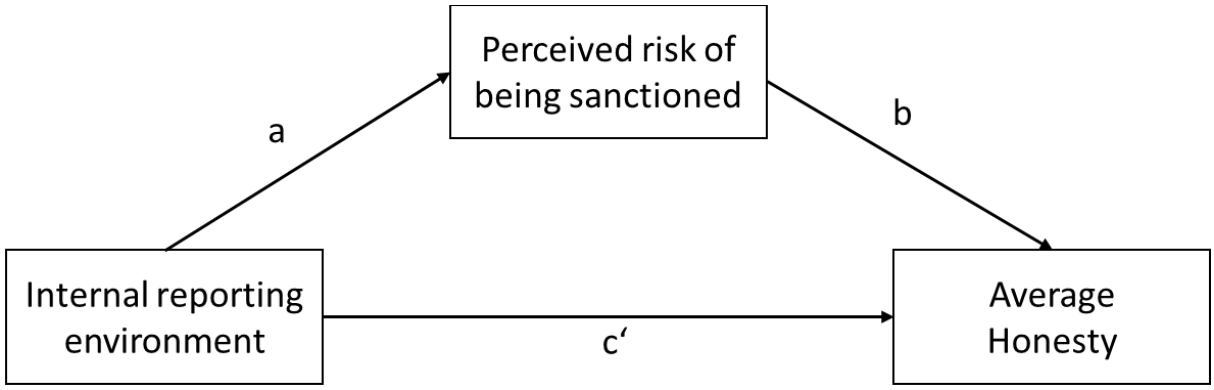
	Pooled Profit-Sharing Plan			
	Absent		Present	
Internal Reporting Environment	Closed	Open	Closed	Open
Empirical expectations	2.11 (1.45)	2.87 (1.93)	2.21 (1.52)	2.53 (1.59)
Personal normative beliefs	3.19 (1.98)	4.33 (2.06)	3.79 (2.06)	3.87 (2.19)
Normative expectations	2.47 (1.72)	3.33 (1.92)	2.97 (1.94)	2.90 (1.73)
Perceived risk of being sanctioned	3.42 (1.98)	4.53 (1.93)	3.52 (1.80)	4.30 (1.84)

Note. Means per belief and condition are shown. Standard deviations are presented in parentheses.

Most notably, empirical and normative expectations are quite low in all conditions. On average, participants’ responses in all conditions are below the midpoint of 4. This suggests that participants expect, on average, that others would report dishonestly and think that one should report dishonestly. While there are no significant differences between conditions for empirical

expectations, personal normative beliefs, or normative expectations (all $p > 0.17$),[49] there is a significant difference between conditions for the perceived risk of being sanctioned ($p = 0.05$). Follow-up pairwise comparisons do not reveal a significant difference between the two conditions regarding participants' perceived risk of being sanctioned (all $p > 0.18$). Grouping conditions regarding the openness of the internal reporting environment, I find a significant difference in participants' perceived risk of being sanctioned (closed vs. open, $p < 0.01$). Grouping conditions by the presence of a pooled profit-sharing plan reveal no significant differences regarding participants' perceived risk of being sanctioned (absent vs. present, $p = 0.96$). These results suggest that an open compared to a closed internal reporting environment affects honesty by increasing participants' perceived risk of being sanctioned. In the next step, I use the measure of the perceived risk of being sanctioned to construct a mediation model shown in Figure 22.

Figure 22: Mediation Model (Experiment 2)



INTERNAL REPORTING ENVIRONMENT is used as the independent variable, participants' PERCEIVED RISK OF BEING SANCTIONED as the mediator, and participants' AVERAGE HONESTY as the dependent variable.[50] I utilize Model 4 of Hayes' PROCESS macro in R with a 95% confidence interval and 10,000 bootstrap samples, as shown in Figure 22 (Hayes, 2022).[51] Table 21 shows a significant a-path from INTERNAL REPORTING

[49] Since the data is not normally distributed, the Kruskal-Wallis test as the non-parametric alternative to the one-way ANOVA is used. Further, if the Kruskal-Wallis test reveals significant differences, the Wilcoxon's test for pairwise comparisons is used.

[50] In the model, I also include participant's gender, age, and years of budgeting experience as control variables. Only the effect of GENDER on AVERAGE HONESTY is weakly significant ($b = -0.10$, $p < 0.10$). Therefore, I do not show control variables in the table.

[51] In Experiment 1, I used Model 14 in which the effect of empirical expectations on honesty (b-path) is moderated by participants' personal normative beliefs. I also utilize Model 14 in Experiment 2 but do not find evidence that the effect of perceived risk of being sanctioned on honesty (b-path) is moderated by participant's personal

ENVIRONMENT to PERCEIVED RISK OF BEING SANCTIONED (a = 0.92, p < 0.01). Further, there is a significant b-path from PERCEIVED RISK OF BEING SANCTIONED to AVERAGE HONESTY (b_1 = 0.04, p < 0.01). The direct effect of INTERNAL REPORTING ENVIRONMENT on AVERAGE HONESTY (c'-path) is also significant (c' = 0.13, p < 0.05). Finally, the positive indirect effect of POSSIBILITY OF PEER SANCTIONING via EMPIRICAL EXPECTATIONS on AVERAGE HONESTY has a 95% confidence interval, not including zero [0.01, 0.08], providing support for the mediation. Overall, these results provide support that participants perceived a higher risk of being sanctioned when the internal reporting environment is open, which increases honest reporting.

Table 21: Regression Results for the Mediation Model (Experiment 2)

Independent variables	Dependent variable	
	Perceived risk of being sanctioned (M)	Average Honesty (Y)
Constant	i_M = 2.95*** (0.71)	i_Y = 0.26** (0.13)
Internal reporting environment (X)	a = 0.92*** (0.33)	c' = 0.13** (0.05)
Perceived risk of being sanctioned (M)		b_1 = 0.04*** (0.01)
Model F	3.10	7.49
R^2	0.09	0.20

Note. Standard errors are presented in parentheses.

*p < 0.10. **p < 0.05. ***p < 0.01.

Participants' Sanctioning Behavior

Next, participants' sanctioning behavior and reactions are analyzed in more detail. This should support the argumentation that the possibility of peer sanctioning increases honesty because participants sanction less honest participants, which increases their honesty in the next period. The focus of this analysis is on whether the presence of a pooled profit-sharing plan affects participants' sanctioning behavior and reaction to sanctions in an open internal reporting environment. To this end, participants from both conditions with an open internal reporting

normative beliefs (i.e., the index of moderated mediation is not significant as the confidence interval contains zero with an index of 0.0092 [-0.01, 0.02]). Therefore, only the results of Model 4 are shown.

environment are compared (i.e., Condition 2 and 4). I first investigate in which situation participants sanction others and, second, whether sanctioned participants increase their honesty in the next period. Table 22 shows the absolute and relative frequency of participants' sanctioning in Conditions 2 and 4:

Table 22: Absolute and Relative Frequency of Sanctioning (Experiment 2)

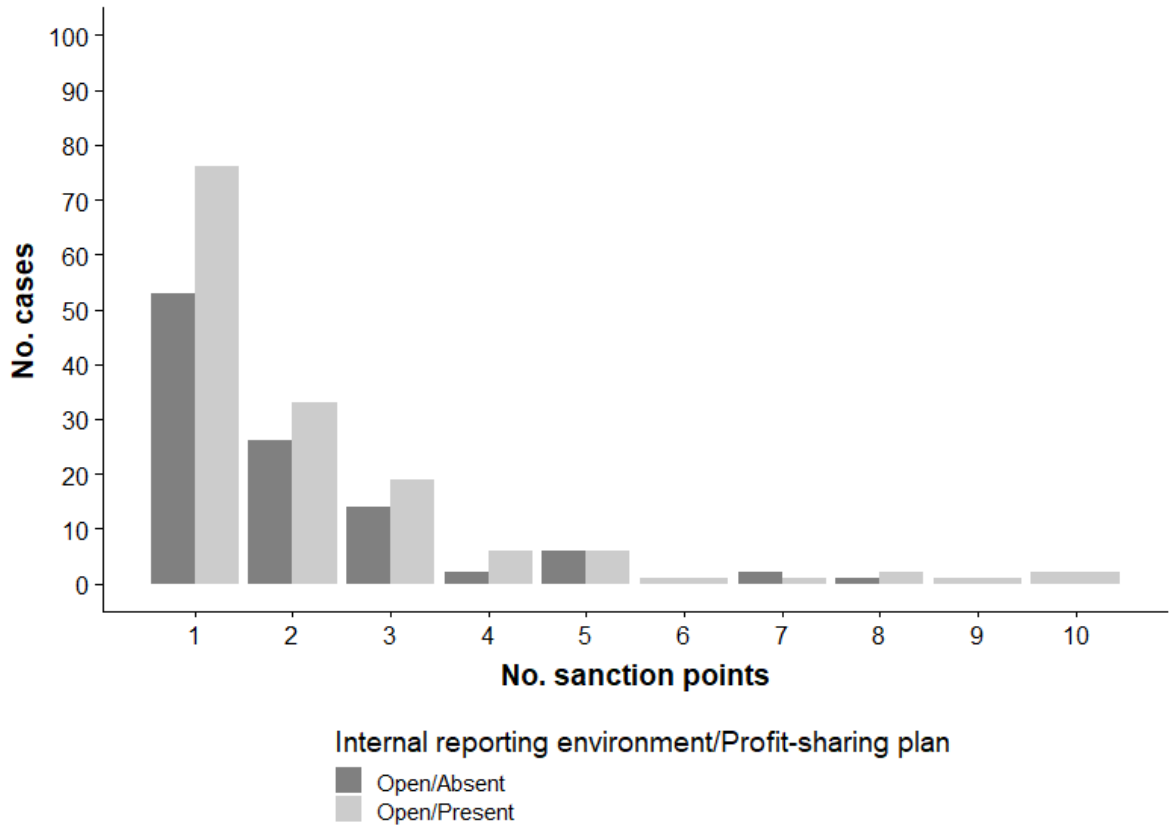
Reaction	Potentially sanctioned participant is…					
	Less honest than the sanctioning participant		Equally honest than the sanctioning participant		More honest than the sanctioning participant	
	Pooled profit-sharing plan					
	Absent	Present	Absent	Present	Absent	Present
Sanctioned [a]	$n = 60$ (34.48%)	$n = 111$ (49.55%)	$n = 22$ (8.73%)	$n = 9$ (5.92%)	$n = 22$ (12.64%)	$n = 27$ (12.05%)
Not Sanctioned [b]	$n = 114$ (65.52%)	$n = 113$ (50.45%)	$n = 230$ (91.27%)	$n = 143$ (94.08%)	$n = 152$ (87.36%)	$n = 197$ (87.95%)

Note. There are 600 sanctioning opportunities in Condition 2 (pooled profit-sharing plan absent) and 600 sanctioning opportunities in Condition 4 (pooled profit-sharing plan present).
[a] Assigned at least one sanction point. [b] Assigned no sanction point.

Participants in Condition 2 and 4 have 20 opportunities to sanction other participants during the 10 periods, which gave 600 sanctioning opportunities for all 30 subjects in both conditions. Table 22 shows that in the absence of a pooled profit-sharing plan, participants receive sanction points in 104 cases overall (i.e., 60 + 22 + 22 = 104), thus in 17.33% of all cases (104 out of 600). When a pooled-profit sharing plan is present, participants receive sanction points in 147 cases overall (i.e., 111 + 9 + 27 = 147), thus in 24.50% of all cases (147 out of 600). For both conditions, there are similar relative frequencies of participants' being sanctioned when the potentially sanctioned participant is equally honest (8.73% vs. 5.92%) or more honest (12.64% vs. 12.05%) than the potentially sanctioning participant. When the potentially sanctioned participant is less honest than the potentially sanctioning participant, the results show that participants are sanctioned much more frequently when a pooled profit-sharing plan is present than when it is absent (49.55% vs. 34.48%). In this situation, participants are sanctioned with similar severity (i.e., number of sanction points) in the absence of a pooled profit-sharing plan ($M = 1.95$, $SD = 1.32$) and in the presence of pooled profit-sharing plan ($M = 2.10$, $SD = 1.78$).

In total, in open internal reporting environments, participants who are less honest than the potentially sanctioning participant receive 117 sanction points in the absence of a pooled profit-sharing plan and 223 sanction points in the presence of a pooled profit-sharing plan. These results support the argumentation that the presence of a pooled profit-sharing plan increases participants' sanctioning of dishonest participants. Figure 23 shows the distribution of sanction points participants assigned to others in all situations. When a pooled profit-sharing plan is absent, participants assigned one sanction point to another participant in their organization in 50.96% of the cases (53 out of 104), assign two sanction points in 25.00% of the cases (26 out of 104), and assign three sanction points in 13.46% of the cases (14 out of 104). Thus, these three categories account for over 89% of all cases. When a pooled profit-sharing plan is present, participants assigned one sanction point to another participant in their organization in 51.70% of the cases (76 out of 147), assign two sanction points in 22.45% of the cases (33 out of 147), and assign three sanction points in 12.93% of the cases (19 out of 147). The three categories account for over 87% of all cases. Thus, in both conditions, participants mostly decide to assign a low to moderate amount of sanction points.

Figure 23: Severity of Peer Sanctioning (Experiment 2)



I examine answers from the post-experimental questionnaire to get more insight into participants' motivation to sanction others. This might explain the increased relative frequency of sanctioned participants who reported less honestly when a pooled profit-sharing plan is present compared to when it is absent (49.55% vs. 34.48%). When a pooled profit-sharing plan is present, participants' earnings also depend on the reporting behavior of the other two participants, as their reporting affects the organization's profit and the 5% profit share each of the three participants receives. Thus, participants may be motivated to sanction more dishonest participants because it decreases their 5% profit share.

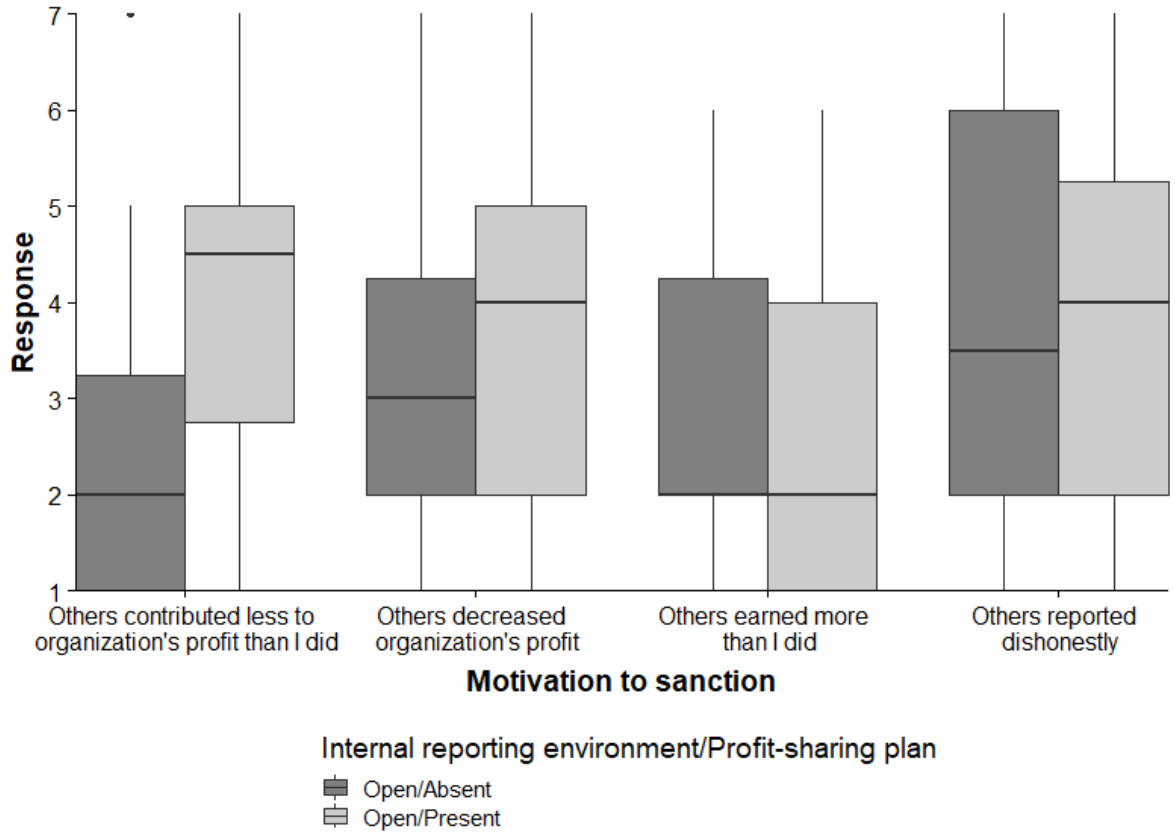
In the post-experimental questionnaire, participants should indicate their agreement with statements regarding their motivation to assign sanction points. First, participants are asked to indicate their agreement on a 7-point Likert scale with the statement, "I assigned sanctions points to division managers when they contributed less to organization's profit than I did" (1 = *strongly disagree* to 7 = *strongly agree*). Second, participants should indicate their agreement with the statement, "When other division managers reported higher costs than their true costs, I assigned sanctions points to them because their decision decreased organization's profit." Third, participants are asked to indicate their agreement with the statement, "I assigned sanctions points to division managers when they earned more than I did." Finally, participants indicated their agreement with the statement, "When other division managers reported higher costs than their true costs, I assigned sanctions points to them because they should report honestly." Since I want to get more insights into participants' motivation to assign sanction points, Figure 24 shows only the responses of participants who sanctioned another participant at least once (40 out of 60 participants).

The results show that participants' agreement with the first statement (i.e., others contributed less to organization's profit than I did) is significantly higher in Condition 4 than in Condition 2 ($p < 0.05$, effect size $r = 0.39$). There are no significant differences between conditions for the other three statements (all $p > 0.40$). I also compare personal traits of sanctioning and non-sanctioning participants. In line with Experiment 1, results show that there is no significant difference between the two groups regarding their personal normative beliefs ($p = 0.27$).[52] Overall, the results provide support that in the presence of a pooled profit-sharing plan, unequal

[52] Sanctioning and non-sanctioning participants significantly differ regarding the statements about their motivation to sanction others. Since all statements include the phrase "I assigned sanction points…", the low agreement of non-sanctioning participants is likely to stem from the fact that they did not assign any sanction points. Unlike in Experiment 1, I did not ask questions about unfairness in Experiment 2.

contribution to the organization's profit is a reason for some participants to sanction dishonest others. In the absence of a pooled profit-sharing plan, participants care significantly less about others' contribution to the organization's profit (Median = 2).[53]

Figure 24: Drivers of Peer Sanctioning



Next, I provide further support for the argumentation that the presence of a pooled profit-sharing plan increases honesty because participants sanction less honest participants more frequently. Again, a mixed-model regression is used with random effects. The number of sanction points a participant received from another participant in one period is used as the dependent variable, labeled RECEIVED SANCTION POINTS. Further, the difference in honesty between the sanctioning and the sanctioned participant is used to construct two independent variables. HONESTY DIFFERENCE (LESS HONESTLY) equals the absolute difference between the sanctioning and sanctioned participant's honesty if the sanctioned participant has reported less honestly than the sanctioning participant in that period and is zero otherwise. The variable HONESTY DIFFERENCE (MORE HONESTLY) is constructed

[53] To compare conditions pairwise regarding these statements, I use the median of the responses and a non-parametric test (Wilcoxon's test) because the data is not normally distributed.

analogously. Finally, the variable PERIOD and the third participant's honesty, labeled HONESTY THIRD MANAGER, are included to control for potential time and group effects.

I run separate mixed-model regressions for both conditions. In Table 23, the results are shown for Condition 2, in which the internal reporting environment is open, and a pooled profit-sharing plan is absent. Participants receive significantly more sanction points as they report less honestly than the potentially sanctioning participant ($\beta = 0.38$, $t = 2.52$, $p < 0.05$). Further, PERIOD has a significantly negative effect on RECEIVED SANCTION POINTS ($\beta = -0.03$, $t = -2.61$, $p < 0.01$). There may be two reasons. On the one hand, participants in one organization may agree upon a social norm of honesty over time, which makes sanctioning unnecessary. On the other hand, participants may get tired of sanctioning as sanctioning is costly, and others do not react. The results also show that participants receive fewer sanction points as the third manager reports more honestly ($\beta = -0.31$, $t = -1.77$, $p < 0.10$). The reason may be that participants are less motivated to sanction a dishonest participant when there is a third participant who reports honestly and ensures that the organization's profit is above zero.

Table 23: Determinants of Getting Sanctioned in Condition 2 (Experiment 2)

Effect	Estimate	*SE*	*df*	*t*	*p*
Intercept	0.50	0.14	71.31	3.68	<0.01
Period	-0.03	0.01	569.53	-2.61	<0.01
Honesty difference (Less honestly)	0.38	0.15	587.90	2.52	<0.05
Honesty difference (More honestly)	0.27	0.21	546.38	1.28	0.20
Honesty third manager	-0.31	0.17	478.52	-1.77	<0.10
Random effect	Variance	SD			
Participant (intercept)	0.31	0.55			
Residual	0.64	0.80			

Note. Results of a linear mixed-model regression are shown. All *p* values in this table are two-tailed.

In Table 24, the results are shown for Condition 4, in which the internal reporting environment is open and a pooled profit-sharing plan is present. Like Condition 2, participants receive significantly more sanction points as they report less honestly than the potentially sanctioning participant (β = 0.58, t = 2.68, p < 0.01). In line with this finding, participants receive significantly fewer sanction points as they report more honestly than the potentially sanctioning participant (β = -0.71, t = -3.31, p < 0.01). In contrast to Condition 2, participants in Condition 4 receive more sanction points as the third manager reports more honestly (β = 0.71, t = 3.68, p < 0.01). Thus, when a pooled profit-sharing is present, participants seem to be more motivated to sanction less honest participants when the third participant also reports honestly. It seems that honest reporting from two of three participants legitimizes a sanction against the dishonest participant. Finally, although only weakly significant, the effect of PERIOD on RECEIVED SANCTION POINTS in Condition 4 (β = -0.03, t = -1.63, p = 0.10) is similar to Condition 2 (β = -0.03, t = -2.61, p < 0.01).

Table 24: Determinants of Getting Sanctioned in Condition 4 (Experiment 2)

Effect	Estimate	*SE*	*df*	*t*	*p*
Intercept	0.40	0.19	194.36	2.07	<0.05
Period	-0.03	0.02	590.28	-1.63	0.10
Honesty difference (Less honestly)	0.58	0.22	309.21	2.68	<0.01
Honesty difference (More honestly)	-0.71	0.21	377.94	-3.31	<0.01
Honesty third manager	0.71	0.22	358.03	3.27	<0.01
Random effect	Variance	SD			
Participant (intercept)	0.20	0.45			
Residual	1.31	1.14			

Note. Results of a linear mixed-model regression are shown. All p values in this table are two-tailed.

Overall, the results show that the determinants of getting sanctioned are similar in both conditions. However, results of both mixed-model regressions suggest that others' dishonesty

triggers more sanctions in Condition 4 than in Condition 2 (Less honesty: $\beta = 0.58$ vs. 0.38), supporting the prediction of more sanctions when a pooled profit-sharing plan is present.

Participants' Reaction to Sanctions

After showing that participants sanction other participants who report less honestly, the next step is to investigate whether participants report more honestly after being sanctioned. Therefore, I use a mixed-model regression with random effects. In the model, HONESTY is regressed on the total sum of sanction points participants received from the other two participants in their organization in the previous period, labeled SANCTIONED PREVIOUS PERIOD. Participant's honesty in the previous period and the average honesty of the other two participants in the previous period are included as covariates to control for anchoring effects and different group dynamics, labeled HONESTY PREVIOUS PERIOD and HONESTY GROUP PREVIOUS PERIOD. The TRUE COSTS and PERIOD are included as covariates to control for differences in honesty due to varying true costs in each period and time effects. I run separate mixed-model regressions for Conditions 2 and 4. Table 25 shows the results for Condition 2.

Table 25: Determinants of Honest Reporting in Condition 2 (Experiment 2)

Effect	Estimate	*SD*	*df*	*t*	*p*
Intercept	1.29	0.17	262.20	7.61	<0.01
True costs	-0.01	0.00	234.80	-6.39	<0.01
Period	0.01	0.01	231.30	1.39	0.17
Honesty (previous period)	0.16	0.06	264.00	2.77	<0.01
Honesty group (previous period)	0.05	0.06	257.50	0.77	0.44
Sanctioned (previous period)	-0.01	0.01	245.40	-0.89	0.38
Random effect	Variance	SD			
Participant (intercept)	0.07	0.26			
Residual	0.05	0.22			

Note. Results of a linear mixed-model regression are shown. All *p* values in this table are two-tailed.

There is no significant effect of SANCTIONED PREVIOUS PERIOD on HONESTY (β = -0.01, t = -0.89, p = 0.38). Also, HONESTY GROUP PREVIOUS PERIOD has no significant effect on HONESTY (β = 0.05, t = 0.77, p = 0.44). Only TRUE COSTS (β = -0.01, t = -6.39, p < 0.01) and HONESTY PREVIOUS PERIOD (β = 0.16, t = 2.77, p < 0.01) have a significant effect on HONESTY. Thus, participants in Condition 2 tend to report more dishonestly when, in absolute terms, there is less budget slack possible due to increasing true costs and orient themselves on past behavior to behave consistently over time. Importantly, there is no support that participants report more honestly after being sanctioned in a previous period.

Table 26 shows the results for Condition 4, which are like the results of Condition 2. Again, there is a significant effect of TRUE COSTS (β = -0.01, t = -5.69, p < 0.01) and HONESTY PREVIOUS PERIOD (β = 0.23, t = 4.07, p < 0.01) on HONESTY but again no significant effect of SANCTIONED PREVIOUS PERIOD (β = -0.01, t = -1.31 p = 0.19) or HONESTY GROUP PREVIOUS PERIOD (β = 0.01, t = 0.06, p = 0.95) on HONESTY.

Table 26: Determinants of Honest Reporting in Condition 4 (Experiment 2)

Effect	Estimate	*SE*	*df*	*t*	*p*
Intercept	1.47	0.19	256.10	7.72	<0.01
True costs	-0.01	0.00	228.60	-5.69	<0.01
Period	-0.01	0.01	233.60	-1.43	0.16
Honesty (previous period)	0.23	0.06	258.10	4.03	<0.01
Honesty group (previous period)	0.01	0.08	262.30	0.06	0.95
Sanctioned (previous period)	-0.01	0.01	253.20	-1.31	0.19
Random effect	Variance	SD			
Participant (intercept)	0.06	0.25			
Residual	0.06	0.25			

Note. Results of a linear mixed-model regression are shown. All p values in this table are two-tailed.

Overall, the results of the mixed-model regressions do not support my argument that the presence of a pooled profit-sharing plan increases honesty because more participants sanction

less honest participants, which then increases honesty in the next period. Although participants mostly sanction other participants who report less honestly, sanctioned participants do not react with a more honest report in the next period. One explanation may be that participants are randomly rematched after each period, and participants do not expect to meet the participant again who sanctioned their behavior. Another explanation may be that, in contrast to Experiment 1, there is no possibility to explicitly indicate the appropriate behavior with a text message (compare Section 4.3). Thus, sanctioned participants do not get an explicit signal that others view dishonest reporting as a norm violation, which is in line with the low normative expectations measured in the post-experimental questionnaire.

Nevertheless, the results provide some insights under which conditions the possibility of peer sanctioning affects behavior in participative budgeting. The ANOVA (see Table 18) and the mixed-model regression (see Table 19) used to test the hypothesis show that the openness of the internal reporting environment and the presence of a pooled profit-sharing plan both have a significant positive effect on honesty. First, the additional analyses provide an explanation for the positive main effect of the openness of the internal reporting environment on honesty. The mediation model shows that the effect of the openness of the internal reporting environment on honesty is partially mediated by participants' perceived risk of being sanctioned. Changing from a closed to an open internal reporting environment increases participants' perceived risk of being sanctioned, which increases honesty. Thus, the openness of the internal reporting environment amplifies the effect of the possibility of peer sanctioning on honesty.

Second, the additional analyses provide an explanation for the positive main effect of the presence of a pooled profit-sharing plan on honesty. The analysis of sanctioning behavior in open internal reporting environments supports that participants more often sanction dishonest participants when a pooled profit-sharing plan is present compared to when a pooled profit-sharing plan is absent. Answers from the post-experimental questionnaire suggest that in the presence of a pooled profit-sharing plan, unequal contribution to the organization's profit is a reason for some participants to sanction the participant who contributes less (i.e., report less honest). Thus, the presence of a pooled profit-sharing plan seems to increase participants' willingness to sanction dishonest reporting in participative budgeting.

4.4.5 Comparing Results of Experiments 1 and 2

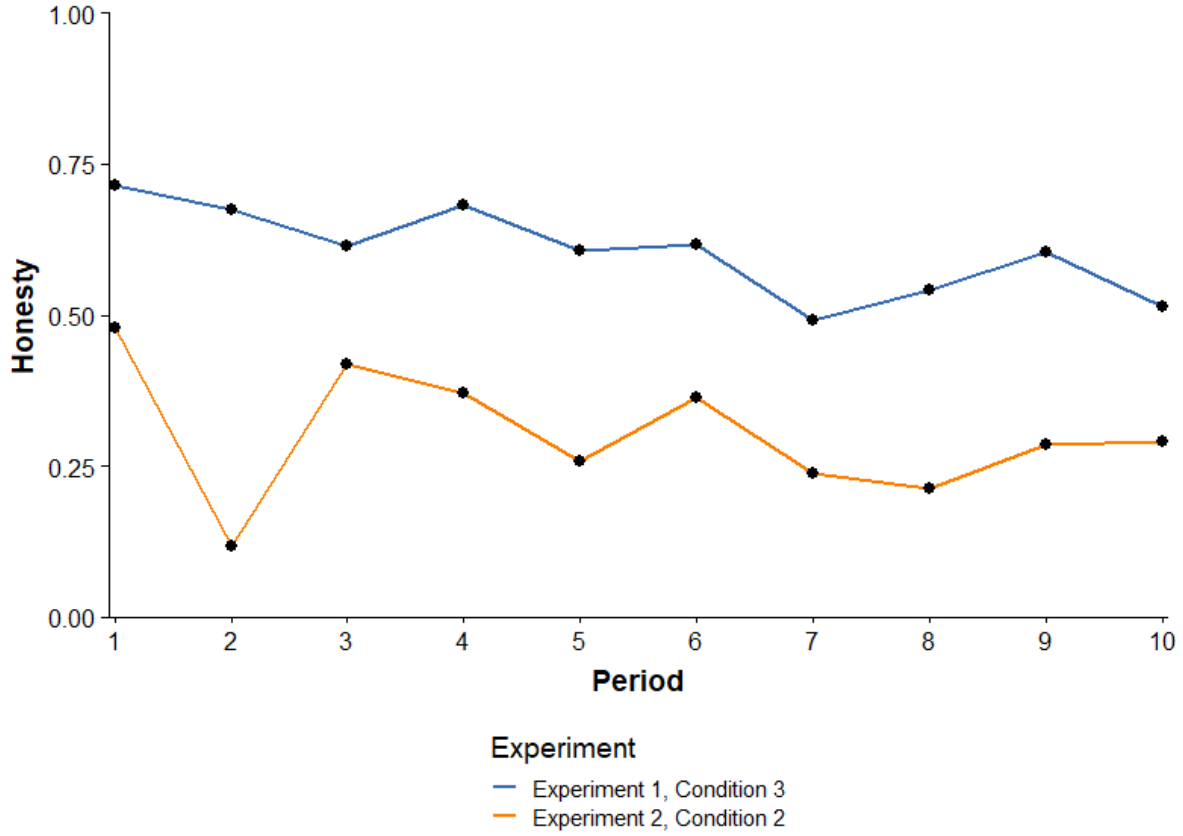
Although a similar setting is used in Experiments 1 and 2, the results show different levels of honesty. To understand these differences and provide insights into the driver of honesty in participative budgeting, selected conditions from Experiment 1 and 2 are compared.

Honesty Differences Between Experiments in Open Internal Reporting Environments

The goal of both experiments is to investigate how peers affect honesty in open internal reporting environments when peer sanctioning is possible. Best suitable for comparison is Condition 3 from Experiment 1 (open internal reporting environment/possibility of peer sanctioning present) (hereafter called Experiment 1) and Condition 2 from Experiment 2 (open internal reporting environment/pooled profit-sharing plan absent) (hereafter called Experiment 2) because the experimental setting in both conditions is very similar. In both conditions, participants act as one of three division managers in an organization, observe others' true costs and reported costs, and can sanction others' reporting behavior afterward. Further, participants' earnings in both experiments include a fixed salary of 500 Lira and any budget slack obtained (i.e., the difference between reported and true costs). Despite those similarities, HONESTY in Experiment 1 is approximately twice as high as HONESTY in Experiment 2 (M = 0.61 vs. 0.30). Figure 25 depicts HONESTY per period and condition and shows that this pattern is consistent over time.

Three important setting differences may explain the difference in honesty. First, in Experiment 2, participants' possibility of peer sanctioning only includes assigning sanction points. In Experiment 1, participants must also indicate the appropriate behavior via a normative text message when sanctioning other participants. Second, a participant in Experiment 1 completes the 10 period with the same two other participants, while a participant in Experiment 2 is randomly assigned to a new organization with new participants each period. Finally, the sequence of true costs differs between Experiments 1 and 2.

Figure 25: Comparison of Honesty Between Experiments (Open Reporting Environment)

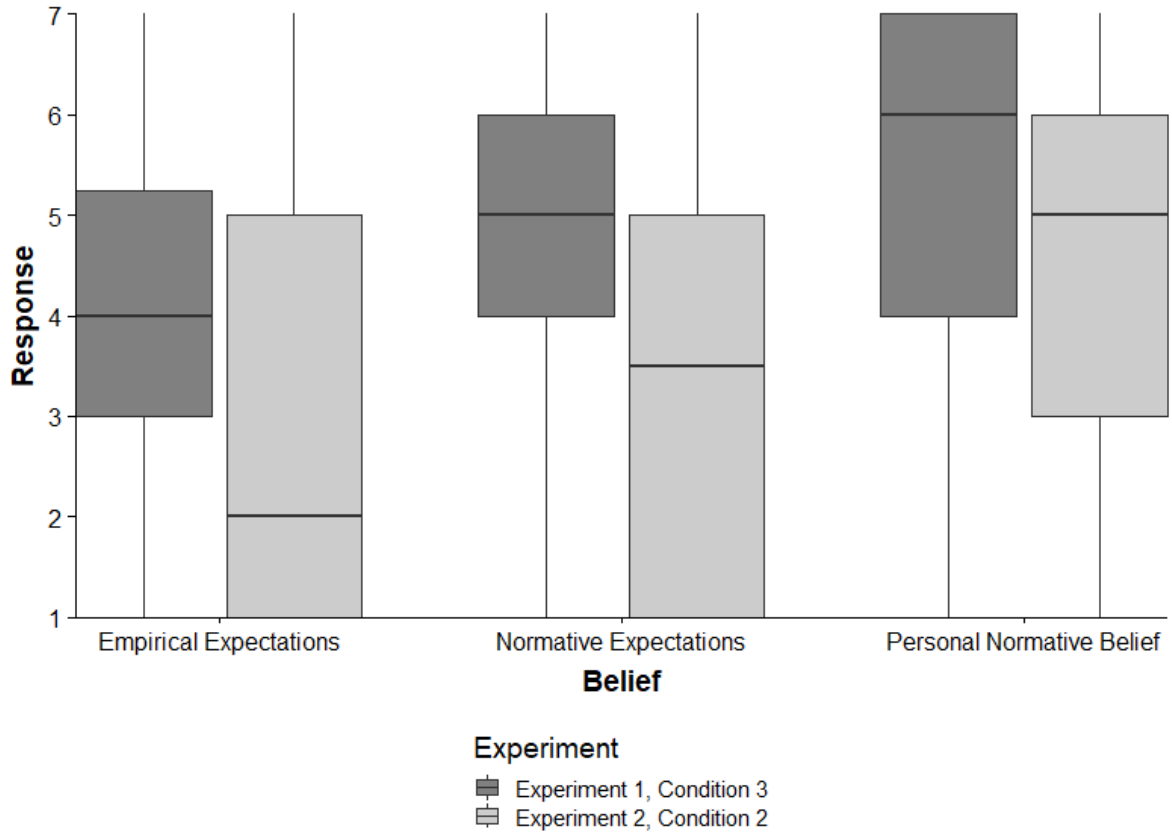


I start with evaluating the importance of the additional text message in Experiment 1. Looking at the sanctioning behavior shows that participants in Experiment 1 are sanctioned in 17.93% of all cases, while participants in Experiment 2 are sanctioned in 17.33% of all cases. In both experiments, participants mostly assign one to three sanction points (approximately 85% vs. 89%); thus, the average amount of sanction points assigned is very similar in Experiment 1 (M = 2.26, SD = 2.14) to Experiment 2 (M = 1.99, SD = 1.44). I conclude that participants in both experiments show similar sanctioning behavior. However, as shown in the mixed-model regressions, participants in Experiment 1 increase honesty after being sanctioned ($\beta = 0.02$, $t = 2.02$, $p < 0.10$), while this is not the case for participants in Experiment 2 ($\beta = -0.01$, $t = -0.89$, $p = 0.38$). The difference between both experiments is that only in Experiment 1 sanctioned participants receive a message indicating the appropriate reporting behavior. The more honest behavior the message suggests, the more participants' honesty increases in the next period ($\beta = 0.35$, $t = 2.07$, $p < 0.05$). This suggests that the combination of sanction points with a normative message is more effective in increasing honesty than assigning sanction points alone. The reason is that, as already discussed in Section 4.3.5, the monetary consequences of one to three sanction points are not enough in most periods that honest reporting becomes the wealth-

maximizing decision.[54] Thus, the important part of being sanctioned seems to be the explicit signal transmitted by the text message that others view dishonest reporting as a norm violation, increasing sanctioned participants' empirical and normative expectations regarding a social norm of honesty.

This argumentation is supported by the comparison of participants' empirical expectations, normative expectations, and personal normative beliefs as shown in Figure 26.

Figure 26: Comparison of Beliefs Between Experiments (Open Reporting Environment)



Participants' empirical expectations are significantly higher in Experiment 1, where the sanctioning option includes a text message about appropriate behavior, than in Experiment 2 (Median = 4 vs. 2, $p < 0.05$). Further, participants' normative expectations are significantly higher in Experiment 1 than in Experiment 2 (Median = 5 vs. 3.5, $p < 0.01$). Finally, there is only weak support for the difference between participants' personal normative beliefs (Median

[54] When true costs are 4,850 Lira, an agent can earn 500 + (5,500 – 4,850) = 1,150 Lira when reporting dishonestly. Receiving three sanction points in this situation would leave the agent with 1,150 * 0.7 = 808 Lira which is still more than the fixed salary of 500 Lira.

= 6 vs. 5, $p < 0.10$). Besides the finding that participants' normative expectations are significantly higher when the sanctioning option includes a text message about appropriate behavior, Figure 26 depicts that participants' normative expectations are less dispersed in Experiment 1 than in Experiment 2 (Interquartile range: 2 vs. 4). This suggests that participants in Experiment 1 are further than participants in Experiment 2 in coordinating themselves to a common understanding of appropriate behavior (i.e., a social norm of honesty).

In addition, interacting with the same participants throughout the experiment may improve the coordination of a social norm of honesty in Experiment 1 (see Section 2.2.1 for the conceptualization of a social norm as a coordination game) and increase honesty in the participative budgeting setting. In contrast, participants in Experiment 2 expect to face new participants with different beliefs every period, making it difficult to achieve a shared understanding of appropriate behavior. Thus, participants in Experiment 2 are less affected by others' behavior and beliefs and rather tend to determine appropriate behavior based on the situation at hand expressed by the true costs in the respective period.

Finally, the true costs participants face in the 10 periods are different between experiments. The results of the mixed model regressions show that as true costs increase, participants in both experiments report less honestly. Thus, different true costs may explain part of the honesty differences. Figure 27 depicts the true costs per period and experiment and shows that in most periods, the true costs are higher in Experiment 2 than in Experiment 1. This suggests that honesty may be lower in Experiment 2 than 1 because true costs are higher.

Using the estimated coefficient for the effect of TRUE COSTS on HONESTY from the mixed model regression ($\beta = -0.00024$, $t = -6.389$, $p < 0.01$), the honesty levels from Experiment 2 are adjusted for the difference in true costs between Experiment 1 and 2.
Figure 28 shows honesty per period and experiment in addition to the adjusted honesty levels for Experiment 2. The results show that the difference in true costs explains some of the honesty difference between Experiment 1 and 2, but honesty is still significantly higher in Experiment 1.

Figure 27: Comparison of True Costs Between Experiments

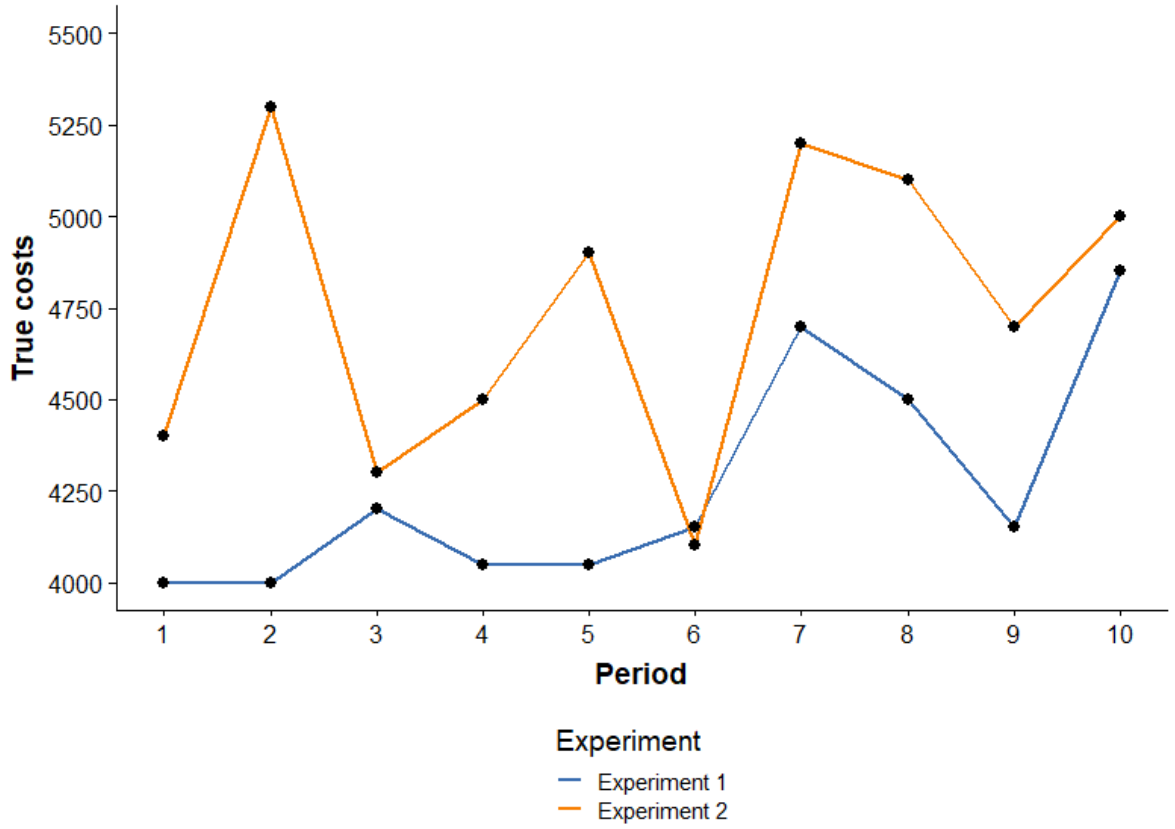
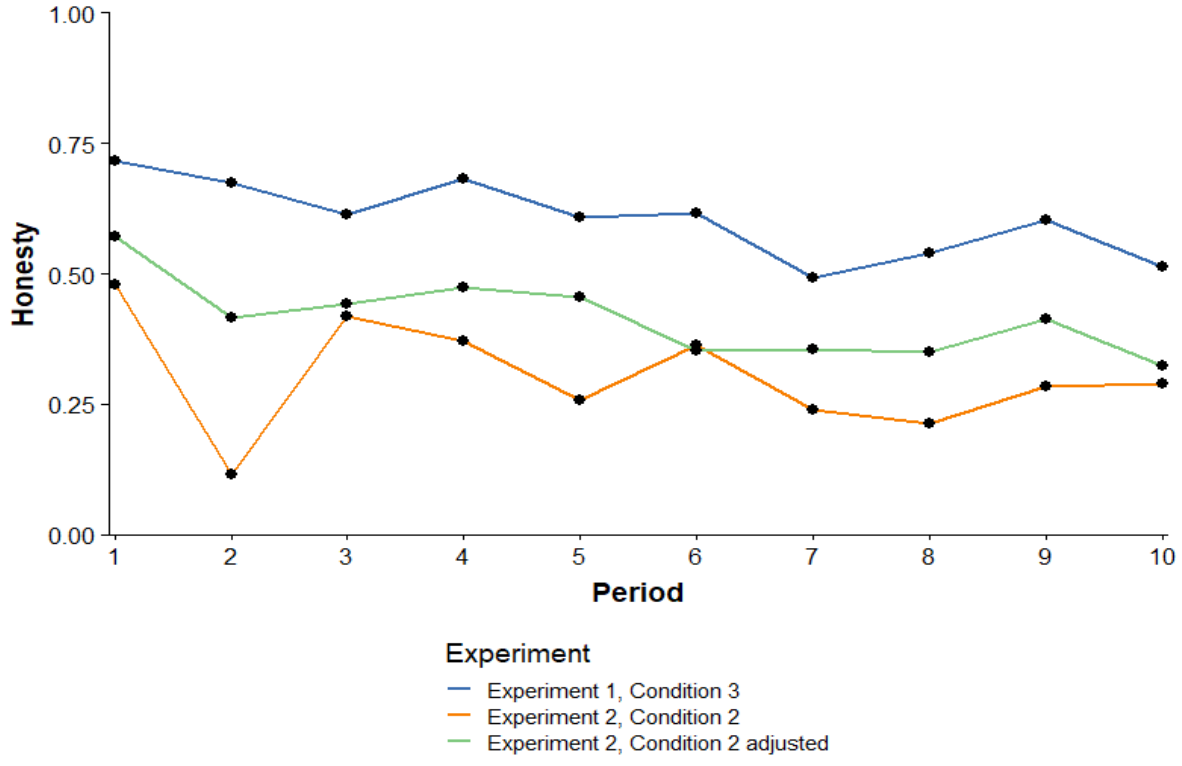


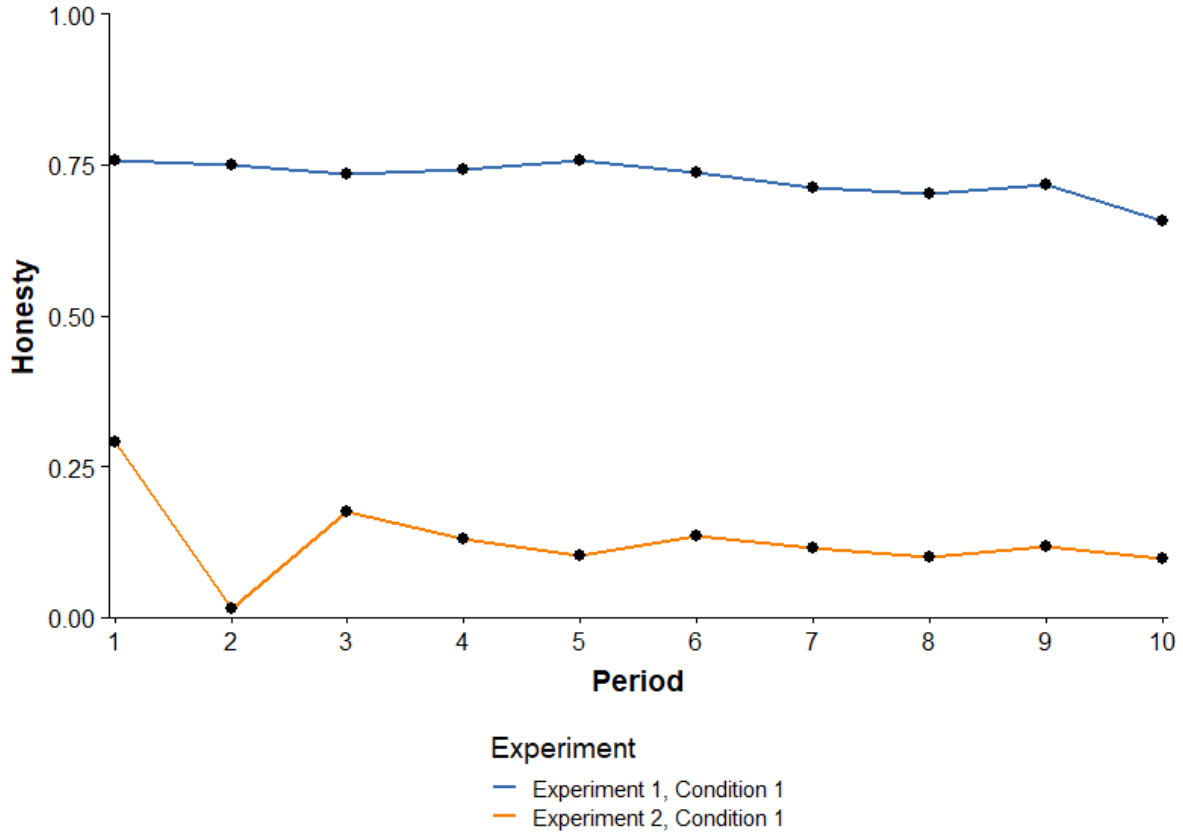
Figure 28: Comparison of Honesty Between Experiments (Open Reporting Environment & True Costs Adjusted)



Honesty Differences between Experiments in Closed Internal Reporting Environments

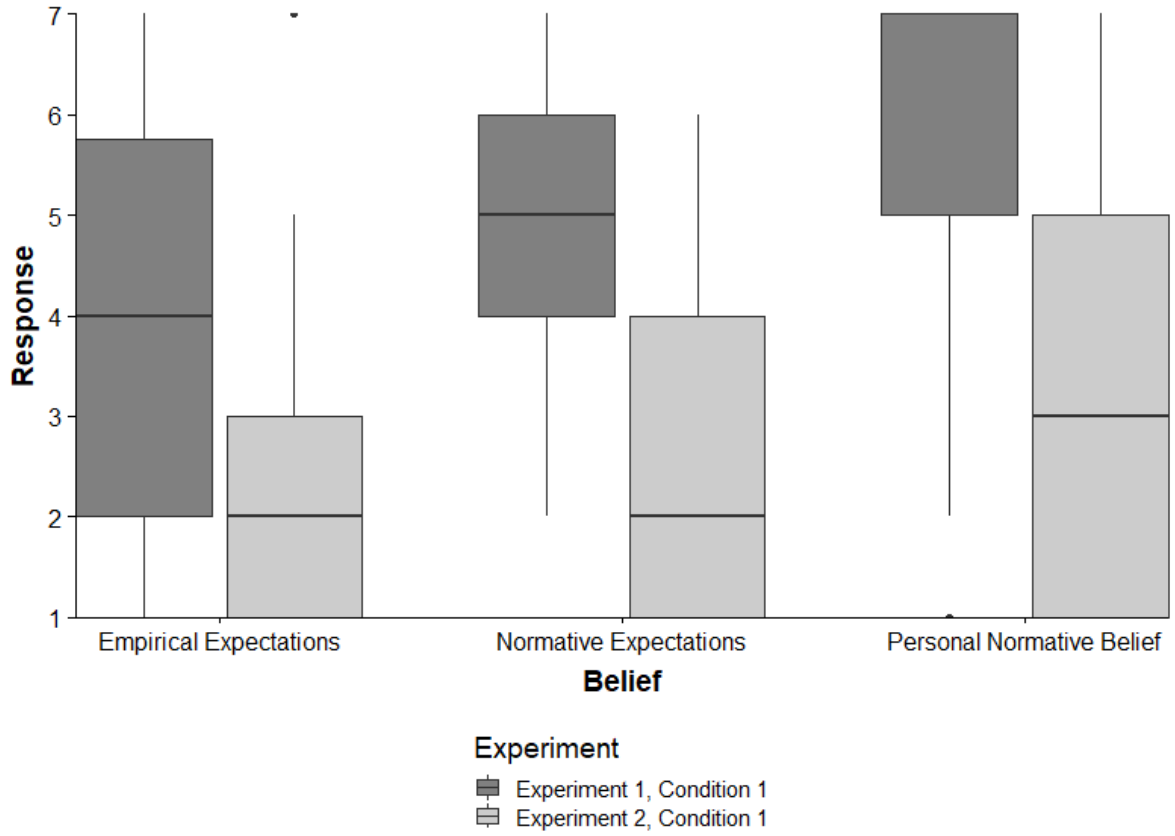
There is another important difference between Experiment 1 and 2 that concerns honesty in the closed internal reporting environments. Since peer sanctioning is always possible in Experiment 2, there are no closed conditions from Experiments 1 and 2 which have the same setting. The best suitable for comparison is Condition 1 from Experiment 1 (closed internal reporting environment/possibility of peer sanctioning absent) (hereafter called Experiment 1) and Condition 1 from Experiment 2 (closed internal reporting environment/pooled profit-sharing plan absent) (hereafter called Experiment 2). The main difference is that participants in Experiment 2 can sanction others (although they do not observe their true or reported costs), while this is not possible for participants in Experiment 1. Results show that HONESTY in Experiment 1 is significantly higher than HONESTY in Experiment 2 (M = 0.73 vs. 0.13). Figure 29 depicts HONESTY per period and per experiment and shows that this pattern is consistent over time.

Figure 29: Comparison of Honesty Between Experiments (Closed Reporting Environment)



Part of the differences can again be explained by the difference in true costs, but still, there remains a significant difference. Another explanation may be the difference in participants' beliefs, as shown in Figure 30.

Figure 30: Comparison of Beliefs Between Experiments (Closed Reporting Environment)



Participants' empirical expectations, normative expectations, and personal normative beliefs are significantly higher in Experiment 1 than in Experiment 2 (all $p < 0.01$). Further, participants' empirical expectations, normative expectations, and personal normative beliefs in Experiment 2 are, in general, very low as their median value ranges from 2 to 3. Thus, although participants never observed another participant in the experiment, most expect that others will report dishonestly, expect that others think one should report dishonestly, and personally believe that dishonest reporting is appropriate. These expectations are reasonable since a lot of participants answered in the comment section that their goal when participating in studies on the online platform Prolific is primarily to earn money. In Experiment 1, before the cost reporting task (Stage 2), participants are asked to state their agreement with statements from Murphy et al. (2020) measuring individuals' internal and external motivation to report honestly. This might have increased participants' awareness about honesty as appropriate behavior in the

upcoming task and activated a social norm of honesty in Experiment 1, which did not happen in Experiment 2.

Finally, although participants in Experiment 2 cannot observe others' honesty, some participants assigned sanction points. For example, in Period 1, 50% of participants received sanction points. This may also motivate some participants to report more dishonestly to use additional budget slack as a protection against the monetary consequences of sanction points.

Overall, both comparisons provide some insights. The comparison of the closed reporting conditions shows that participants' empirical expectations, normative expectations, and personal normative beliefs are significantly lower in Experiment 2 compared to Experiment 1. The questions about participants' internal and external motivation to report honestly in Experiment 1 may explain this difference and further emphasize the importance of situational cues to activate social norms. The comparison of the open reporting conditions shows that participants' empirical expectations, normative expectations, and personal normative beliefs are significantly lower in Experiment 2 compared to Experiment 1. Here, the two experiments differ in that participants in Experiment 1 repeatedly interact with the same peers and must send a normative text message when sanctioning others. In this setting, it is easier for participants to estimate what others in their organization will do and think one should do, bringing social norms to the forefront. In contrast, being randomly rematched after each period makes it very difficult to form expectations about others' behavior and beliefs and to fulfill others' expectations. Arguably, in this situation, expectations and social norms become less important.

4.4.6 Discussion

The results of Experiment 2 and the comparison of Experiment 1 and 2 are now discussed in view of the research questions of this thesis and how they contribute to the participative budgeting literature on peers' influence and social norms. Further, I discuss limitations and avenues for further research.

Results in the view of RQ2

I skip RQ1 because in Experiment 2, peer sanctioning is possible in all conditions. RQ2 asks which managers sanction norm-violators in participative budgeting. First, results show that participants in Experiment 2 assign sanction points to other participants in a participative

budgeting setting. Further, participants receive significantly more sanction points as they report less honestly than the potentially sanctioning participant (see Table 23 and Table 24). Thus, there are participants in Experiment 2 who are willing to sanction norm-violators in a participative budgeting setting, although they have no monetary incentive to do so.

Second, results show that participants sanction less honest participants relatively more often when a pooled profit-sharing plan is present compared to when it is absent. Additional analysis reveals that in the presence of a pooled profit-sharing plan, participants are significantly more motivated to sanction others who contributed less to the organization's profit than they did. I do not find significant differences between conditions regarding other motivations to sanction. I argue that the implementation of a pooled profit-sharing plan, in which each participant receives a 5% profit share regardless of contribution, will bring equality and fairness considerations to the forefront. Thus, the finding that less honest participants are sanctioned much more frequently when a pooled profit-sharing plan is present than when it is absent (49.55% vs. 34.48%) may be due to increased fairness considerations. This suggests that, like in Experiment 1, negative emotions of unfairness (i.e., I contribute more to organization's profit, but all receive the same 5% profit share) trigger sanctions. Further, results show that sanctioning and non-sanctioning participants do not differ regarding their personal normative beliefs. Supporting results from Experiment 1, managers' willingness to sanction seems to be another important personal trait for the emergence of a social norm that is different from managers' norm-sensitivity. As an answer to RQ2, the results of the experiment provide some support that, in the presence of a pooled profit-sharing plan, managers are more likely to sanction violators of a social norm of honesty when it is important to them that everyone contributes equally to the organization's profit.

This study contributes to the participative budgeting literature on social norms by supporting findings from Experiment 1. Besides norm sensitivity, this study highlights managers' willingness to sanction others as another personal trait that is important for the emergence of a social norm of honesty in participative budgeting. Like Experiment 1, this study points to negative feelings of unfairness (i.e., unequal contributions but the same profit share) as the driver of sanctions. Thus, when theorizing the effect of the possibility of peer sanctioning in participative budgeting, future studies should consider whether managers perceive others' dishonesty as unfair, as this seems to be an important driver of sanctioning.

Results in the view of RQ3

RQ3 asks how peers' influence affects honesty under a pooled profit-sharing plan. In other words, RQ3 asks whether the effect of peers' influence on honesty is moderated by the presence of a pooled profit-sharing plan. In the presence of a pooled profit-sharing plan, participants' dishonest reporting harms others' wealth. The behavioral economics literature argues that sanctions are driven by negative emotions like feelings of unfairness or being exploited (Falk et al., 2005; Ernst Fehr & Fischbacher, 2004). Thus, a pooled profit-sharing plan may amplify peer sanctioning in the sense that more sanctions are assigned to dishonest participants, which increases honesty. The results show that peers' influence is not moderated by the presence of a pooled profit-sharing plan (i.e., no significant interaction between the internal reporting environment and pooled profit-sharing plan). When changing from a closed to an open internal reporting environment, average honesty increases by about 0.175 when the pooled profit-sharing plan is absent and about 0.156 when the pooled profit-sharing plan is present. Thus, the effect of the internal reporting environment does not depend on the presence of a pooled profit-sharing plan.

Nevertheless, the results show that honesty is higher when a pooled profit-sharing plan is present compared to when it is absent. Additional analysis reveals that participants sanction less honest participants relatively more often when a pooled profit-sharing plan is present compared to when it is absent. Answers from the post-experiment questionnaire suggest that participants are more motivated to sanction when participants unequally contribute to the organization's profit when a pooled profit-sharing plan is present. However, I do not find support for the argumentation that participants react to sanctions by increasing their honesty in the next period. A possible explanation may be that sanctions in Experiment 2 are less explicit in expressing disapproval due to a missing explicit signal indicating appropriate behavior. Another reason may be that participants care less about what others disapprove of because they are randomly rematched each period. If the same setting was used as in Experiment 1, the effect of the presence of a pooled profit-sharing plan on honesty might be stronger. Relying on the results in Experiment 2, I conclude that the presence of a pooled profit-sharing plan does not change the effect of peers' influence on honesty in participative budgeting.

These findings contribute to the participative budgeting literature on peers' influence and social norms (Brunner & Ostermaier, 2019; Evans III et al., 2016; Guo et al., 2020; Paz et al., 2014; Schwering, 2017). Current literature investigates how peers affect honesty under different

organizational contexts, such as vertical pay dispersion (Guo et al., 2020) or organizational identity (Lill et al., 2023). Understanding how the effect of peers on honesty is moderated by contextual factors is important for theory development. In this study, I investigate a pooled profit-sharing plan as another contextual factor potentially moderating the effect of peers' influence on honesty. Results show that the effect of peers' influence on honesty does not depend on the presence of a pooled profit-sharing plan. Nevertheless, implementing a pooled profit-sharing plan increases honesty initially and increases managers' willingness to sanction dishonest reporting. Referring to results from Experiment 1, an increased willingness to sanction dishonest reporting could have increased honesty more significantly when sanctions include an explicit signal via text message, and participants are not randomly rematched each period. Thus, this study extends the list of contextual factors to consider when theorizing the effect of peers' influence on honesty in participative budgeting.

Results in the view of RQ4

RQ4 asks whether a social norm of honesty is the underlying mechanism of peers' influence in participative budgeting. This is important because, in the case of a social norm of honesty, firms know that changing managers' empirical and normative expectations will change behavior. In line with low honesty levels, participants in Experiment 2 indicate very low empirical and normative expectations regarding honesty. On average, participants' responses in all conditions are below the midpoint of 4 (i.e., midpoint on a 7-point Likert scale), indicating that they rather expect that others would report dishonestly and think one should report dishonestly. The mediation model shows that the perceived risk of being sanctioned (i.e., normative expectations with sanctions) partially mediates the effect of the internal reporting environment on honesty. In contrast to Experiment 1, I do not find support that the effect of the internal reporting environment on honesty is mediated by participants' empirical expectations. Further, the effect of the perceived risk of being sanctioned on honesty is not moderated by personal normative beliefs about honesty. These results suggest that there is no social norm of honesty activated.

Comparing the most similar conditions of Experiment 1 and 2, participants' empirical and normative expectations are significantly higher in Experiment 1 (i.e., in Condition 3) than in Experiment 2 (i.e., in Condition 2). Further, the comparison of these two conditions shows that normative expectations among participants are very similar in Experiment 1 and more dispersed in Experiment 2. This difference is crucial because social norm literature suggests that shared normative expectations are needed to constitute a social norm (Bicchieri et al., 2022; Bicchieri

& Xiao, 2009). All these findings suggest that participants in Experiment 1 (at least in Condition 3) have coordinated themselves to a common understanding of appropriate behavior (i.e., a social norm of honesty), while participants in Experiment 2 did not. Regarding RQ4, I conclude that a social norm of honesty is not the underlying mechanism in Experiment 2 because a social norm of honesty has not been activated (i.e., participants have low empirical and normative expectations regarding honesty).

These findings contribute to the participative budgeting literature on social norms. Several experimental studies in participative budgeting show that situational cues in the budgeting environment can activate social norms in a one-period setting (e.g., information system, contract selection, mode of budget communication) (e.g., Abdel-Rahim & Stevens, 2018; Cardinaels & Yin, 2015; Douthit et al., 2022; Douthit & Stevens, 2015). Comparing the results of Experiments 1 and 2 provides insights into the emergence of a social norm of honesty in participative budgeting over time. Condition 3 from Experiment 1 and Condition 2 from Experiment 2 mainly differ regarding the way peer sanctioning is operationalized and how often participants interact with the same peers. These differences seem small, but results show big differences regarding participants' empirical and normative expectations and, thus, the emergence of a social norm of honesty. This suggests that the additional text message indicating appropriate reporting behavior when sanctioning others and frequent interaction has helped participants to come to a collective understanding of appropriate reporting behavior. Thus, these results contribute to the participative budgeting literature on social norms by highlighting the importance of peer communication and frequent interactions of managers to establish a social norm of honesty in participative budgeting.

Limitations and further research

The results are subject to limitations. Like Experiment 1, there are limitations that concern the external and construct validity. First, I address the issues regarding external validity. In Experiment 2, I recruit participants via the online platform Prolific. Using Prolific's prescreening function, all participants indicate that they have experience being in a management position. Further, 58.91% of all participants indicate that they have experience in a budgeting process with an average of 10.05 years. Like in Experiment 1, I build on the findings of Farrell et al. (2017) that online participants are suitable to investigate the decisions of non-experts in accounting research. Therefore, I assume that the findings are generalizable to participative budgeting in practice.

Further, the highly anonymous setting is another issue of the external validity of the findings. As in Experiment 1, participants do not know the other participants but are also randomly rematched with other participants each period. Relying on social norm theory, I hypothesize that the presence of a pooled profit-sharing plan unfolds its effect through participants' perceived pressure to report honestly to avoid sanctions. In practice, it is likely that managers know each other. Thus, implementing a pooled profit-sharing plan in practice may significantly increase managers' perceived pressure to report honestly. Therefore, future studies are encouraged to investigate how the presence of a pooled profit-sharing plan affects honesty when participants' identity is disclosed and groups remain constant.

Second, the operationalization of the possibility of peer sanctioning is subject to limitations. As I mentioned in Experiment 1, one issue concerns the operationalization of sanctions as monetary consequences. Beyond this, the possibility of peer sanctioning in Experiment 2 does not include a normative text message as in Experiment 1. Outside the experiment, a manager will most likely get to know peers' opinions when being sanctioned. Referring to results from Experiment 1, participants in Experiment 2 would have also increased honesty after being sanctioned when sanctions are operationalized as monetary consequences and a normative text message. Future studies are encouraged to examine peers' influence on honesty under a pooled profit-sharing plan again but in a setting in which participants repeatedly interact with the same peers and can communicate their disapproval explicitly. This would add to the literature investigating combinations of control practices (Merchant & Otley, 2020), showing how a formal control practice (i.e., pooled profit-sharing plans) unfolds its effect through an informal control practice (i.e., peer sanctioning) in a participative budgeting context.

4.5 CONCLUSION

In both experiments, I investigate peers' influence on honesty in participative budgeting, considering not only the effect of peer observability but also the effect of peer sanctioning. In Experiment 1, I show that in open internal reporting environments, honesty is higher when the possibility of peer sanctioning is present compared to when it is absent. This contributes to the participative budgeting literature by providing evidence for the possibility of peer sanctioning as another important mechanism of how peers affect managers' reporting behavior in open organizations.

In Experiment 2, I investigate whether the effect of peers' influence on honesty changes when a pooled profit-sharing plan is present. Although honesty is higher when a pooled profit-sharing plan is present compared to when it is absent, there is no interaction between the openness of the internal reporting environment and the presence of a pooled profit-sharing plan. Results show that the presence of a pooled profit-sharing plan increases the frequency of less honest managers being sanctioned. However, managers do not react to being sanctioned by reporting more honestly in the next budgeting period. A reason may be that sanctions in Experiment 2 are less explicit in expressing disapproval due to missing peer communication, which is the key part of the sanction according to results from Experiment 1. Another reason may be that participants care less about what others disapprove of because they are randomly rematched each period.

Results of comparing both experiments reveal that differences in honesty are due to differences regarding the emergence of a social norm of honesty. While results from the moderated mediation analysis, the post-experimental questionnaire, and the reactions of sanctioned participants provide support that a social norm of honesty has emerged in Experiment 1 and affects managers' behavior, results of Experiment 2 suggest no emergence of a social norm of honesty. These results contribute to the participative budgeting literature on social norms. Experiments 1 and 2 mainly differ in the operationalization of the sanctioning option and the consistency of group membership. Thus, these results highlight the importance of peer communication and frequent interactions of managers for the efficacy of peer sanctioning and the emergence of a social norm.

The results of the experiments contribute further to the participative budgeting literature on social norms by identifying individuals who bear the costs of sanctioning and are willing to enforce a social norm of honesty in participative budgeting. Results show that some managers are motivated to sanction dishonest reporting, although their payoff has not been harmed. Rather, it is the perception of managers that dishonest reporting is unfair or depicts an unequal contribution to a common goal that triggers sanctions. These managers who engage in third-party sanctioning (i.e., sanction of a party whose economic payoff is not harmed by the norm violation) are central to the efficacy of a social norm of honesty in participative budgeting.

Finally, however, honesty in an open internal reporting environment decreases over time in both experiments, even when the possibility of peer sanctioning is possible. Since current

literature has not yet considered peer sanctioning as another important mechanism in open internal reporting environments, future studies might investigate how peers' willingness to sanction norm violations is affected by other contextual factors not tested in both experiments. Thus, providing managers the possibility to sanction others might be able to prevent the decline of honesty in participative budgeting when the internal reporting environment is open.

5 COMBINING EXPERIMENTS AND AGENT-BASED MODELING

5.1 INTRODUCTION

In this chapter, I employ a mixed-method approach by combining experiments and agent-based modeling (ABM) to provide further support that a social norm of honesty drives the observed behavior in Experiment 1. Experiments are especially suitable for studying how an independent variable affects a dependent variable because experiments allow to rule out the effect of confounding factors by controlling the experimental environment (Gächter, 2009). To ensure a high level of internal validity, which is needed to make causal inferences (Abernethy, Chua, Luckett, & Selto, 1999), experiments focus on a few independent variables and mechanisms in controlled environments (Klingert & Meyer, 2012; Wall & Leitner, 2021). However, this narrow focus can be a problem when there are several plausible mechanisms predicting similar outcomes (Smith & Rand, 2018). For example, the accounting literature emphasizes that additional evidence is needed to increase confidence in the proposed causal mechanism when there are multiple plausible mechanisms (Asay, Guggenmos, Kadous, Koonce, & Libby, 2022). Here, ABM can complement experiments. With ABM, researchers can not only control the environment, but also control agents' behavior by explicitly modelling their decision rules (Klingert & Meyer, 2012). Thereby, ABM offers a cost-efficient possibility to test several mechanisms and help experiments to decipher between competing mechanisms (Smith & Rand, 2018).

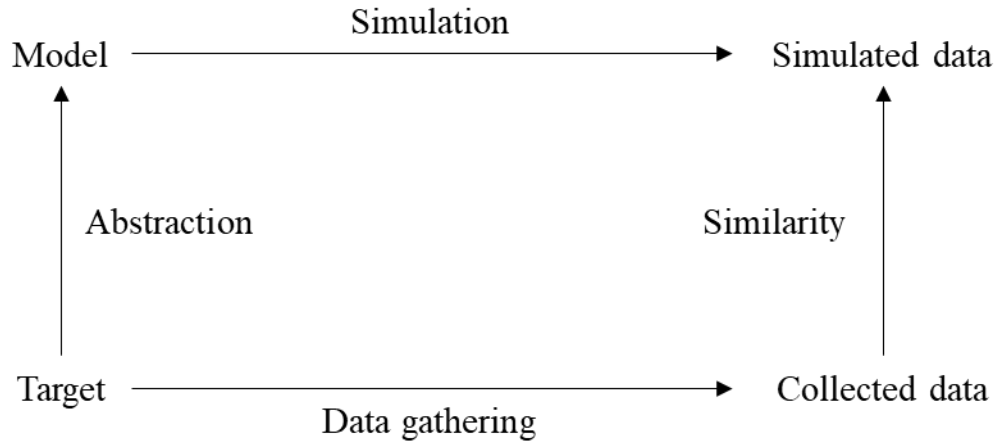
This chapter has five parts. In the first part, simulation modeling as a research method and ABM as a certain type of simulation modeling are briefly outlined. Second, I develop an agent-based model of the participative budgeting setting in Experiment 1. Therefore, I replicate the agent-based model by Andrighetto et al. (2013), which explicitly incorporates the salience of social norms as part of agents' decision process. Next, I adapt their model to the participative budgeting setting in Experiment 1 and use the empirical data to calibrate certain parameters. Fourth, simulation experiments are conducted, investigating how honesty is affected by different agent types, which are derived from agency and social norm theory. Finally, the simulated honesty levels are compared to the empirical honesty levels obtained from Experiment 1. This comparison serves as the basis for evaluating whether the agent type and the representing theory can reproduce the empirical data and, therefore, can be considered as a

plausible candidate for the mechanism in the targeted phenomenon. Specifically, the comparison aims to evaluate whether a social norm of honesty can explain the observed behavior in the experiments and, thus, managerial reporting in participative budgeting.

5.2 SIMULATION MODELING AS A RESEARCH METHOD

Simulations are a specific type of modeling. Like statistical models, simulations need inputs that are chosen by the researcher and produce outputs in the form of simulation runs, which represent the behavior of the model through time (Gilbert & Troitzsch, 2005). The logic of a simulation as a research method is shown in Figure 31:

Figure 31: Logic of Simulation as a Research Method



Note. From *Simulation for the Social Scientist* (2nd ed., p. 17), by N. Gilbert, K. G. Troitzsch, 2005, McGraw-Hill Education (https://cress.soc.surrey.ac.uk/s4ss/).

According to Gilbert and Troitzsch (2005), using simulation to answer a research question has several logical steps. The starting point is a target that represents the phenomenon under investigation, such as a social norm of honesty in participative budgeting. Next, based on the presumed social processes of the target, a simulation model is built in the form of a computer program. This computer program is used to generate simulated data, which is compared to empirical data collected from the target phenomenon. If the simulation model can reproduce the empirical data to some extent, the implemented social processes can be considered a plausible explanation for the processes in the targeted phenomenon. ABM is a certain approach of simulation modeling that is used when significant aspects of both the cognition of actors and

their social embedding (their social interactions and societal level constructs) should be represented in the model (Conte et al., 2014). ABM as a research method, at least partially, emerged as an answer to deductive, analytical modeling, which often requires assuming away actors' heterogeneity regarding their preferences, beliefs, and behaviors to be able to solve given differential equations. In contrast, ABM can show how complex social phenomena like social norms can emerge from heterogeneous individuals who learn, adapt, interact, and behave according to specified decision rules (Smith & Rand, 2018).

An agent-based model has three key elements: Agents, the environment in which agents are embedded, and the rules that determine how agents interact with other agents and the environment (e.g., Macal & North, 2010; Tesfatsion, 2006). An agent is an autonomous entity with its own properties, behaviors, and rules for interaction. A researcher codifies on the micro level how agents behave and interact with other agents and the environment and then investigates the emergent results on the macro level (Smith & Rand, 2018). These rules on the micro level specify agents' objectives and the range of possible actions from which they must choose to achieve their objectives (e.g., Safarzyńska & van den Bergh, 2010; Tesfatsion, 2006; Wooldridge & Jennings, 1995). Further, agents are endowed with specific capabilities regarding the information they can sense, process, and act on. The environment represents the second building block of an agent-based model and may refer to a physical space (e.g., geographical locations) but also to the conceptual space in which agents operate. The conceptual space, as it is more relevant for modeling participative budgeting, could refer to agents' context in which they must decide (e.g., being observed and potentially sanctioned by peers after reporting dishonestly). Finally, the third building block of an agent-based model specifies how agents interact with other agents and the environment. Agents may interact directly in the form of direct communication or indirectly by observing others' behavior, which affects their next decision (Safarzyńska & van den Bergh, 2010; Tesfatsion, 2001). For example, in the agent-based model by Andrighetto et al. (2013) that is used as a starting point for my agent-based model of participative budgeting, agents can directly communicate to others that cooperation is the appropriate behavior by sending a message. Further, agents affect others' norm perception indirectly through observable norm-compliance. In addition to specifying with whom agents interact and how, the modeler must also specify in which chronological order interactions occur and whether interactions change over time (Tesfatsion, 2017).

Whether ABM is suitable depends on the research question. In general, ABM should be considered if the research question investigates a phenomenon that emerges as the result of agents' interactions over time. Another characteristic of a research question favoring ABM is the complexity of agents' behavior. A particular strength of ABM is the possibility that agents can be modeled differently from other agents, representing heterogeneity within the population. If agents' heterogeneity is not important for the research question, system dynamics modeling or, in the case of a small number of actors, analytical modeling may be more feasible (Rand & Rust, 2011). The objective of this chapter is to provide further support for the hypothesis that a social norm is the mechanism underlying the observed behavior in Experiment 1. A social norm is a complex phenomenon that emerges as a result of individuals' decision-making in recurring situations (Bicchieri, 2006). Therefore, I consider ABM as suitable to achieve the research objective.

Before a researcher can use an agent-based model as a tool to generate data, it needs to be verified and validated (Macal & North, 2010; Rand & Rust, 2011). Verification describes the process that ensures that the computer program does what it is supposed to do. Besides documentation, programmatic testing, and test cases, model replication is an integral part of the process of verification. Model replication refers to the re-implementation of a conceptual model into programming code (i.e., replicated model) that was developed and already implemented by others (i.e., original model). If the output of the replicated model and the original model is similar, this increases the credibility that the computational model correctly depicts the textual descriptions of the conceptual model (Thiele & Grimm, 2015; Wilensky & Rand, 2007).

Validation is the process that proves whether the implemented model corresponds to the empirical target. A model is "valid" when it can be relied on to reflect the target's behavior (Gilbert & Troitzsch, 2005). The process of validation can be further decomposed into empirical input and output validation. Through empirical input validation, the modeler ensures that the model's assumptions correspond to the real world, for example, how fast agents start to imitate others when observing their behavior or how often they sanction others when reporting dishonestly. Empirical output validation is the key test of model validation, which tests whether the model's outcome corresponds to the real world. Besides stylized facts (Heine, Meyer, & Strangfeld, 2005; Meyer, 2019), empirical data can be used to show that the real world is a possible outcome of the implemented model. If the implemented model is able to reproduce the empirical data to some extent, the model and the implemented social processes can be

considered a plausible explanation for the processes in the targeted phenomenon (Gilbert & Troitzsch, 2005). Thus, to increase confidence in an agent-based model and its conclusions, empirical data should be used to calibrate the inputs of the agent-based model and to validate its outputs.

5.3 BENEFITS OF AGENT-BASED MODELING FOR EXPERIMENTAL BUDGETING RESEARCH

While experiments can benefit ABM, most importantly by validating the models' inputs and outputs, experiments can also benefit from ABM (Smith & Rand, 2018). ABM can help a researcher explore the long-run implications of their typically one-shot experiment. Further, ABM may reveal dependencies among actors or boundary conditions that lead to new hypotheses that have not been tested and motivate further experiments. Besides these two benefits, I focus on the capability of ABM to decipher between multiple plausible mechanisms.

In management accounting research, experiments are among the most frequently used methods. Examining all papers published in the Journal of Accounting and Economics, Journal of Accounting Research, the Journal of Accounting and Economics, The Accounting Review, and Accounting, Organizations, and Society from 2003 to 2013, Bloomfield, Nelson, and Soltes (2016) found that experiments and field studies are the most frequently used methods in management accounting research to gather data. Similarly, Guffey and Harp (2017) examine articles published in the Journal of Management Accounting Research from 1989 to 2013 and find that experiments are among the five most frequently used methods. According to the systematic literature review by Wibbeke and Lachmann (2020) and the overview of studies in Chapter 3, this applies in particular to the studies investigating budget slack in participative budgeting. Experiments are often used because randomization and a controlled setting provide high internal validity, which allows for studying causal relationships (Abernethy et al., 1999).

However, high control and, thus, internal validity come at the expense of the scope of mechanisms that can be investigated. To make strong causal inferences, experimental researchers systematically manipulate only a small number of independent variables while extraneous variables are held constant (Church & Ackert, 2017). In the face of multiple plausible mechanisms predicting similar outcomes, experimental research would have to conduct costly follow-up experiments to provide support for a specific mechanism.

Distinguishing between possible mechanisms may be crucial when the research goal is to derive effective interventions to change a certain behavior. For example, individuals may split their endowment in a dictator game equally for different reasons. On the one hand, they may split their endowment because they have a social preference for fairness and value an equal distribution (i.e., they choose fair behavior because they generally prefer fairness in social interactions) (Fehr & Schmidt, 1999). On the other hand, they may split their endowment because they comply with an established social norm of fairness (i.e., they choose fair behavior because they comply with their expectations about others' behavior and beliefs) (Bicchieri, 2006). Interventions that aim to increase fairness should be aimed at changing individuals' expectations about others' behavior and beliefs when a social norm is the underlying causal mechanism, while this is ineffective in the case of a mechanism rooted in the social preference for fairness.

ABM can complement experiments because it can serve as a cost-efficient testbed to evaluate different mechanisms. In comparison to experiments, a particular advantage of ABM is to have full control over individuals' decision processes at the micro-level (Klingert & Meyer, 2012). ABM allows the explicit implementation of key elements of a theory into the agents' decision processes and tests their implication at the macro-level (Janssen & Ostrom, 2006; Smith & Rand, 2018). In the situation of multiple plausible explanations for participants' behavior, ABM can be used to formally specify several plausible mechanisms and evaluate them by validating their aggregate outcomes with empirical data obtained from the experiment (Smith & Rand, 2018). There are some studies utilizing the potential of combining experiments with ABM. For example, Andrighetto et al. (2013) conducted an experiment where participants played variations of a public-good game. Then, the authors develop an agent-based model explicitly incorporating agents' motivation to comply with a salient social norm to test whether a social norm can explain the different cooperation levels in the experiment. Lorscheid and Meyer (2021) investigate team decisions using their empirical data from an experiment to implement different team decision processes in an agent-based model and validate the model-generated decision against the team decisions made in the experiment. Therefore, I also use this mixed-method approach combining experiments and ABM to further evaluate whether a social norm of honesty is the underlying mechanism of managers' reporting behavior. The data from Experiment 1 is used to validate essential inputs and outputs of the agent-based model.

5.4 REPLICATION OF THE AGENT-BASED MODEL BY ANDRIGHETTO ET AL. (2013)

5.4.1 MODEL DESCRIPTION

As a starting point for developing an agent-based model of participative budgeting, the agent-based model by Andrighetto et al. (2013) is replicated. The authors investigate the interaction of material punishment and normative information on cooperation rates in a public good game. They hypothesize that the combination of material punishment with normative information, what they call a sanction, is more effective in increasing cooperation in a public good game than material punishment or norm information alone. The reason is that sanctions are more effective in making a social norm salient in an individual's mind (Andrighetto et al., 2013). Looking back to Sections 2.2.1 and 2.2.2, increasing the salience of a social norm means increasing individuals' empirical and normative expectations due to situational cues (Bicchieri, 2006). Recent results in laboratory experiments show that observers have higher empirical and normative expectations when they observe punishment in combination with normative information (H. Chen et al., 2020).

To test their hypothesis, Andrighetto et al. (2013) conducted a laboratory experiment where participants played a variation of the public good game, varying whether punishment, norm communication, or both are possible. In addition, they develop an agent-based model in which agents play the same public good game as in the laboratory experiment and explicitly incorporate the motivation to comply with a social norm as part of the agent's decision process. The idea of developing an agent-based model is to compare the behavior of the agents in the model where a social norm is part of the agents' decision process with participants' behavior in the laboratory experiment to provide support for the authors' hypothesis that a social norm of cooperation is the mechanism underlying the observed behavior in the experiment.

In the model, 48 agents are divided into groups of four agents that play the public good game for 30 periods. In line with the laboratory experiment, the 30 periods are divided into three parts. In the first part (Period 1 – 10) and the third part (Period 21 – 30), agents play a standard public good game in which agents simultaneously must decide whether they want to contribute their endowment to the public good. To simplify the model, agents' contribution choice is binary: each agent chooses to cooperate and contribute the whole endowment of 20 units (*C*) or to defect by contributing 0 units to the public good (*D*). Agents can observe other agents'

contributions but cannot directly respond to others' behavior. The following Equation 11 shows how the Agent *i*'s payoff, P_i, is affected by the behavior of the other three agents:

$$P_i = 20 - C_i + 0.4 \sum_{j \neq i}^{l} C_j \quad (11)$$

Where C_i represents the integer contribution of Agent *i* that can only take the value of 0 or 20. In the second part of the 30 periods (Period 11 – 20), each period consists of two stages. First, agents decide to cooperate or defect. Second, after observing others' contributions, agents can react to agents who did not contribute. As in the experiment, depending on the treatment, agents can decrease other agents' payoff through punishment, send them messages without material consequences, or both.

In the punishment treatment, in each period, agents who cooperated can choose to punish agents who defected. Being punished decreases the punished agent's payoff by 30 units (high) or five units (low), depending on the punishment's severity. In line with the experiment, punishing is also costly for the punishing agent in the ratio of 1:3. Thus, inflicting a punishment with high severity costs the punishing agent 10 units. In the message treatment, in each period, agents who cooperated can send a message to other agents who defected. The message does not affect anyone's payoff but is an explicit expression of the agent's disapproval of others' behavior. Finally, in the sanction treatment, agents who cooperated can punish and send messages to agents who defected.

The model is dynamic in that agents observe other agents' behavior, changing their preference to follow a social norm over time and thus going beyond a purely static social preference model. The choice to report honestly depends on a probability that is updated every period as a function of agents' individual drive and normative drive. The individual drive (*ID*) reflects agents' goal to maximize their payoff, not considering what the norm prescribes, and is updated with a winner-stay-losers-change algorithm. The normative drive (*ND*) reflects agents' motivation to comply with the social norm, dependent on the norm's salience. In sum, in each period, each agent goes through the following steps:

1. Make a decision (i.e., to cooperate or to defect)
2. Observe the decision of the other three agents
3. Assign punishment points and send messages to the other two agents (if possible)

4. Process information from the previous period
   a. Update *ID*
   b. Update *ND*
   c. Update cooperation probability

5.4.2 Normative Drive, Individual Drive, and Cooperation Probability

Individual drive

Agents' decision to cooperate or defect in a period depends on a probability that is a function of agents' *ID* and *ND*, which are updated in each period. The *ID* reflects agents' goal to maximize their utility by increasing their payoff without considering what the norm prescribes. Agents update their *ID* depending on a winner-stay-losers-change algorithm. Therefore, agents calculate the payoff for the action taken and the potential payoff for the other action considering the number of cooperators in the previous period. Then, the *ID* moves towards the action with the potential higher payoff. If the payoff for defecting is lower than the potential payoff for cooperating, agents' *ID* directs their choice towards cooperation.

Agents' payoffs depend on their actions, the number of cooperators in a group, and the resulting costs from imposing and receiving punishments and sanctions. Agents have a memory to keep track of received punishment and normative messages that affect their *ID*. When agents find a memory of being punished in a previous period, they always include the material consequences of high punishment (i.e., payoff deduction of 30 units) in their calculation of the potential payoff for defecting. This depicts a risk-averse calculation as high punishment is the most extreme case when defecting. When agents receive a normative message, they initially consider this as a real threat and include the material consequences of high punishment in their calculation of the payoff for defecting. The normative message as a threat loses its credibility after two periods if it is not supported by punishment. Finally, agents forget that they have received messages and punishments with a certain probability. Thus, agents may not consider the material consequences of high punishment in their calculation, although they have received punishment or a normative message in a previous period.

Normative drive

The agent's *ND* is updated every period based on the agent's perception of the norm salience. In the model, norm salience is an agent's perception regarding the importance of the social

norm of cooperation within the group. Norm salience is endogenously updated every period for each agent according to the norm cues an agent receives. Norm cues include agents' personal decisions and gathered normative and social information when observing and interacting with the other three agents in the same organization. Agents are modeled using an architecture to store memories of perceived norm cues (called the "EMIL-I-A architecture," see Conte et al. (2014, pp. 162-166)). The influence of the different norm cues on the norm salience is derived from Cialdini, Reno, and Kallgren (1990) and defined in Andrighetto et al. (2013), as summarized in Table 27.

Table 27: Norm Cues and Weights

Cue	Acronym	Weight
Observed Compliance/Violation	O_C and O_V	$W_O = 0.33$
Punishment Inflicted/Observed/Received	*Pun*	$W_P = 0.33$
Sanction Inflicted/Observed/Received	*S*	$W_S = 0.99$
Explicit Norm Invocation	*E*	$W_E = 0.99$
Observed Non-Punished Violation	*NPV*	$W_{NPV} = 0.66$
Own Compliance/Violation	*C* and *V*	$W_C = 0.99$

The salience of the norm is increased by acts that can be interpreted as norm compliance, the transmission of normative information, or norm enforcement. Acts in which norm compliance is explicitly requested, like sanctions or normative messages, increase the norm salience more strongly (i.e., a weight of 0.99) than acts that rather implicitly indicate the existence of the social norm, such as observed compliance or punishment (i.e., a weight of 0.33). In contrast, observations of non-punished norm violations reduce the salience of the norm as it can be interpreted as a decreasing interest of the group to comply with and enforce the social norm. Finally, the agent's own behavior affects norm salience in a self-enforcing way. Agents register the occurrences of every norm cue in every period and update the salience of the norm according to the following function from Troitzsch (2021):

$$Sal_i^t = \alpha\,(\beta + \frac{C-V}{C+V}w_c + \frac{O_c-O_v}{O_c+O_v}w_o + \frac{\max(0,(O_v+V)-Pun-S)}{O_v+V}w_{npv} + \frac{Punw_p+Sw_s}{\max(Pun+S,O_v+V)} + \frac{E}{V}w_E) \quad (12)$$

Where Sal_i^t represents the salience of the norm for Agent *i* in Period *t*. The terms α and β are chosen dependent on the weights of all norm cues such that the salience of the norm remains in

the range from 0 to 1. Finally, *C*, *V*, O_C, O_V, *P*, *S*, and *E* are the registered occurrences of each cue over time, which are weighted with their specific weight according to Table 27.[55] Note that, unlike the other norm cues, the non-punished norm violations (acronym NPV) cannot be found in the formulation because they have to be calculated by comparing unpunished norm violations to overall norm violations (see the fourth term in Equation 12). The salience of the norm ranges from 0 to 1, where 0 represents that the norm is not salient at all and 1 represents a maximum salient norm. Since agents may receive different norm cues to update norm salience, there is heterogeneity regarding norm salience within the population. Agent's *ND* in Period *t* equals agent's perceived salience of the norm in Period *t*:

$$ND^t = Sal^t \tag{13}$$

Cooperation Probability

The extent to which *ID* and *ND* affect the agents' probability to cooperate in a Period *t* is determined through the parameters of individual weight (*IW*) and normative weight (*NW*). These parameters express the importance of individual drive and normative drive for agents' decision-making. Using the agent's individual drive and normative drive, as well as the parameters individual weight and normative weight, the agent's probability to report cooperate *p* is calculated as follows:

$$p_i^t = p_i^{t-1} + (ID_i \cdot IW + ND_i \cdot NW)$$

$$p_i^t = \begin{cases} 0 \ if \ p_i^t \leq 0 \\ p_i^t \ if \ 0 < p_i^t < 1 \\ 1 \ if \ p_i^t \geq 1 \end{cases} \tag{14}$$

Where p_i^t is the probability of Agent *i* cooperating in Period *t*. While agents' *ID* and *ND* are updated every period, Andrighetto et al. (2013) fix the values for the *IW* and *NW* at 0.5. Thus, agents consider both drives equally when updating their probability to cooperate. While agents' *ID* ranges from -1 to 1 and can negatively or positively affect agents' probability to cooperate,

[55] The original model by Andrighetto et al. (2013) also calculates norm salience on the basis of registered occurrences of each norm cues and their specific norm weight but utilized a different function:
$Sal_i^t = Sal_i^{t-1} + \frac{1}{\alpha + \omega}(W_C + W_O \cdot O + W_{NPD} \cdot NPD + W_P \cdot P + W_S \cdot S + W_M \cdot M)$
Since the model description lacks information about some important parameters, I decide to use the function by Troitzsch et al. (2021) which uses a similar approach.

agents' *ND* ranges from 0 to 1 and thus can only positively affect agents' probability to cooperate. In 95% of the cases, agents' decision is based on their cooperation probability, but they have a 5% probability of taking a random action, which represents a mutation in their strategy.

5.4.3 Comparison of the Original and Replicated Model

The success of a replication refers to whether the replicated model can produce outputs that are sufficiently similar to the outputs of the original model. To evaluate the quality of the replication, Axtell, Axelrod, Epstein, and Cohen (1996) proposed three replication standards: numerical identity, distributional equivalence, and relational equivalence. Numerical identity refers to the situation in which the original and the replicated model produce the exact same numerical results. Distributional equivalence refers to the situation where one cannot statistically distinguish the output of the original and the replicated model. Relational equivalence refers to the situation where the original and replicated model show distributional differences, but the relations between the input and output of both models are qualitatively the same.

One of the benefits of replication is that a successful replication adds credibility to the replicated model and qualifies for further developing the model (Wilensky & Rand, 2007). The goal of Chapter 5 is to adapt the agent-based model by Andrighetto et al. (2013) to the participative budgeting setting in Experiment 1 and compare agents' norm-guided behavior in the model with the participants' behavior in Experiment 1 (see Section 4.3). Thus, replicating the original model by Andrighetto et al. (2013) is a good step to increase the credibility of the agent-based model before adapting it to the participative budgeting setting. In Experiment 1, there is only one condition in which participants can assign punishment points but then also must send a normative message to the norm-violator. Therefore, I replicate the sanction treatment of the original model as this treatment, unlike the other two treatments, considers the combination of punishment and normative messages (what the authors define as a sanction).

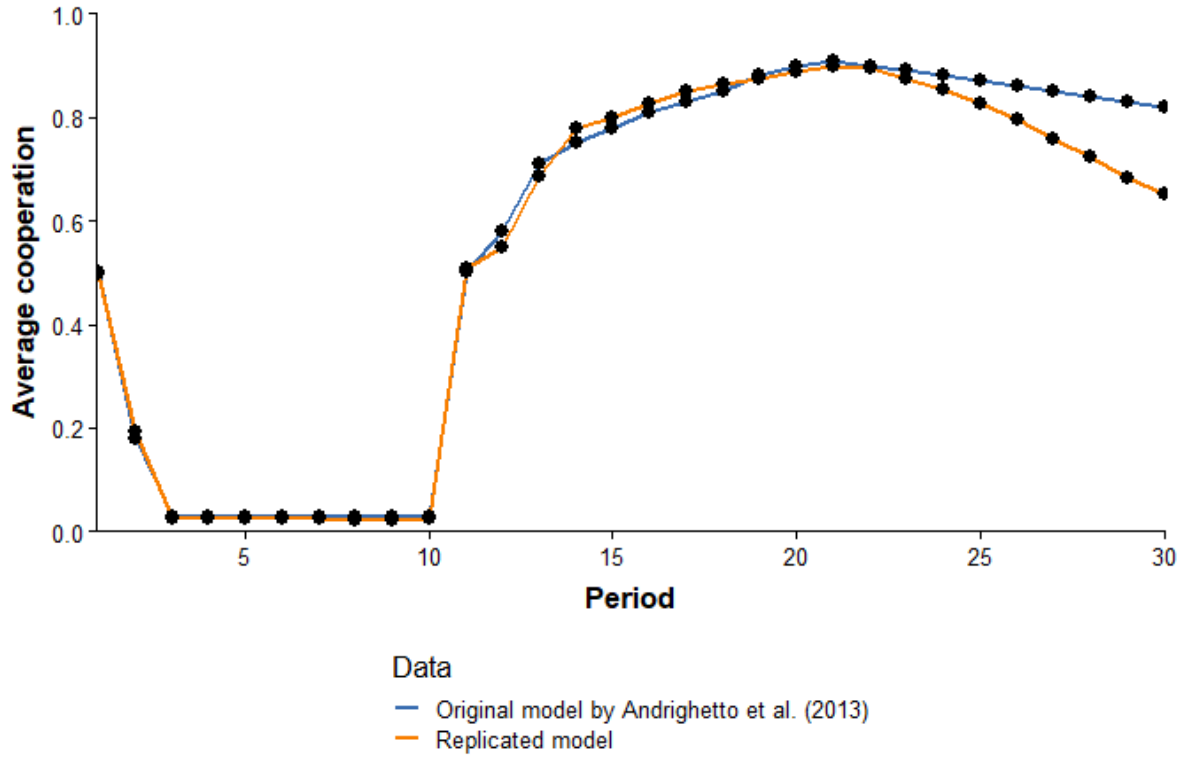
In line with the original model, the replicated model has 48 agents divided into 12 groups of four agents. Agents play the public good game for 30 periods and must decide in each period whether to cooperate (i.e., contribute their endowment of 20 units to the public good) or to defect (contribute 0 units to the public good). While agents who cooperated can punish and

send normative messages to agents who defected only from Period 11 to 20, there is no possibility to punish or send messages in all other periods. The *IW* and *NW* are set to 0.5, and agents' initial probability of sending monetary punishments in Period 11 equals 50% (Andrighetto et al. (2013) extracted this information from their experimental data). Following the original model, agents' probability of punishing a defector is inversely proportional to the number of defectors within their group. In addition, agents' probability of sending a message is proportional to the salience of the norm. Thus, the higher agents perceive the norm's salience, the higher their probability of sending a message to a defector. The probability for an agent to forget previous punishment or cheap talk is set to 0.3. Finally, there are a few assumptions I must make because there is no further explanation in the description of the original model. First, I set the initial probability to cooperate to 0.5 as the cooperation rate in Period 1 is 0.5 in all versions of the original model. Second, agents' probability to punish a defector equals 100% if there is only one defector, 50% if there are two defectors, and 33% if there are three defectors in the group of the cooperator.

Following the original model, 1000 independent simulation runs are conducted in which 48 agents are created each and divided into groups of four to play the public good game over 30 periods. Then, the cooperation rate is measured in each period as the number of cooperators divided by the total number of agents. Finally, the cooperation rate for each period is averaged over all 1000 simulation runs. Figure 32 shows the results produced with the original model in comparison to the results produced with the replicated model.[56] Both models show that without the possibility to punish or send messages, the initial average cooperation rate declines quickly and stays at a low level, where nearly all agents defect until Period 10. In Period 11, where agents can punish and send messages to agents, the average cooperation rate in both models increases up to approximately 0.5 and further increases continuously until Period 21. Then, the average cooperation slightly decreases over the remaining nine periods because there is no option to punish or send messages anymore. Comparing the results reveals differences between the original and replicated model beginning in Period 22. Here, the average cooperation rate is higher in the original model than in the replicated model, and the average cooperation rate produced by the original model remains above the average cooperation rate produced by the replicated model.

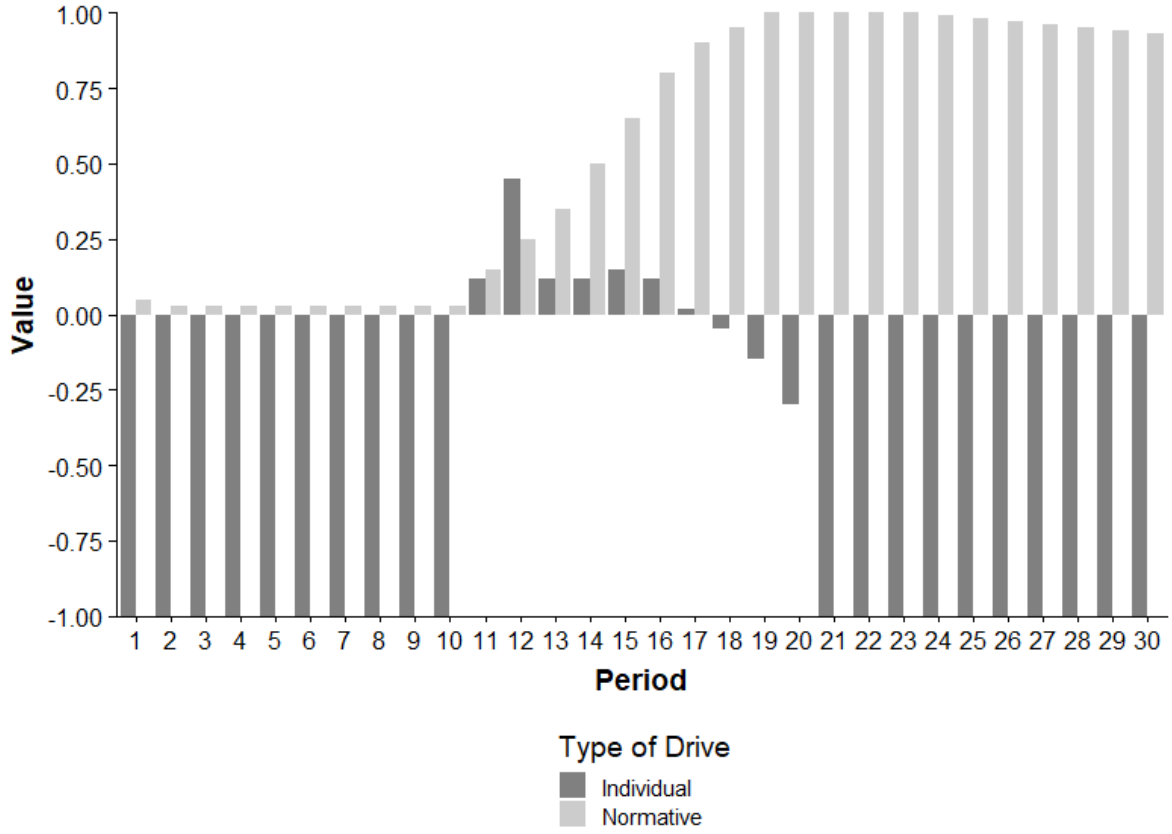
[56] Since no data is available for the original model, the cooperation rates of the original model over time are taken from the corresponding Figure 2A in Andrighetto et al. (2013).

Figure 32: Average Cooperation in the Original Model and Replicated Model



Agents' *ID* and *ND* over time are another important dimensions to evaluate the success of the replication. Figure 33 and Figure 34 show the agents' *ID* and *ND* averaged over all 1000 simulation runs for each period in the original and replicated model. In the original and replicated model, agents' *ID* is -1 from Period 1 to Period 10. The reason is that there is no risk of being punished, and without the monetary consequences of punishment, defection always yields the highest payoff. When agents can punish and send messages to defectors, agents' average *ID* increases and turns positive in the first half of the second block of periods (i.e., Periods 11 to 20) but then decreases and turns negative again. The reason is that as more and more agents decide to cooperate, no further punishment is inflicted due to the lack of defectors. Then, some agents forget to be punished in a previous period and no longer consider the monetary consequences of punishment. Thus, defection again yields the highest payoff and directs the *ID* towards -1. From Period 21 to 30, when agents cannot punish or send messages to defectors anymore, agents' average *ID* is -1 again. Comparing the results reveals marginal differences from Periods 11 to 20. Here, the average *ID* in the original model turns immediately positive in Period 11 while it is still negative in the replicated model. While both models have the highest average *ID* in Period 12, the average *ID* in the replicated model turns negative faster than in the original model.

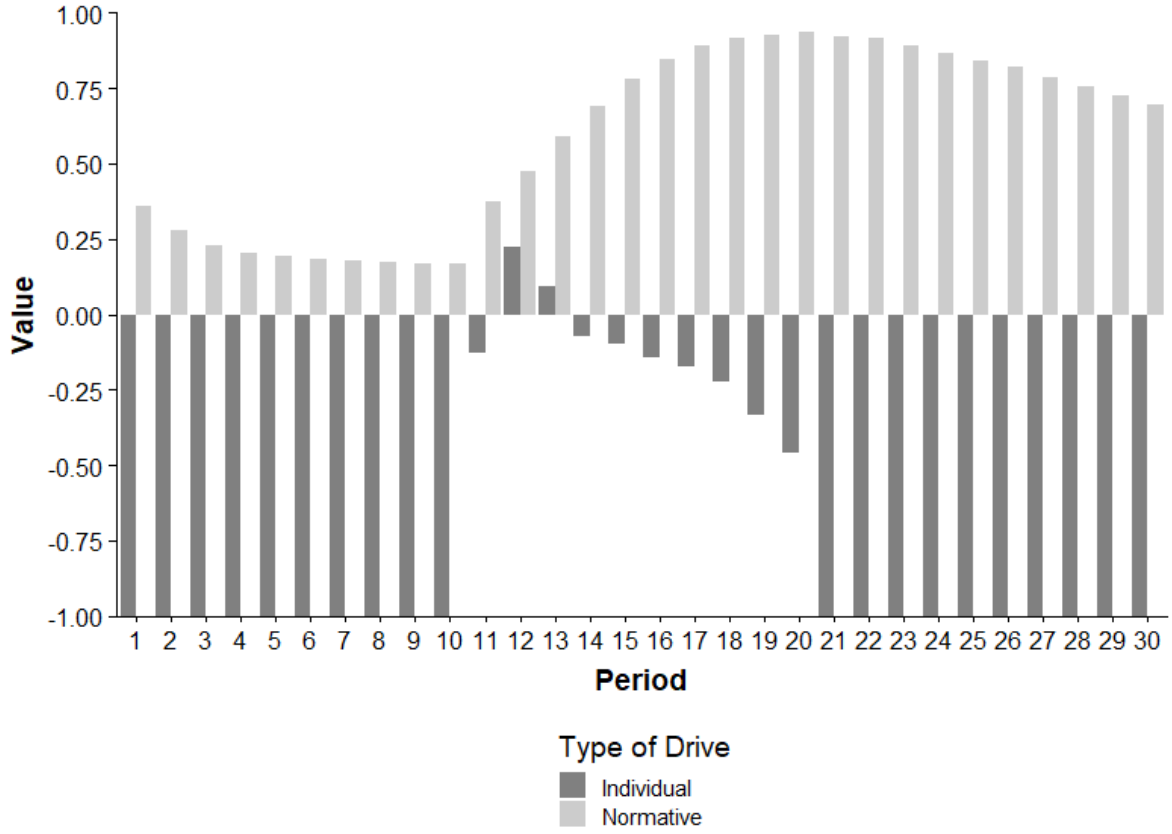
Figure 33: Individual and Normative Drive in the Original Model



Note. From "Punish and Voice: Punishment Enhances Cooperation when Combined with Norm-Signalling", by G. Andrighetto, J. Brandts, R. Conte, J. Sabater-Mir, H. Solaz, and D. Villatoro, 2013, *PLOS ONE*, 8(6), e64941, (https://doi.org/10.1371/journal.pone.0064941).

Regarding the average *ND* in both models, the results show that from Period 1 to 10, the average *ND* is near 0 as agents defect to yield a high payoff and observe norm violations that are not punished. From Period 11, agents' average *ND* increases continuously as agents can explicitly request norm compliance through normative messages and sanctions. As more agents decide to cooperate, they self-enforce their perception of the norm salience, and fewer norm violations can be observed. The average *ND* increases until the maximum of 1 around Period 19. After that, it only slightly decreases until period 30.

Figure 34: Individual and Normative Drive in the Replicated Model



Comparing the original and replicated models reveals differences. In contrast to the original model, the average *ND* in the replicated model peaks around Period 20 and never reaches the maximum value of 1. Further, the average *ND* in the original model stays near the maximum value of 1 until Period 30, while the average *ND* in the replicated model slowly decreases. This also explains why the average cooperation rate in the original model remains at a constant level from Period 21 to 30 while the average cooperation rate in the replicated model slowly decreases.

Overall, the original and replicated model produces results that are qualitatively very similar but quantitatively different. The biggest difference can be found in the dynamic of agents' *ND*. The implemented mechanism to update norm salience is based on Troitzsch (2021) and not on Andrighetto et al. (2013) due to a lack of explanation regarding implementation in the original model. Therefore, it is reasonable to assume that the difference is due to a different processing of norm cues when updating agents' perception of the norm salience. For example, in the

original model, norm cues are counted per period, while Troitzsch (2021) cumulates norm cue occurrences over time while discounting earlier registered norm cues.

Since the results of the original model are not available as raw data, I cannot evaluate the numerical identity or distributional equivalence. However, according to the replication standards proposed by Axtell et al. (1996), the results of both models are "relational equivalent" and hint at a "distributional equivalence". Therefore, I use this replication as a starting point to build an agent-based model of participative budgeting in the next section.

5.5 DEVELOPING AN AGENT-BASED MODEL OF PARTICIPATIVE BUDGETING

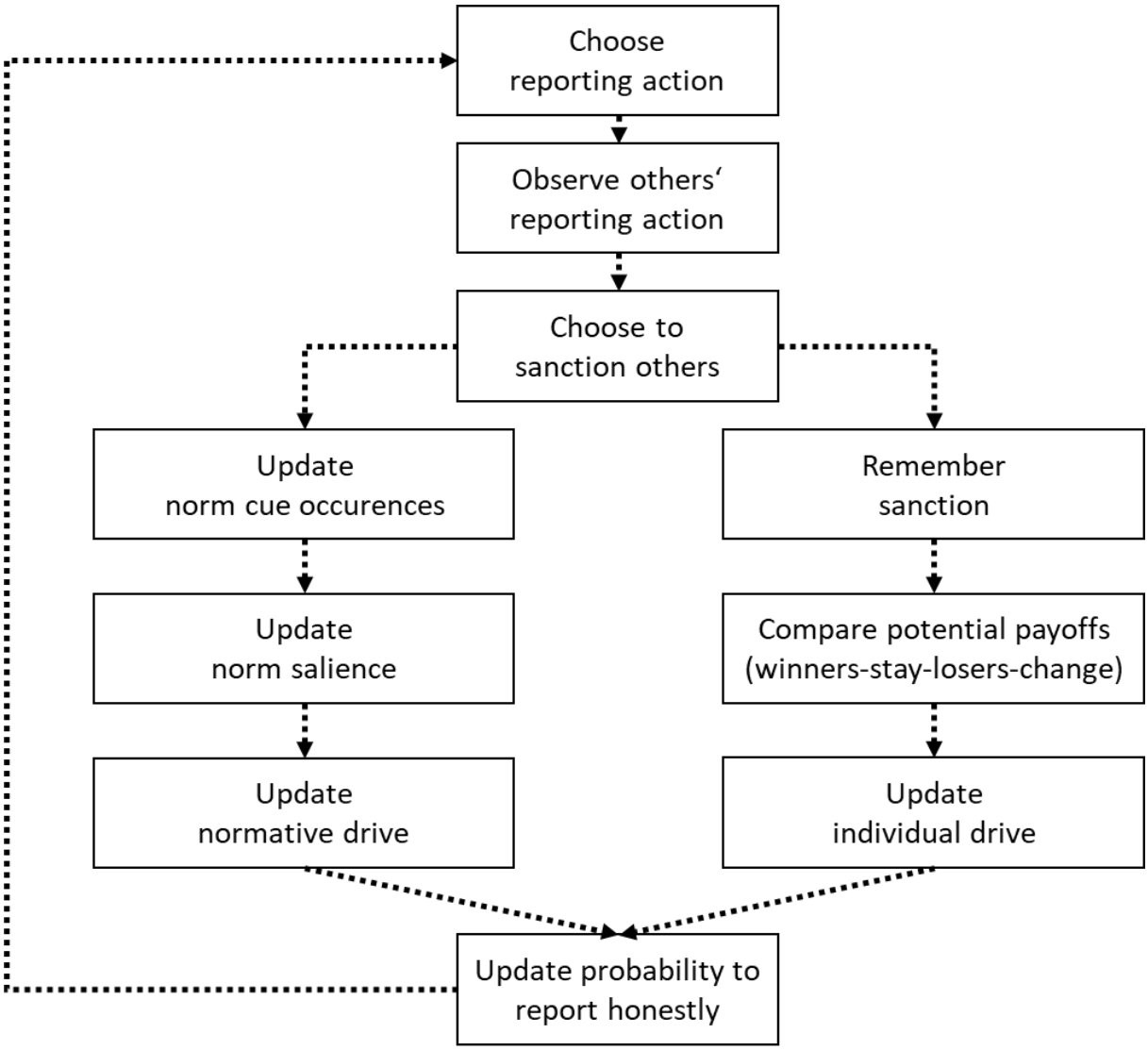
5.5.1 MODEL DESCRIPTION

This agent-based model aims to represent the participative budgeting setting from Experiment 1. Therefore, each agent represents a division manager, and three managers form an organization. In each period, agents learn the true costs of their division and decide whether to report honestly and to sanction the other two agents for their reporting choice. To simplify the model, agents' reporting choice is binary: report the true costs (i.e., report honestly) or report the highest possible cost of 5,500 Lira (i.e., report dishonestly). The true costs sequence is the same as in Experiment 1. Thus, in each period, agents can yield the same budget slack as participants in Experiment 1. Agents who reported honestly in a given period can sanction agents who reported dishonestly after observing their reporting choices. In line with the experiment, agents can assign up to 10 sanction points that reduce the sanctioned agent's payoff by 10% per sanction point but are also costly for the sanctioning agent. Figure 35 shows the procedure for each agent in each budgeting period.

In line with the original model, the choice to report honestly depends on a probability that is updated every period as a function of agents' *ID*, *IW*, *ND*, and *IW* (see Equation 15).

$$p^{\text{honest in t}} = p^{\text{honest in t-1}} + (ID \times IW + ND \times NW) \tag{15}$$

Figure 35: Sequence of Events in the Participative Budgeting Model



After agents decide whether to report honestly and to sanction other dishonest agents in their organization, each agent updates its *ID* and *ND*. To update the *ID*, agents calculate their potential payoff separately for each reporting choice, considering the true costs in this period. If agents have received sanction points in a previous period, they consider these when calculating the potential payoff for reporting dishonestly. Then, the *ID* moves towards the reporting choice that returns the potential higher payoff. To update the *ND*, the norm salience mechanism from Troitzsch (2021) is used. Agents register the occurrence of every norm cue they receive, which includes the following:

- Own norm compliances and violations (*C* and *V*),
- Observed norm compliance and violations (O_C and O_v),
- Sanctions inflicted, observed, or received (*S*),

- Explicit messages sent, observed, or received (*E*) and
- Observed non-sanctioned norm violations (*NPV*)

Table 28 gives an overview of the variables that are used to determine an agent's reporting choice. Being sanctioned and the intensity with which agents are sanctioned play a central role in determining agents' *ID*. Thus, agents' probability of sanctioning other dishonest agents is very important for the dynamic of norm compliance in the model. I extracted agents' probability to sanction dishonest agents from the results obtained from Experiment 1. In Condition 3 of Experiment 1, participants sanctioned less honest participants in about 44% of the cases and mostly assigned one to three sanction points. Thus, an honest agent sanctions a dishonest agent with a probability of 44%. If agents decide to sanction, they assign a randomly chosen number of sanction points, where the probability of assigning a certain number of sanction points corresponds to the relative frequency observed in Experiment 1. If agents choose to sanction, they also send a message indicating honest reporting as appropriate behavior. Additionally, I extract the initial probability to report honestly from Experiment 1 (equals 72%).

Table 28: Overview of Variables

Variable	Description
Strategy	Agent's previous reporting choice
Sanction	Number of sanction points received in the current period
Remember sanction	Remember being sanctioned in a previous period
ID	Agent's individual drive
C	Number of own norm compliance
V	Number of own norm violation
O_C	Number of observed norm compliances
O_V	Number of observed norm violations
S	Number of sanctions inflicted/observed/received
E	Number of explicit norm messages sent/observed/received
NPV	Number of observed non-punished norm violations
Sal	Agent's perceived salience of the norm
ND	Agent's normative drive

Finally, following the original model, agents forget that they have been sanctioned in a previous period with a probability of 30% each period and consider their *ID* and *ND* equally when updating their probability to report honestly; thus, *IW* and *NW* equal 0.5. Table 29 summarizes the global variables of the model.

Table 29: Overview of Global Parameters

Variable	Description	Value
n	Number of agents in the population	48
k	Number of agents per organization	3
IW	Individual weight	0.5
Salary	Manager's fixed salary in each budgeting period	500
p_{honest}	Probability to report honestly (Initial value extracted from Experiment 1)	0.72
$p_{sanction}$	Probability that an agent sanctions a dishonest agent (extracted from Experiment 1)	0.44
$p_{sanction\_intensity}$	Probability that an agent sanction assigns X sanctions points to a dishonest agent (data from Experiment 1)	P(X=1) = 0.50, P(X=2) = 0.25, P(X=3) = 0.10, P(X=4) = 0.01, P(X=5) = 0.05, P(X=6) = 0.02, P(X=7) = 0.01, P(X=8) = 0.01, P(X=9) = 0.00, P(X=10) = 0.05

5.5.2 Comparative Analysis of Theory-Compliant Submodels

In Experiment 1, it is argued that honesty is higher in an open internal reporting environment when the possibility of peer sanctioning is present than when it is absent. The argumentation is that the social norm of honesty is more salient, which motivates more participants to comply with the social norm and report honestly. The reason is that being sanctioned gives participants a clear signal that peers view dishonest reporting as a norm violation, which increases

managers' perceived salience of the social norm of honesty (Dimant et al., 2021). However, an alternative explanation may be rooted in agency theory. Agency theory predicts that individuals are solely motivated by material self-interest and want to maximize their utility by increasing wealth (Baiman, 1990). Since sanctions significantly decrease participants' payoff, reporting honestly and thereby avoiding any sanctions may become participants' preferred reporting choice because it potentially yields the highest payoff. Thus, participants are still solely motivated by material self-interest and simply report more honestly because they want to avoid sanctions when the possibility of peer sanctioning is present. This alternative explanation only considers the material consequences of sanctions but not sanctions' norm-signaling function. To test the feasibility of these two explanations as the mechanism underlying the experiment results, submodels based on social norm and agency theory are implemented. Next, simulation experiments are conducted to compare the resulting honesty levels.

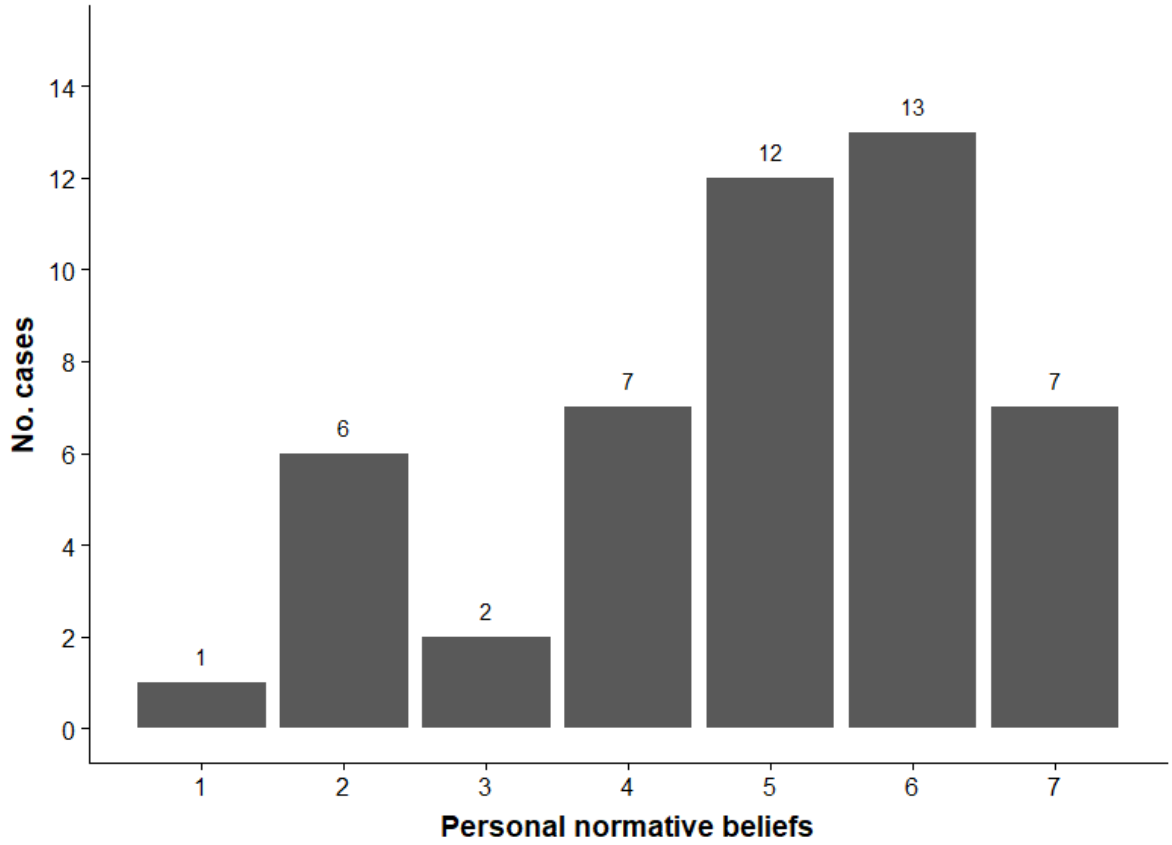
To build different submodels, the agents' *IW* and *NW* are varied to build four different submodels with theory-compliant agents:

Submodel 1: Agents based on agency theory (*IW* = 1.0, *NW* = 0.0)
Submodel 2: Agents based on social norm theory (*IW* = 0.5, *NW* = 0.5)
Submodel 3: Agents based on social norm theory (*IW* = 0.0, *NW* = 1)
Submodel 4: Combination of Submodels 1, 2 and 3

In Submodel 1, agents' *IW* is 1, and *NW* is 0. Thus, agents only consider the material payoff of an action when updating their probability to report honestly in the next period. Since agency theory assumes that the maximization of wealth is the agents' sole motivation (Baiman, 1990), this can be considered a good approximation for an agent based on agency theory. Submodels 2, 3, and 4 are based on social norm theory. In Submodel 2, agents' *IW* is 0.5, and *NW* is 0.5. Thus, agents consider their wealth and compliance with the social norm of honesty equally when updating their probability to report honestly in the next period. This proxies the tradeoff between utility from material possessions against disutility from norm violation (Bicchieri, 2006, p. 52). In Submodel 3, agents' *IW* is 0.0, and *NW* is 1. Thus, agents solely consider norm compliance when updating their probability to report honestly in the next period. This proxies an agent who is strongly affected by their empirical and normative expectations (i.e., the salience of the social norm).

Submodel 4 is a combination of all three submodels. According to social norm theory, individuals differ regarding the extent to which their empirical and normative expectations affect their behavior, which is defined as norm-sensitivity (Bicchieri, 2006). Some individuals may change their behavior moderately as a reaction to a change in their empirical and normative expectations, while others react more strongly or not at all. While the proportion of these types in a population depends on how well the respective social norm is established in a population (Bicchieri, 2017, pp. 166-167), the observed proportion of participants' personal normative beliefs from Experiment 1 is used to calibrate Submodel 4. The moderated mediation model of Experiment 1 (see Section 4.3.4) shows that the effect of participants' empirical expectations on their average honesty is moderated by participants' personal normative beliefs, Therefore, the distribution of participants' personal normative beliefs as shown in Figure 36 is used to calibrate the proportion of agent types in the model.

Figure 36: Distribution of Personal Normative Beliefs (Experiment 1)



Note. Personal normative beliefs are measured by asking participants to state their agreement with the following question on a 7-point Likert scale (1 = *not at all* and 7 = *very much*): "Do you personally believe that one should report the true costs to corporate headquarters?"

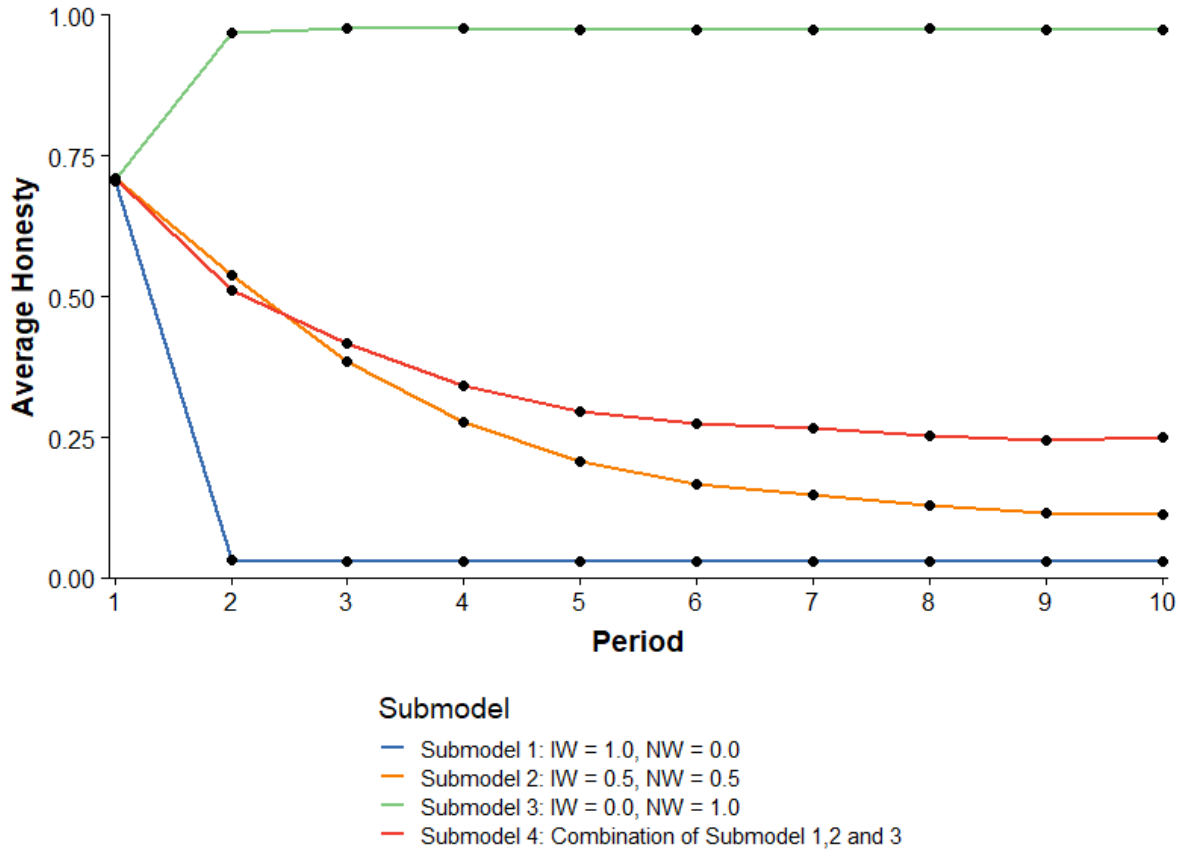
According to the moderated mediation model, for participants with low values of personal normative beliefs (i.e., a value of 3.4 and below), the effect of empirical expectations on honesty is not significant (b = -0.01, t = -0.49, p = 0.63). These participants seem to be unaffected by their empirical expectations and indicate through their personal normative beliefs that they personally think one should overstate costs. Therefore, these participants are mapped to Submodel 1, where agents are based on agency theory and only consider the material payoff of an action. For participants with moderate values of personal normative beliefs (i.e., a value between 3.4 and 6.9), the effect of empirical expectations on honesty is significant (b = 0.05, t = 2.59, $p < 0.05$). Thus, these participants are mapped to Submodel 2, where agents consider both their wealth and compliance with the social norm of honesty when updating their probability to report honestly in the next period. For participants with high values of personal normative beliefs (i.e., a value above 6.9), the effect of empirical expectations on honesty is also significant (b = 0.11, t = 4.55, $p < 0.01$), and the effect on honesty is even higher compared to participants with moderate values of personal normative beliefs. Therefore, these participants are mapped to Submodel 3, where agents only consider norm-compliance when updating their probability to report honestly in the next period because these participants all indicate the highest possible value of personal normative beliefs (i.e., a value of 7). Accordingly, the population in Submodel 4 consists of 19% agents from Submodel 1 (9 out of 48), 66% agents from Submodel 2 (32 out of 48), and 15% agents from Submodel 3 (7 out of 48).

To systematically investigate the effect of the different agent types on honesty, simulation experiments are conducted to analyze the effect of the submodels (independent variable) on honesty (dependent variable). Following Lorscheid, Heine, and Meyer (2012), Table 30 explicates the design of the simulation experiments. Following Andrighetto et al. (2013), 1000 simulation runs are conducted in which 48 agents each are created and divided into groups of three to form 16 organizations. Further, each simulation run was performed with 10 periods representing the 10 budgeting periods. In each period in each run, the honesty level of the population is calculated as the average honesty of all 48 agents. Figure 37 shows the average honesty of the 1000 populations in each period for all four submodels.

Table 30: Design of Experiment

Independent variable	Control variables	Dependent variable
Different submodels	Budgeting periods	Honesty
	Reporting choice	
	True costs	
	Initial probability of reporting honestly	
	Probability to sanction	
	Intensity of sanctioning	
	Forgetting probability	
	Number of simulation runs	

Figure 37: Honesty per Submodel and Period



In Submodel 1, where agents solely consider an action's material consequences, average honesty rapidly declines after Period 1 and remains at a very low level throughout the remaining nine periods. Average honesty is very low but remains slightly above 0 because some of the agents who report dishonestly in Period 1 are sanctioned, making honest reporting the wealth-maximizing reporting choice for the next period. Further, these agents also may sanction other agents who report dishonestly. As most agents report dishonestly after Period 1 and only a few agents are left to sanction, average honesty remains at this very low level until Period 10.

In Submodel 2, where agents consider an action's material consequences and norm compliance equally, average honesty declines quickly from Period 1 to 6, where average honesty stabilizes around 0.12. The reason is that agents have a high *ND* due to many observations of norm compliance at the beginning but also a high *ID* towards dishonesty, as there are only a few being sanctioned. Then, more agents start to report dishonestly. Although some agents are sanctioned, agents keep reporting dishonestly because they mostly receive one to three sanction points (as in Experiment 1), which is in Period 1 to 6 not enough to make honest reporting the wealth-maximizing reporting choice. The reason is that the true costs in Periods 1 to 6 are very low (ranging from 4,000 to 4,150 Lira), and participants can yield high payoffs by reporting dishonestly. As more and more norm violations are observed, and unsanctioned, agents' *ND* decreases, which leads to even more dishonest reporting. In Periods 7 and 8, the true costs increase to 4,700 Lira and 4,500 Lira. Thus, for some agents who remember having been assigned seven or more sanction points in the past periods, the wealth-maximizing reporting choice becomes reporting honestly.[57] Since the majority of agents still report dishonestly, agents' *ND* and, thus, average honesty further decrease as the true costs are again low in Period 9 (i.e., 4,150 Lira).

In Submodel 3, where agents only consider norm compliance, average honesty quickly increases after Period 1 and remains around 0.97 until Period 10. The reason is that agents have a high *ND* due to many observations of norm compliance and do not consider their *ID*. Since agents choose a random reporting decision with a probability of 5%, the average honesty is always slightly lower than the maximum honesty of 1.

[57] When true costs are 4,700, an agent can only earn 500 + (5,500 – 4,700) = 1,300 Lira when reporting dishonestly. Receiving seven sanction points in this situation would leave the agent with 1,300 * 0.3 = 390 Lira which is less than the fixed salary of 500 Lira.

In Submodel 4, in which all three agent types are represented in proportion to the experimental data, average honesty decreases from Period 1 to 6 and stabilizes after around 0.25. As in Submodel 2, the reason is that the true costs in Periods 1 to 6 are very low, and thus, the sanction points are not enough to make honest reporting the wealth-maximizing reporting choice. In Periods 7 and 8, when the true costs are higher and less budget slack is possible, average honesty does not decrease any longer because then, for more agents, honest reporting becomes the wealth-maximizing reporting choice due to the sanction points agents remember to have received in the past periods. Overall, average honesty decreases slower in Submodel 4 than in Submodel 2 because there are some agents who only consider the salience of the norm when making their reporting decisions. Initially, the salience of the norm is high due to many observations of norm compliance, and thus, these agents whose decision depends only on their *ND* report honestly most of the time. Since these agents report honestly most of the time, they also represent a permanent source of sanctioning for others who reported dishonestly, which is absent in Submodel 2. It is noteworthy that the population in Submodel 4 consists of 66% agents from Submodel 2 and differs from Submodel 2 only regarding the remaining 34% of agents in the population. The remaining part consists of more agents who solely consider an action's material consequences (i.e., 19%) than agents who only consider the salience of the norm when making their reporting decision (i.e., 15%). Although a decline in honesty from Submodel 4 to 2 would thus be understandable, the results show an improvement in honesty. This, in turn, underlines the importance of agents who are permanently willing to sanction norm violations for the stability of social norms.

5.5.3 Comparison of Simulated and Empirical Honesty Levels

Next, the simulated and empirical honesty levels for each submodel are compared to evaluate which agent type and, thus, which theory is best suited to explain participants' behavior in the experiment. The described agent-based model of participative budgeting is built based on Condition 3 in Experiment 1, where the internal reporting environment is open and the possibility of peer sanctioning is given. Therefore, the average honesty of the participants from this condition is used as an empirical benchmark for our simulated honesty levels. Following Lorscheid and Meyer (2021), the empirical distance as the absolute distance from the simulated honesty level to the empirical honesty level in each Period t, as shown in Equation 16, is calculated for all four submodels.

$$Empirical\ distance_t = |Simulated\ honesty_t - Empirical\ honesty_t| \quad (16)$$

Table 31 shows the empirical distance averaged over all 1000 runs per period and in total for all periods. For example, 0.05 in Period 1 expresses that the absolute honesty difference between the simulated populations and participants in Experiment 1 is in Period 1 on average 0.05 (honesty ranges from 0 to 1).

Table 31: Average Empirical Distances per Submodel and Period

	Period										
Sub-model	1	2	3	4	5	6	7	8	9	10	All
1	0.05	0.64	0.58	0.65	0.58	0.59	0.46	0.51	0.57	0.48	0.51
2	0.05	0.14	0.23	0.41	0.40	0.45	0.34	0.41	0.49	0.40	0.33
3	0.05	0.30	0.36	0.29	0.37	0.36	0.48	0.43	0.37	0.46	0.35
4	0.05	0.16	0.20	0.34	0.31	0.34	0.23	0.29	0.36	0.26	0.25

Submodel 1 functions as a benchmark for the evaluation of the other submodels as agents in Submodel 1 are based on agency theory, and thus, the maximization of wealth is the agents' sole motivation (Baiman, 1990). The empirical distance averaged over all 10 periods is highest in Submodel 1 (all = 0.51) and shows a significant distance to the empirical honesty levels. Since considering the monetary consequences of sanctioning is the only reason for an agent in Submodel 1 to report honestly, this indicates that participants in the experiment not only report honestly to avoid the monetary consequences of being sanctioned. As seen in the experimental data and implemented in the agent-based model, participants were mostly assigned one to three sanction points, which are not enough to make reporting honestly the wealth-maximizing reporting choice.

In Submodel 2, agents' motivation to comply with a social norm is added, which significantly decreases empirical distance in comparison to Submodel 1 (all = 0.33 vs. 0.51). Although honesty levels are similar to empirical honesty levels at the beginning, there are significant differences starting from Period 4 (i.e., 0.41) and remaining on this level until Period 10.

In Submodel 3, agents' motivation to maximize their payoff when deciding whether to report honestly is excluded, and agents base their behavior solely on the salience of the norm. This does not decrease empirical distances in comparison to Submodel 2 (all = 0.35 vs. 0.33) because, in contrast to participants in Experiment 1, agents in Submodel 3 increase their honesty after Period 1. This leads to higher empirical distances in Periods 2 and 3 compared to Submodel 2.

According to social norm theory, individuals differ regarding their norm sensitivity (Bicchieri, 2006). Therefore, Submodel 4 considers heterogeneity regarding agents' norm-sensitivity by including all three agent types from Submodel 1 to 3 proportional to their occurrence in Experiment 1. This results in empirical distances, which are the lowest among all submodels (all = 0.25).

Overall, the results show that starting from Submodel 1, where agents are based on agency theory, empirical distances start to decrease as assumptions of social norm theory are implemented (e.g., individuals' motivation to comply with social norms and the heterogeneity regarding norm-sensitivity within a population). This suggests that participants' behavior in Experiment 1 can be better explained when considering the norm-signaling function of sanctions and participants' motivation to comply with a salient social norm of honesty.

5.6 DISCUSSION

The results of comparing simulated and empirical honesty levels are now discussed in view of the research questions of this thesis and how they contribute to the participative budgeting literature on social norms. Further, I discuss limitations and avenues for further research.

Results in the View of RQ4

The purpose of Chapter 5 is to provide additional support that a social norm of honesty is the underlying mechanism of peers' influence in participative budgeting. Therefore, I derived different submodels varying agents' decision rules to evaluate whether the agency or social norm theory is a better explanation of the behavior observed in Experiment 1. Ideally, a submodel approximates the observed reporting decision in the experiment, but it is already useful to evaluate whether a submodel based on social norm theory is an improvement on simple models. Testing different submodels with reference to empirically observed data is an

important part of theory development using agent-based modeling (Grimm & Railsback, 2012; Heine et al., 2005; Lorscheid, Berger, Grimm, & Meyer, 2019). Submodel 1 uses agents based on the agency theory, which are solely motivated by material self-interest and want to maximize their utility by increasing wealth. Results show that the difference between simulated and empirical honesty levels decreases as, beginning from Submodel 1, more assumptions of social norm theory are implemented. This supports the argumentation that participants in the experiment not only report honestly because they want to avoid the material consequences of being sanctioned but also because being sanctioned by peers increases the salience of the social norm of honesty. Submodel 4 produces honesty levels most consistent with results from Experiment 1. In contrast to the other submodels, I consider participants' heterogeneity regarding norm-sensitivity in Submodel 4, as observed in Experiment 1. Since social norm theory assumes that individuals are heterogeneous with respect to their norm sensitivity (Bicchieri, 2017), Submodel 4 is arguably the most compatible of all submodels with social norm theory. To answer RQ4, the increasing fit between simulated and empirical honesty levels as more assumptions of social norm theory are included provides support for the notion that a social norm of honesty explains the observed reporting behavior in Experiment 1.

Limitations and Further Research

The results of the agent-based model are subject to several limitations. In several places, I replaced the actual heterogeneity of agents with homogeneity to simplify the model. For example, in the model, the probability of sanctioning dishonest agents depends on the number of honest agents, and the respective probabilities are the same for all agents. In contrast, the results of Experiment 1 reveal that participants are heterogeneous regarding their willingness to sanction norm violators, which plays a central role in the emergence of the social norm. Therefore, considering heterogeneity regarding agents' willingness to sanction dishonest peers appears to be a promising way to refine the model.

Further, agents' decision to report honestly depends on their *ID* and *ND*. In the model, the salience of norm functions as a counterpart to agents' motivation to maximize their payoff. However, results from the moderated mediation model in Experiment 1 (see Table 12) show that participants' personal normative beliefs have a positive effect on honesty. Although I use participants' personal normative beliefs to calibrate agents' norm-sensitivity in Submodel 4, the direct influence of personal beliefs to report honestly is currently not considered in the model. Since participants' personal normative beliefs have a significant effect on honesty,

personal normative beliefs should be added to the list of agents' characteristics and considered in the decision-making process. Another limitation concerns agents' reporting options. In the model, agents can only choose to report 0% or 100% honestly. Agents only move between these extreme values, although most participants in Experiment 1 report partially honestly. More reporting options would lead to a better representation of agents' preferences.

Finally, there are limitations concerning the validity of results from an agent-based model in general. To test a hypothesized mechanism, researchers using ABM often employ an "if X, then Y approach." When a given empirical outcome Y can be reproduced by the model, mechanism X can be considered as a plausible candidate for the true mechanism in the real world (Smith & Rand, 2018). ABM adds to the understanding of the true mechanism by comparing the explanatory power of different models with respect to empirical data (Meyer & Heine, 2005; Lorscheid & Meyer, 2021). However, given the infinite possibilities to specify agents' decision processes, it is very likely that an empirical pattern can also be generated by other decision rules that do not matter in the real-world setting (Bueoro & Squazzoni, 2005). Here, model validation, especially empirical input validation, is important to ensure that the chosen parameter, relations between parameters, and agents' decision rules in the agent-based model correspond to the real world (Rand & Smith, Buero & Squazzoni, 2005). I use data from Experiment 1 to calibrate several parameters (e.g., the initial probability of reporting honestly, probability of sanctioning, and intensity of sanctioning). Additionally, agents are modeled using an architecture to store memories of perceived norm cues (i.e., "EMIL-I-A architecture"). The weights of the different norm cues have been extracted from a field experiment by Cialdini et al. (1990). Based on the performed empirical input validation, especially regarding the social norm mechanism, I consider the results of my agent-based model reliable. Therefore, I also consider the implications regarding a social norm of honesty as the underlying mechanism in participative budgeting as reliable.

5.7 CONCLUSION

The purpose of this chapter is to provide additional support that a social norm of honesty is the mechanism underlying the effect of peers' influence on honesty in participative budgeting. Therefore, a mixed-method approach is used, combining experiment and ABM. The reason is that ABM has a particular advantage over experiments in that agents' decision processes at the micro-level can be fully controlled, and simulation experiments can be conducted cost-

efficiently (Klingert & Meyer, 2012). ABM allows the explicit implementation of key elements of a theory, for example, agency or social norm theory, into the agents' decision processes and tests their implication at the macro level (Janssen & Ostrom, 2006; Smith & Rand, 2018). Thus, in the situation of multiple plausible explanations, agent-based simulation modeling can be used to specify multiple mechanisms and evaluate competing mechanisms by validating their aggregate outcomes with empirical data obtained from the experiment (Smith & Rand, 2018).

Therefore, an agent-based model of the participative budgeting setting in Experiment 1 is developed. First, the agent-based model by Andrighetto et al. (2013) is replicated as a starting point for the development of an agent-based model of participative budgeting. The reason is that their model of a public good game explicitly considers a social norm as part of agents' decision process and the effect of norm cues like sanctions on the salience of the social norm. Second, the public good game is adapted to the participative budgeting setting in Experiment 1. Next, simulation experiments are conducted, investigating how honesty is affected by different submodels that are derived from agency and social norm theory. Finally, the simulated honesty levels are compared to the empirical honesty levels obtained from Experiment 1 to evaluate whether the submodels can reproduce the empirical data and, therefore, can be considered as a plausible explanation for the processes in the targeted phenomenon. Specifically, the comparison aims to evaluate whether a social norm of honesty can explain the observed behavior in the experiments and, thus, managerial reporting in participative budgeting.

Results show an overall increasing fit between empirical and simulated honesty levels as more assumptions of social norm theory are implemented (e.g., individuals' motivation to comply with social norms and the heterogeneity regarding norm-sensitivity within a population). This provides support for the hypothesis that participants' behavior in the experiment can be better explained when considering the norm-signaling function of sanctions and participants' motivation to comply with a salient social norm of honesty. However, simulated honesty levels in Submodel 4 are still significantly different from the honesty levels in Experiment 1. Thus, this model is only the first step to provide support for a social norm as the underlying causal mechanism in participative budgeting. Future research should refine this model. Thereby, I highlighted heterogeneity regarding agents' willingness to sanction norm-violators and the effect of personal normative beliefs on honesty as promising ways to develop the model further.

6 OVERALL CONCLUSION

Recent surveys by Deloitte (2023) and the WHU Controller Panel (2023) show that firms still rely on decentral managers participating in the budgeting process when preparing budgets. Since the value of participative budgeting decreases when managers misreport their private information (Baiman & Evans, 1983), ensuring managerial honesty in the budgeting process is still crucial for firms. This thesis investigates how peers affect managerial honesty in participative budgeting by establishing a social norm of honesty. In everyday life, most individuals seek approval from their peers (Bicchieri, 2006). Therefore, individuals' behavior is often guided by their expectations about what their peers do and approve of (i.e., the social norm). Since managers do not act in social isolation at the workplace, social norms have received more attention in the participative budgeting literature (Douthit et al., 2022; Douthit & Stevens, 2015; Stevens & Thevaranjan, 2010). However, peers' influence through social norms is a double-edged sword because individuals' perceptions of appropriate behavior may change from pro-social to pro-self behavior when receiving unexpected information about peers' behavior and beliefs. This is important for firms that recently tend to open their organization (Evans III et al., 2016; Waber et al., 2014), as increased transparency among managers makes it more likely that managers receive information about peers' behavior and beliefs.

To contribute to the participative budgeting literature regarding peers' influence and social norms (e.g., Brunner & Ostermaier, 2019; Guo et al., 2020; Lill et al., 2023; Paz et al., 2014; Schwering, 2017), I investigate the current state of the participative budgeting literature on social norms by summarizing the most relevant experimental studies. This overview reveals that prior experimental studies focus on how social norms in participative budgeting can be activated rather than how peers change social norms over time. Based on these findings, I conducted two experiments employing settings where three managers repeatedly interact. In Experiment 1, I reproduce the results of prior studies and highlight the importance of the possibility of peer sanctioning for the emergence and maintenance of a social norm of honesty in participative budgeting. In Experiment 2, I investigate how the presence of a pooled profit-sharing plan can amplify the effect of the possibility of peer sanctioning on honesty. Finally, I combine experiments and agent-based modeling to provide additional support for a social norm

of honesty as the underlying mechanism. Based on the results, this thesis makes the following contributions in particular.[58]

First, this thesis contributes to the developing theory about peers' influence on managerial honesty in participative budgeting. Primarily, Experiment 1 provides empirical evidence for peer sanctioning as another essential aspect of peers' influence, which comes into play when firms open their internal reporting environment. Prior studies in participative budgeting find mainly an adverse effect of observable peer behavior on honesty (Brunner & Ostermaier, 2019; Emett et al., 2019; Paz et al., 2014; Schwering, 2017). Experiment 1 supports that the negative effect of observable peer behavior on honesty can be mitigated when managers can socially sanction each other. Future studies are thus encouraged to consider the effect of peer observability and the possibility of peer sanctioning when theorizing and testing the effect of peers on managerial honesty in open internal reporting environments. In practice, the extent to which peer sanctioning is possible may vary depending on organizational factors. While a more open organization might already increase the possibility of peer sanctioning because managers more often observe and are observed by their peers, firms can further increase the possibility of peer sanctioning by increasing the frequency with which managers interact and communicate (Mas & Moretti, 2009). Thus, practice may learn from this that they should foster the possibility of peer sanctioning when opening their internal reporting environment to benefit from the associated positive effects of organizational openness while maintaining honesty in participative budgeting.

Second, the results of both experiments contribute to the participative budgeting literature on social norms by advancing our understanding under which conditions the possibility of peer sanctioning can mitigate the erosion of honesty. On the one hand, managers must be willing to bear the costs of sanctioning to enforce a social norm of honesty in participative budgeting. Results suggest managers are motivated to sanction dishonest reporting, although their payoff has not been harmed. Instead, it is the perception of managers that dishonest reporting is unfair or depicts an unequal contribution to a common goal that triggers sanctions. Following social norm theory (Bicchieri, 2006), some studies in the participative budgeting literature have investigated individuals' norm sensitivity using different personal traits as proxies, for example, negative affect intensity or interpersonal susceptibility (e.g., Blay et al., 2019; Cardinaels &

[58] For a more detailed presentation of the contributions see Section Discussion 4.3.5, 4.4.6, and 5.6.

Yin, 2015). Besides norm sensitivity, this thesis highlights managers' willingness to sanction norm violators as another personal trait crucial for the emergence and robustness of a social norm.

On the other hand, the possibility of peer sanctioning can only mitigate the erosion of honesty if managers also respond to sanctions. Comparing both experiments suggests that for peer sanctioning to be effective, managers must have a shared understanding of appropriate behavior. Without managers coordinating towards mutual normative expectations that constitute a social norm (Bicchieri, 2006, 2017), what behavior is inappropriate and violates the social norm remains unclear. Thus, it is unclear whether a sanction is the reaction to a norm violation or occurs due to the material self-interest of the sanctioning party. Regarding norm coordination and, thus, the effectiveness of peer sanctioning, this thesis highlights the importance of group consistency and the possibility of explicitly expressing disapproval about others' reporting behavior.

Finally, this thesis shows how experiments frequently used in the participative budgeting literature (Wibbeke & Lachmann, 2020) can benefit from ABM to provide additional support for the mechanism underlying observed behavior in the experiment. The reason is that ABM has a particular advantage over experiments in that agents' decision processes at the micro-level can be fully controlled, and simulation experiments can be conducted cost-efficiently (Klingert & Meyer, 2012). ABM allows the explicit implementation of key elements of a theory like the agency or social norm theory into the agents' decision processes and tests their implication at the macro-level (Janssen & Ostrom, 2006; Smith & Rand, 2018). Thus, in the situation of multiple plausible explanations, agent-based simulation modeling can be used to specify various mechanisms and evaluate competing mechanisms by validating their aggregate outcomes with empirical data obtained from the experiment (Smith & Rand, 2018). I developed an agent-based model to provide additional evidence for a social norm of honesty as the mechanism underlying the observed behavior in Experiment 1. Results show an increasing overall fit between empirical and simulated honesty levels as more assumptions of social norm theory are implemented. This suggests that participants' behavior in the experiment can be better explained when considering the norm-signaling function of sanctions and participants' motivation to comply with a salient social norm of honesty. Together with the results from the moderated mediation model in Experiment 1, this supports my notion that participants' behavior in the experiment is affected by a social norm of honesty. Therefore, this serves as an

example to show the benefits of combining the two methods. As agent-based modeling is relatively new in management accounting research (Wall & Leitner, 2021), this thesis hopes to pave the ground for further research questions in management accounting research being tackled by combining experiment and agent-based modeling.

As mentioned in Sections 4.3.5, 4.4.6, and 5.6, this thesis is subject to limitations. Besides external validity issues, a central issue concerns the operationalization of peer sanctioning. Although informal sanctions between managers do not have monetary consequences in the real world, I operationalize the possibility of peer sanctioning as an option to reduce others' earnings. Additionally, in Experiment 1, participants must communicate a normative message to the sanctioned participant by completing the following sentence: "I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been X (indicating the appropriate cost report) Lira." While participants can decide what they communicate as an appropriate cost report, the sentence is worded toward honesty. This could have inhibited participants who think one should report dishonestly from using the possibility to sanction honest participants. Outside of the experiment, managers are not constrained in informal conversations. Thus, the possibility of peer sanctioning may affect honesty differently in the real world. Future studies should address these limitations. It would be interesting to investigate whether the possibility of peer sanctioning positively affects honesty when managers have more freedom in formulating their normative text messages. Moreover, peer sanctioning in this study occurs in an anonymous setting, which is unrealistic for practice, as managers most likely will know each other's identity. Schwering (2017) used a setting in which peers' honesty is disclosed with peers' identities. Since there is no possibility of peer sanctioning in her study, it would be interesting to investigate whether revealing peers' identities changes the effect of the possibility of peer sanctioning on honesty.

Finally, honesty in both experiments decreases over time when the internal reporting environment is open. The possibility of peer sanctioning slows down the erosion of honesty over time but does not stop it. This might suggest that honesty always decreases over time in open internal reporting environments. Current literature investigates how open internal reporting environments affect honesty under different organizational contexts, such as vertical pay dispersion (Guo et al., 2020) or organizational identity (Lill et al., 2023). Understanding how contextual factors moderate the effect of an open internal reporting environment on honesty is essential for theory development. The current literature has not yet considered the

possibility of peer sanctioning as another essential mechanism in open internal reporting environments. Therefore, future studies should build on findings of this thesis and investigate how peers' willingness to sanction norm violations is affected by organizational factors. In a different organizational context, the possibility of peer sanctioning might prevent the decline of honesty or even increase honesty over time.

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8 APPENDICES

APPENDIX A: INSTRUCTIONS EXPERIMENT 1

General instructions

Welcome, and thank you for attending this study. This is a study of decision-making in an economic scenario.

- You will receive a fixed payment of £4 if you pass the comprehension test in Stage 1 and complete the whole study.
- You can increase your payment by earning Lira in Stage 2 of the study.
- Lira is the currency of this experiment and will be converted to GBP/£ at the rate of 200 Lira = £1.

Overview

The study consists of three stages:

Stage 1

- Answer some questions about yourself.
- Read the instructions of the cost reporting task.
- Participate in 3 practice decision periods of the cost reporting task.
- Take part in the comprehension test. You must pass the comprehension test and complete the whole study to receive the fixed payment of £4 and a possible bonus payment from Stage 2.

Stage 2

- You will be randomly assigned to a group of three.
- Participate in 10 formal decision periods of the cost reporting task with the same two other participants.

Stage 3

- Answer some questions about the study.
- Get information about your payment for this study.

Stage 1: Questions about yourself Part 1

This study is about reporting, specifically honest reporting versus misreporting. We define honest reporting as reporting the truth or reality to others, whereas misreporting is not. For example, individuals may misreport their income on their tax returns, employees may misreport their hours worked, or managers may misreport the costs of their division or organization. Please indicate the extent to which you agree or disagree with the following statements. It is important that you respond truthfully to each question.

1 Strongly disagree	2	3	4	5	6	7	8	9 Strongly agree

1. Reporting honestly makes me feel good about myself.
2. I believe in reporting honestly even if no one will know.
3. I value honest reporting for its own sake.
4. Reporting honestly maintains my self-worth.
5. Reporting honestly is important to me.
6. Reporting honestly feels like the right thing to do.
7. I report honestly to get approval.
8. No matter what others think or believe, it is important not to misreport.
9. I report honestly if I think I will receive acknowledgement for doing so.
10. I would avoid misreporting if it pleased others.
11. Misreporting is against my personal values.
12. I report honestly if it pleases others.
13. I would feel guilty if I misreported.

Stage 1: Questions about yourself Part 2

Please indicate the extent to which you agree or disagree with the following statements.

1 Strongly disagree	2	3	4	5	6	7	8	9 Strongly agree

1. Safety first.
2. I do not take risks with my health.
3. I prefer to avoid risks.
4. I take risks regularly.
5. I really dislike not knowing what is going to happen.
6. I usually view risks as a challenge.
7. When I do something wrong, I have strong feelings of shame and guilt.

Stage 1: Questions about yourself Part 3

Please indicate the extent to which you agree or disagree with the following statements.

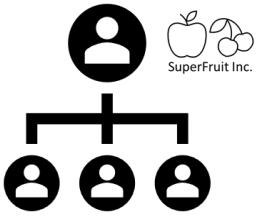
1 Risk avoider	2	3	4	5	6	7	8	9 Risk seeker

1. I view myself as a…

Stage 1: Instruction for cost reporting task

Your role:

- You are one of three division managers of the organization SuperFruit Inc.
- For your work as a division manager, SuperFruit Inc. will pay you a fixed salary of 500 Lira.
- Your division yields fixed revenues of 6,000 Lira.



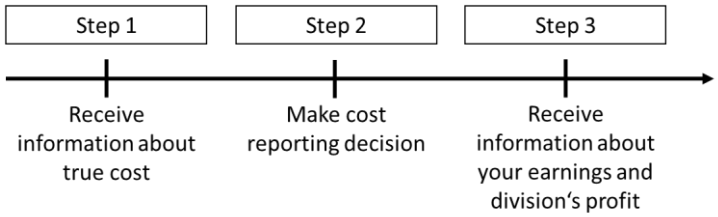
Your task:

- Budgeting is the typically annual process in an organization in which the available financial resources (budgets) for the next year are planned and approved for individual units (divisions, departments, cost centers).
- As part of the annual budgeting process SuperFruit Inc. requires you as a division manager to report the true cost of your division to corporate headquarters. Thus, corporate headquarters can allocate the scarce budget of the organization efficiently.
- Corporate headquarters only has the information that all divisions have a possible range of costs between 4,000 and 5,500 Lira.
    - You know for sure what your true cost will be, but corporate headquarters and the other two division managers will never know the true cost of your division. **[Internal reporting environment CLOSED]**
    - You know for sure what your true cost will be, but corporate headquarters will never know the true cost of your division. In contrast, the other two division managers know the true cost of your division and your reported cost. **[Internal reporting environment OPEN]**
- Corporate headquarters provides you with budget equal to the cost you have reported for the period. You keep the difference: Reported cost – true cost.
- Division's profit = 6,000 Lira (Fixed revenues) – reported cost – 500 Lira (Fixed salary).
- Please note that the organization's profit is the sum of the three division's profits. Thus, by reporting higher cost than the true cost you decrease your division's profit and consequently organization's profit.

Procedure

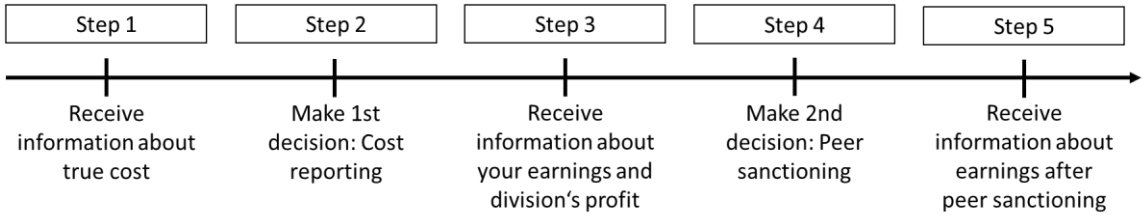
[Possibility of peer sanctioning ABSENT]

Each cost reporting period consists of the same 3 steps:



[Possibility of peer sanctioning PRESENT]

Each cost reporting period consists of the same 5 steps:



Step 1: Receive information about true costs

In each period, the true cost of each division is randomly drawn from the possible cost range (4,000 to 5,500 Lira).

These numbers are equally likely to be drawn, and the true cost drawn for each division is known only to the division manager but not to the other two division managers or corporate headquarters. **[Internal reporting environment CLOSED]**

These numbers are equally likely to be drawn, and the true cost drawn for each division is known to all three division managers of the organization but not to corporate headquarters. **[Internal reporting environment OPEN]**

Step 2: Make cost reporting decision

Each division manager submits a cost report to corporate headquarters. The cost report can be any whole number between 4,000 and 5,500 Lira in 50 Lira increments (4,000, 4,050, 4,100, … 5,500) but cannot be less than the true cost.

Step 3: Receive information about your earnings and division's profit

In this step, each division manager privately receives information about their earnings and the division's profit.

Division managers do not receive information about the earnings or the division's profit of the other two division managers. [Internal reporting environment CLOSED]

Further, each division manager receives information about the earnings and the division's profit of the other two division managers. [Internal reporting environment OPEN]

Your earnings = Fixed salary + Cost surplus (i.e., reported cost – true cost)

- Fixed salary of 500 Lira.
- Any difference between your reported cost and the true cost of your division.

Division's profit = Revenues (6,000 Lira) – your reported cost – your fixed salary (500 Lira)

Examples (true cost = 4,500 Lira)

[Internal reporting environment CLOSED]

In Lira	**Revenues (1)**	**Reported cost (2)**	**Fixed salary (3)**	**Division's profit (1-2-3 = 4)**	**True cost (5)**	**Your earnings (3+2-5 = 6)**
1st Example	6,000	4,500	500	1000	4,500	500 + 4,500 – 4,500 = 500
2nd Example	6,000	5,000	500	500	4,500	500 + 5,000 – 4,500 = 1,000
3rd Example	6,000	5,500	500	0	4,500	500 + 5,500 – 4,500 = 1,500

[Internal reporting environment OPEN]

In Lira	**Revenues (1)**	**Reported cost (2)**	**Fixed salary (3)**	**Division's profit (1-2-3 = 4)**	**True cost (5)**	**Your earnings (3+2-5 = 6)**
You	6,000	4,500	500	1000	4,500	500 + 4,500 – 4,500 = 500
2. Division Manager	6,000	5,000	500	500	4,500	500 + 5,000 – 4,500 = 1,000
3. Division Manager	6,000	5,500	500	0	4,500	500 + 5,500 – 4,500 = 1,500

Step 4: Make peer sanctioning decision – Part 1 [Only Possibility of peer sanctioning PRESENT]

In this step, each division manager can decide whether to sanction the reporting behavior of the other division managers by assigning sanction points to them.

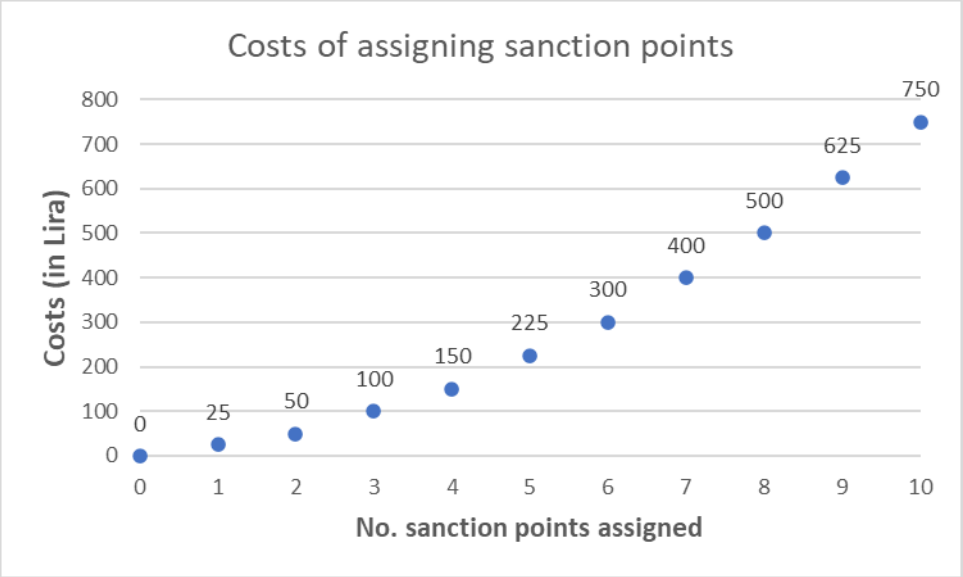
- Each division manager can assign between 0 to 10 sanction points to each of the other two managers.
- Each sanction point reduces the sanctioned division manager's earnings by 10% (i.e., 1 point = 10%, 2 points = 20%, 3 points = 30%...).
- The sum of sanction points received from the two other division managers determines the earnings reduction, which is capped at 100%.

Examples (Your earnings from reporting decision = 1,000 Lira)

Your earnings from reporting decision	**Reduction through sanction points from the other two division managers**	**Your earnings after peer sanctioning**
1,000 Lira	1 point = 10% Reduction	1,000 – 1,000*10% = 900 Lira
1,000 Lira	5 points = 50% Reduction	1,000 – 1,000*50% = 500 Lira
1,000 Lira	10 points = 100% Reduction	1,000 – 1,000*100% = 0 Lira

Costs for sanctioning division manager

Assigning sanction points to other division managers is also costly for the sanctioning division manager as shown in the figure below:



Step 4: Make peer sanctioning decision – Part 2 [Only Possibility of peer sanctioning PRESENT]

If you decide to assign sanction points to the other division managers for their cost reporting, you must also indicate what you consider appropriate cost reporting by completing the following sentences:

"I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been [Your Input] Lira."

Note that this message has no effect on your earnings or the earnings of the receiver of the message.

Step 5: Receive information about earnings after peer sanctioning [Only Possibility of peer sanctioning PRESENT]

Finally, each division manager receives information about the total number of sanction points, the messages they received from the other two division managers, and the resulting earnings after peer sanctioning.

Example:

- Division's true cost = 4,500 Lira
- Your reported cost = 5,000 Lira

You received a total of 6 sanction points and 2 messages from the other two division managers:

"I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been 4,500 Lira."

"I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been 4,500 Lira."

Your earnings after peer sanctioning

Fixed salary	500 Lira
+ Cost surplus (i.e., reported cost – true cost):	5,000 – 4,500 = 500 Lira
= Earnings from reporting decision	**1,000 Lira**
- Earnings reduction through sanction points (6 points)	1,000 *60% = 600 Lira
- Costs for assigning sanction points (3 points)	100 Lira
= Earnings after peer sanctioning	**300 Lira**

Stage 1: Practice periods

You will now start the practice decision periods to get to know the cost reporting task before the formal decision periods start. Especially these practice periods are a calculative exercise to show how your decisions affect your earnings in the formal decision periods.

In the practice decision periods, the other two division managers are represented by bots with predefined behavior, which means they do not react to your decisions. The behavior of the bots was predefined in such a way to show you a variety of different situations that can occur in the formal periods of the cost reporting task. Please note that none of the next three practice decision periods will affect your earnings today.

Overview of predefined bot behavior in practice periods

Practice period 1

			Only Possibility of peer sanctioning PRESENT	
	True cost	Reported cost	Assign sanction points to participant	Send messages to you (appropriate cost reporting)
Bot 1	5,000 Lira	5,450 Lira	0 Points	No message
Bot 2	5,000 Lira	5,500 Lira	0 Points	No message

Practice period 2

			Only Possibility of peer sanctioning PRESENT	
	True cost	Reported cost	Assign sanction points to participant	Send messages to you (appropriate cost reporting)
Bot 1	5,000 Lira	5,200 Lira	2 Points	5,200 Lira
Bot 2	5,000 Lira	5,250 Lira	1 Point	5,250 Lira

Practice period 3

			Only Possibility of peer sanctioning PRESENT	
	True cost	Reported cost	Assign sanction points to participant	Send messages to you (appropriate cost reporting)
Bot 1	5,000 Lira	5,000 Lira	3 Points	5,000 Lira
Bot 2	5,000 Lira	5,050 Lira	2 Points	5,050 Lira

Stage 1: Comprehension test

On the next page, you will attend the comprehension test. Should you fail to respond correctly to some of the questions, you will get the chance to retake the whole comprehension test one more time and correct the wrong answers. Please answer the following questions by selecting one option per question. With the help of the button at the top right you can view the instructions again at any time.

1. The true cost of each division:
    a. is determined by corporate headquarters
    b. is determined by the division manager
    c. is a purely random whole number between 4,000 to 5,500 Lira in increments of 50 Lira
    d. is determined by the other two division managers

2. What does corporate headquarters know?
    a. the true cost of each division
    b. the reported cost of each division manager
    c. the earnings of each division manager
    d. nothing

3. Who reports the cost of each division:
    a. the corporate headquarters
    b. the division manager
    c. the cost report is a purely random whole number between 4,000 to 5,500 Lira.
    d. an employee from the production department

4. What do division managers know?
    a. true cost and reported costs of all three divisions in their organization
    b. true cost and reported cost of their division
    c. only reported cost of their division
    d. only true cost of their division

5. Your division's profit is calculated as
    a. Revenues (6,000 Lira) – your reported cost – fixed salary (500 Lira)
    b. Revenues (5,000 Lira) – your reported cost – fixed salary (500 Lira)
    c. Revenues (6,000 Lira) – your reported cost
    d. Revenues (5,000 Lira) – your reported cost

6. How many decisions does each division manager have to make in each period?
    a. Only one, the reporting decision
    b. Two, first the reporting decision and then the peer sanctioning decision
    c. A division manager can decide nothing
    d. Three, the reporting decision, the peer sanctioning decision, and the group decision

7. Please calculate the division manager's earnings based on the following example. Assume the randomly drawn true cost is 5,000 Lira. The division manager reported cost of 5,500 Lira to corporate headquarters. Including the fixed salary of 500 Lira, the division managers' earnings from this period would be:
    a. 200 Lira
    b. 500 Lira
    c. 1,000 Lira
    d. 1,500 Lira

8. Please calculate the division manager's earnings based on the following example. Assume the randomly drawn true cost is 4,500 Lira. The division manager reported cost of 4,500 Lira to corporate headquarters. Including the fixed salary of 500 Lira, the division managers' earnings from this period would be:
    a. 0 Lira
    b. 500 Lira
    c. 1,000 Lira
    d. 1,500 Lira

Stage 2: Cost reporting task

Now the 10 formal decision periods begin. You have been randomly assigned to a group of 3 which will stay together as an organization throughout all 10 formal decision periods. Within your organization, you will act as a division manager. Please note: You have 1 minute for each of the steps in a cost reporting period. We therefore ask you to be attentive during the next 10 periods in order not to miss any necessary input on your part!

Note that only 1 out of the 10 formal decision periods will be randomly drawn to determine your actual earnings and bonus payment today. Your earnings in Lira will be converted to £ at the rate of 200 Lira = £1.

Step 1: Receive information about true cost

[Internal reporting environment CLOSED]

True cost of your division in this period
X Lira

[Internal reporting environment OPEN]

	True cost in this period
Your division	X Lira
Division 2	X Lira
Division 3	X Lira

Step 2: Make cost reporting decision

"Dear division manager,

We need your support for the annual budget preparation! It is only through your valuable input that we are able to provide each division with a budget equal to their true cost, thereby avoiding an excessive budget that is harmful to the profit of the division and ultimately to the profit of the entire organization. Please submit your cost report for your division below.

Thank you very much!

Sincerely,
Corporate headquarters"

The true cost of your division in this decision period is X Lira.
Your cost report to corporate headquarters: ____ Lira

Step 3: Receive information about your earnings and division's profit

Your earnings:

Fixed salary	X Lira
Cost surplus (i.e., reported cost – true cost)	X Lira
Total	X Lira

[Internal reporting environment CLOSED]

Cost reporting decision and division's profit

In Lira	Revenues	Reported cost	Fixed salary	Division profit	True cost	Earnings
You	6,000	X	500	X	X	X

[Internal reporting environment OPEN]

Cost reporting decision and division's profit of all division managers

In Lira	Revenues	Reported cost	Fixed salary	Division profit	True cost	Earnings
You	6,000	X	500	X	X	X
Division manager 2	6,000	X	500	X	X	X
Division manager 3	6,000	X	500	X	X	X

Step 4: Make peer sanctioning decision [Only Possibility of peer sanctioning PRESENT]

You can assign between 0 to 10 sanction points to each of the other two division managers Each sanction point reduces the sanctioned division manager's earnings by 10%. The sum of sanction points received from the two other division managers determines the earnings reduction, which is capped at 100%. Note that assigning sanction points is also costly for the sanctioning manager.

Please submit how many sanction points you want to assign to the other two division managers to decrease their earnings. Note that if you decide to assign sanction points, you must also indicate to the other division manager (in the last column) what you consider to be appropriate cost reporting:

In Lira	Reported cost	True cost	Division's profit	No. sanction points	Appropriate cost reporting*
Division manager 2	X	X	X	___ points	____ Lira
Division manager 3	X	X	X	___ points	____ Lira

* "I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been [Your Input] Lira."

Step 5: Receive information about earnings after peer sanctioning [Only Possibility of peer sanctioning PRESENT]

You received a total of X sanction points and assigned X sanction points. Further, you received X messages from the other two division managers:

"I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been X Lira."

"I think you should have reported more honestly in this period. In my opinion, an appropriate cost report would have been X Lira."

Your earnings after peer sanctioning:

Fixed salary	500 Lira
+ Cost surplus (Cost report – true cost):	X Lira
= Earnings from reporting decision	X Lira
- Earnings reduction through sanction points	X Lira
- Cost for assigning sanction points	X Lira
= Earnings after peer sanctioning	X Lira

Stage 3: Post-experimental questionnaire

In Stage 3, we will ask you some questions about your reactions to the cost reporting task and your background. Always, check the option that applies best to you. Please do not think too long before answering; usually, your first inclination is also the best one.

This last step will take you about 10 minutes. There will be some questions where you can earn an additional bonus payment. The responses that you provide to the following statements and questions will not be shared with others. Only the researchers will view your anonymous responses after the study is complete. Please remember that you will only receive your fixed payment and a possible bonus payment if you have completed the whole study, including this questionnaire.

Attention check

Why did corporate headquarters require a cost report from you as a division manager?

- There was no particular reason.
- To provide each division with an adequate budget and avoid excessive budgets.
- To choose the division manager of the month.

Manipulation checks

Please rate your degree of agreement with the following statements:

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

1. In each period, I received information about the true costs of the other two divisions managers in my organization.
2. In each period, I received information about the reported costs of the other two division managers in my organization.
3. In each period, I interacted with the same two division managers in my organization.
4. I had the possibility to reduce the earnings of the other two division managers in my organization.
5. I could send a message to the other two division managers in my organization to indicate what I consider appropriate cost reporting.
6. From the information provided, I could infer the honesty level of the other two division managers in my organization.

Social expectation measurement Part 1

Please rate your degree of agreement with the following statements. When answering, think about your decisions in all 10 formal decision periods!

1 Not at all	2	3	4	5	6	7 Very much

1. Did you expect that the other two division managers would report the true cost to corporate headquarters?
2. Is honesty a rule of conduct that applies to a division manager in the previous budgeting scenario?
3. Do you personally believe that one should report the true cost to corporate headquarters?
4. What do you think the other two division managers answered on average to question 3? (If your guess +/- 0.5 is correct, you earn a £0.5 bonus.)

Social expectation measurement Part 2

Imagine another formal decision period. You are a division manager. The true costs have a possible range between 4,000 and 5,500 Lira. The true cost of your division and the other divisions are 4,000 Lira.

4,000 (in Lira)	4,250	4,500	4,750	5,000	5,250	5,500

1. How much cost do you think the other two division managers would report on average to corporate headquarters?
2. How much cost do you personally think one should report to corporate headquarters?
3. What do you think the other two division managers answered on average to question 2? (If your guess +/- 125 Lira is correct, you earn a £0.5 bonus.)

Unfairness perceptions

Please rate your degree of agreement with the following statements. When answering, think about your decisions in all 10 formal decision periods!

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

1. I perceived the fixed salary as unfair (i.e., not high enough).
2. I perceived it as unfair that the budgeting process allowed the other participants to generate higher earnings by reporting dishonestly.
3. I perceived it as unfair that the other participants reported dishonestly and received as a result potentially more earnings.

Drivers of reporting behavior

Please rate your degree of agreement with the following statements. When answering, think about your decisions in all 10 formal decision periods!

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

[Internal reporting environment CLOSED]

a. I wanted to maximize my earnings.
b. I wanted to report honestly.
c. I wanted both parties (i.e., me as the division manager and corporate headquarters) to have even earnings.

[Internal reporting environment OPEN]

d. I wanted the other two division managers to think I was honest.
e. The other two division managers' cost reports affected mine.
f. I wanted to be as honest as the other two division managers.
g. I wanted to make as much money as the other two division managers did.
h. I wanted to report dishonestly when the other two division managers had reported dishonestly in a previous period.

[Internal reporting environment OPEN + Possibility of peer sanctioning PRESENT]

i. I wanted to report dishonestly to ensure that sanction points did not reduce my earnings below my fixed salary of 500 Lira.
j. The received messages affected my reporting behavior.
k. I wanted to conform to received messages to avoid sanction points.
l. I wanted to conform to received messages because I found them legitimate.
m. The messages helped me to coordinate with other division managers concerning an appropriate cost reporting.

Drivers of sanctioning behavior

Please rate your degree of agreement with the following statements. When answering, think about your decisions in all 10 formal decision periods!

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

1. I assigned sanction points to division managers when they reported dishonestly.
2. I assigned sanction points to division managers when they earned more than I did.
3. I assigned sanction points to division managers when they reported higher cost than the other two division managers in the organization.
4. I sent messages to division managers to enforce honest reporting.
5. I assigned sanction points to division managers when they reported less honestly than I suggested in a previous message.
6. I assigned sanction points to honest division manager to increase the earnings gap between the two of us.
7. I assigned sanctions points to division managers without a specific motivation, just to explore what happens.

Machiavellianism

Please indicate the extent to which you agree or disagree in general and irrespective of the experiment with the following statements.

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

1. I tend to manipulate others to get my way.
2. I have used deceit or lied to get my way.
3. I have used flattery to get my way.
4. I tend to exploit others toward my own end.

Background Information

Please be assured that the following information will remain confidential and will not be used to identify any individual participant.

1. What is your gender
    a. Female
    b. Male
    c. Diverse
    d. Prefer not to say
2. Age
3. What is your current academic degree?
    a. Bachelor's degree
    b. Master's degree
    c. PhD
    d. None
4. How many years of work experience do you have?
5. Have your ever gained experience in a budgeting process?
    a. Yes
    b. No
6. If yes, how many years?

Final question

It would be very helpful if you could tell us at this point whether you have taken the post-experimental questionnaire seriously so that we can use your answers for our scientific analysis or whether you were just clicking and entering random answers to get to the end of the experiment as fast as possible? The answer to this question will not affect your final payment.

- I took the experiment seriously.
- I did not take the experiment seriously.

APPENDIX B: INSTRUCTIONS EXPERIMENT 2

General instructions

Welcome, and thank you for attending this study. This is a study of decision-making in an economic scenario.

- You will receive a fixed payment of £4 **if you pass the comprehension test in Stage 1 and complete the whole study.**
- You can increase your payment by earning Lira in Stage 2 of the study.
- Lira is the currency of this experiment and will be converted to GBP at the rate of 200 Lira = £1.

Overview

The study consists of three stages:

Stage 1

a) Read the instructions of the cost reporting task.
b) Participate in 3 practice decision periods of the cost reporting task.
c) Take part in the comprehension test (You have to pass the comprehension test and complete the whole study to receive the fixed payment of £4 and a possible bonus payment from Stage 2).

Stage 2

a) Participants are randomly assigned to groups of three.
b) Participate in 10 formal decision periods of the cost reporting task.

Stage 3

a) Answer some questions about the study.
b) Get information about your payment for this study.

Stage 1: Instructions, practice periods, and comprehension test

Overview

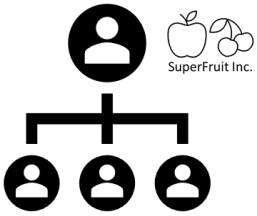
1) On the following screen, there are instructions about the setting and procedure of the cost reporting task. Please read it carefully.

2) After reading the instructions, you will participate in 3 practice decision periods, in which the decisions you make will be the same as in the 10 formal decision periods, but your decisions in these 3 practice periods will not affect your earnings.

3) Then, you will attend the comprehension test. For each question in the comprehension test you have two attempts to give the correct answer. Please note that we will have to exclude you from the study if any question is not answered correctly on the 2nd attempt at the latest. This will prevent you from receiving the fixed £4 payment and a possible bonus payment from Stage 2.

Setting

Your role:



- You are one of three division managers of the organization "SuperFruit Inc."
- For your work as a division manager, SuperFruit Inc. will pay you a fixed salary of 500 Lira.
- Your division yields fixed revenues of 6,000 Lira.

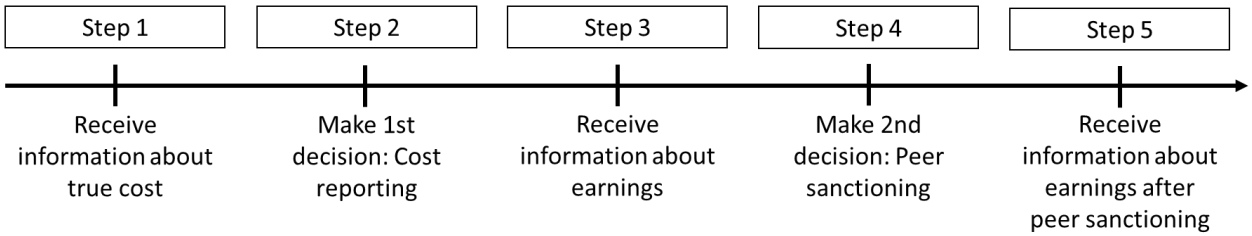
Your task:

- As part of the annual budgeting process[1], "SuperFruit Inc." requires you as a division manager to report the true cost of your division to corporate headquarters. Thus, corporate headquarters can allocate the scarce budget of the organization efficiently.
- You know for sure what your true cost will be, but corporate headquarters and the other two division managers will never know the true cost of your division. [Internal reporting environment CLOSED]
- You know for sure what your true cost will be, but corporate headquarters will never know the true cost of your division. [Internal reporting environment OPEN]
- Corporate headquarters only has the information that all divisions have a possible range of costs between 4,000 and 5,500 Lira.
- In contrast, the other two division managers know the true cost of your division. [Internal reporting environment OPEN]
- Corporate headquarters provides you with budget equal to the cost you have reported for the period. You keep the difference: Reported cost – true cost.
- Division's profit = 6,000 Lira (Fixed revenues) – reported cost – 500 (Fixed salary).
- Organization's profit = Sum of the three division's profits

[1]Budgeting is the typically annual process in an organization in which the available financial resources (budgets) for the next year are planned and approved for individual units (divisions, departments, cost centers).

Procedure

Each cost reporting period consists out of the same 5 steps:



Step 1: Receive information about true costs

- In each period, the true cost of each division is randomly drawn from the possible cost range (4,000 to 5,500 Lira).
- These numbers are equally likely to be drawn, and the true cost drawn for each division is known only to the division manager but not to the other two division managers or corporate headquarters. [Internal reporting environment CLOSED]
- These numbers are equally likely to be drawn, and the true cost drawn for each division is known to all three division managers of the organization but not to corporate headquarters. [Internal reporting environment OPEN]

Step 2: Make cost reporting decision

- Each division manager submits a cost report to corporate headquarters.
- The cost report can be any whole number between 4,000 and 5,500 Lira in 50 Lira increments (4,000, 4,050, 4,100, … 5,500) but cannot be less than the true cost.

Step 3: Receive information about earnings

In this step, each division manager receives information about their earnings.

Division managers do not receive information about the reported costs and earnings of the other two division managers. [Internal reporting environment CLOSED]

Further, each division manager receives information about the cost reports and earnings of the other two division managers. [Internal reporting environment OPEN]

[Pooled Profit-Sharing ABSENT]
Your earnings = Fixed salary + Cost surplus (i.e., reported cost – true cost)

- Fixed salary of 500 Lira.
- Any difference between reported cost and the true cost of your division.

[Internal reporting environment CLOSED]

Fixed Salary	Reported cost	True cost	Your earnings
500 Lira	4,500 Lira	4,500 Lira	500 Lira
500 Lira	5,000 Lira	4,500 Lira	1,000 Lira
500 Lira	5,500 Lira	4,500 Lira	1,500 Lira

[Internal reporting environment OPEN]

In Lira	**Fixed Salary**	**Reported cost**	**True cost**	**Cost surplus**	**Earnings**
Division Manager 1	500	4,500	4,500	0	500
Division Manager 2	500	5,000	4,500	500	1,000
Division Manager 3	500	5,500	4,500	1000	1,500

[Pooled Profit-Sharing PRESENT]

Your earnings = Fixed salary + Cost surplus (i.e., reported cost – true cost) + 5% share of organization's profit

- Fixed salary of 500 Lira.
- Any difference between the reported cost and the true cost of your division.
- 5% share of organization's profit (i.e., the pooled profit of all three divisions). The profit of each division = 6,000 Lira (Division's fixed revenues) – reported cost – 500 (Fixed salary)

[Internal reporting environment CLOSED]

In Lira	**Revenues**	**Reported cost**	**Fixed salary**	**Division's profit**
Division Manager 1	6,000	4,500	500	6,000 – 4,500 – 500 = 1000
Division Manager 2	6,000	5,000	500	6,000 – 5,000 – 500 = 500
Division Manager 3	6,000	5,500	500	6,000 – 5,500 – 500 = 0
Organization				1,000 + 500 + 0 = 1,500

In Lira	**Fixed Salary (1)**	**Reported cost**	**True cost**	**Cost surplus (2)**	**5% share of organization's profit (3)**	**Earnings (1+2+3)**
Division Manager 1	500	4,500	4,500	0	1,500 * 5% = 75	575

[Internal reporting environment OPEN]

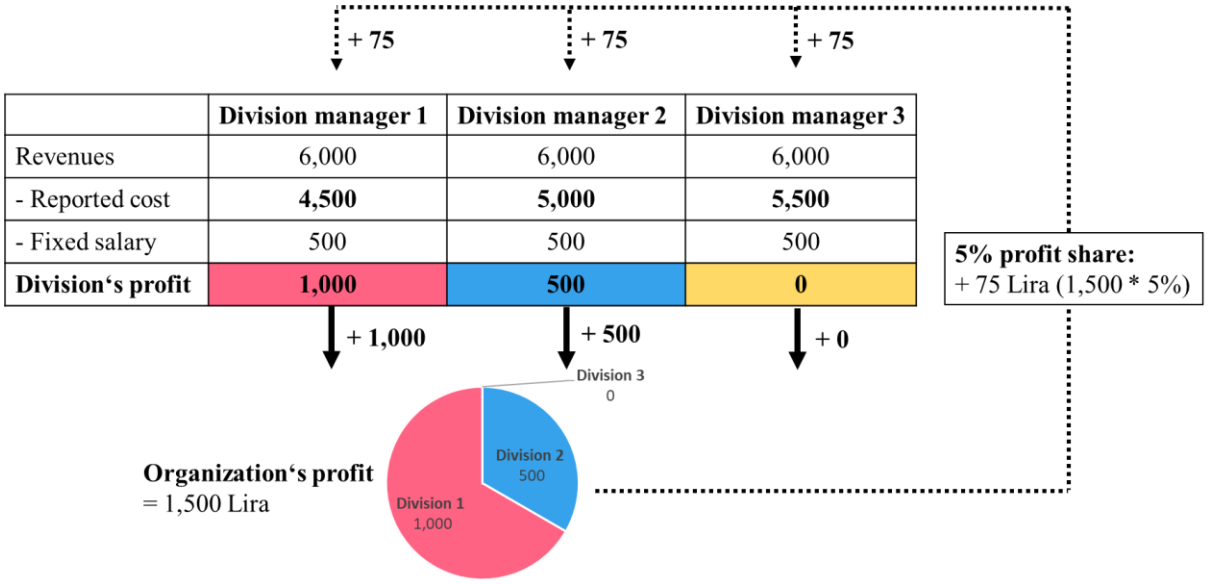
In Lira	**Revenues**	**Reported cost**	**Fixed salary**	**Division's profit**
Division Manager 1	6,000	4,500	500	6,000 – 4,500 – 500 = 1000
Division Manager 2	6,000	5,000	500	6,000 – 5,000 – 500 = 500
Division Manager 3	6,000	5,500	500	6,000 – 5,500 – 500 = 0
Organization				1,000 + 500 + 0 = 1,500

In Lira	**Fixed Salary (1)**	**Reported cost**	**True cost**	**Cost surplus (2)**	**5% share of organization's profit (3)**	**Earnings (1+2+3)**
Division Manager 1	500	4,500	4,500	0	1,500 * 5% = 75	575
Division Manager 2	500	5,000	4,500	500	1,500 * 5% = 75	1,075
Division Manager 3	500	5,500	4,500	1,000	1,500 * 5% = 75	1,575

Information about your 5% share of organization's profit [Pooled Profit-sharing PRESENT]

On the previous page, you saw that SuperFruit Inc. pays you a 5% share of organization's profit (i.e., the pooled profit of all three divisions).

- Please note that through your reported cost, you affect the organization's profit and thus the 5% profit-share and earnings of the other two division managers.
- **<u>As your reported cost increases</u>, the organization's profit decreases as well as the 5% share of organization's profit and thus the earnings of the other two division managers.**
- The following figure illustrates the calculation of organization's profit and the 5% share of organization's profit:



Step 4: Make peer sanctioning decision

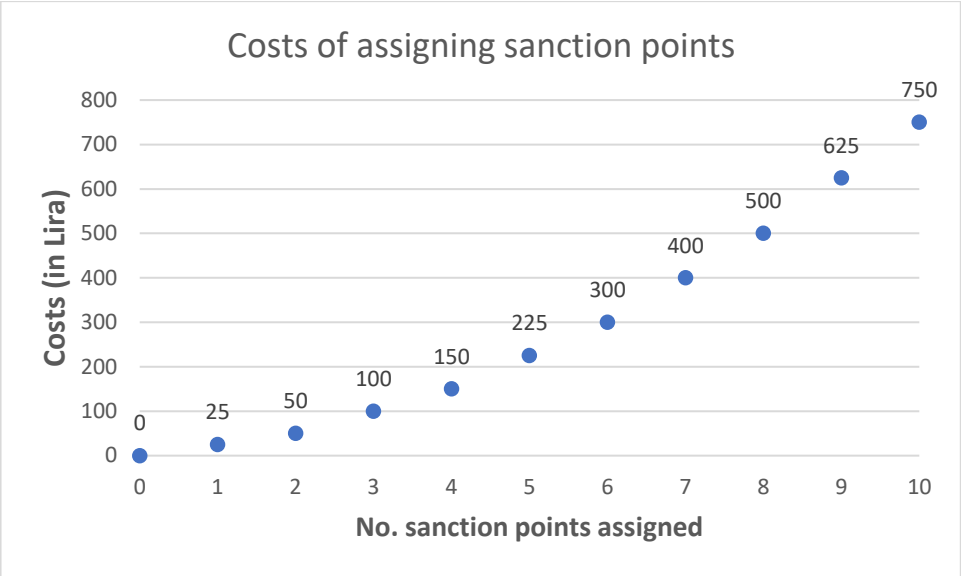
In this step, each division manager can decide whether to sanction their peers by assigning sanction points.

- Each division manager can assign between 0 to 10 sanction points to each of the other two managers.
- Each sanction point reduces the sanctioned division manager's earnings by 10%.
- The sum of sanction points received from the two other division managers determines the earnings reduction, which is capped at 100%.

Examples (Earnings from reporting decision = 1,000 Lira)

Earnings from reporting decision	Reduction through received sanction points	Earnings after peer sanctioning
1,000 Lira	1 point = 10% Reduction	1,000 – 1,000*10% = 900 Lira
1,000 Lira	5 points = 50% Reduction	1,000 – 1,000*50% = 500 Lira
1,000 Lira	10 points = 100% Reduction	1,000 – 1,000*100% = 0 Lira

But sanctioning other division managers (assigning sanction points to them) is also costly for the sanctioning division manager as shown in the figure below:



Step 5: Receive information about earnings after peer sanctioning

Finally, each division manager receives information about the total number of sanction points they received from the other two division managers and the resulting earnings after peer sanctioning.

Example:

- Division's true cost = 4,500 Lira
- Your cost report = 5,000 Lira

You received a total of 6 sanction points from the other two division managers and assigned 0 sanction points.

[Pooled Profit-Sharing ABSENT]

Your earnings after peer sanctioning:

Fixed salary	500 Lira
+ Cost surplus (i.e., reported cost – true cost):	5,000 – 4,500 = 500 Lira
= Earnings from reporting decision	**1,000 Lira**
- Earnings reduction through sanction points	1,000 *60% = 600 Lira
- Costs for assigning sanction points	0 Lira
= Earnings after peer sanctioning	**400 Lira**

[Pooled Profit-Sharing PRESENT]

Your earnings after peer sanctioning:

Fixed salary	500 Lira
+ Cost surplus (i.e., reported cost – true cost):	5,000 – 4,500 = 500 Lira
+ 5% share of organization's profit	75 Lira
= Earnings from reporting decision	**1,075 Lira**
- Earnings reduction through sanction points	1,075 *60% = 645 Lira
- Costs for assigning sanction points	0 Lira
= Earnings after peer sanctioning	**430 Lira**

Stage 1: Three practice decision periods

You will now start the practice decision periods to get to know the cost reporting task before the formal decision periods start. Especially these practice periods are a calculative exercise to show how your decisions affect your earnings.

In the practice decision periods, the other two division managers are represented by bots with predefined behavior, which means they do not react to your decisions. The behavior of the bots was predefined in such a way to show you a variety of different situations that can occur in the formal periods of the cost reporting task.

Please note that none of the next three practice decision periods will affect your earnings today.

Overview of predefined bot behavior in practice periods

Practice period 1

	True cost	Cost report	Assign sanction points to participant
Bot 1	5,000 Lira	5,450 Lira	0 Points
Bot 2	5,000 Lira	5,500 Lira	0 Points

Practice period 2

	True cost	Cost report	Assign sanction points to participant
Bot 1	5,000 Lira	5,200 Lira	2 Points
Bot 2	5,000 Lira	5,250 Lira	1 Points

Practice period 3

	True cost	Cost report	Assign sanction points to participant
Bot 1	5,000 Lira	5,000 Lira	3 Points
Bot 2	5,000 Lira	5,050 Lira	2 Points

Stage 1: Comprehension test

On the next page, you will attend the comprehension test. For each question you have two attempts to give the correct answer. Please note that we will have to exclude you from the study if any question is not answered correctly on the 2nd attempt at the latest. This will prevent you from receiving the £4 payment and a possible bonus payment in Stage 2.

Please answer the following questions by selecting one (and only one) option per question.

1. The true cost of each division:

   a. is determined by corporate headquarters
   b. is determined by the division manager
   c. is a purely random whole number between 4,000 to 5,500 Lira in increments of 50 Lira
   d. is determined by the other two division manager

2. What does corporate headquarters know?

   a. the true cost of each division
   b. the reported cost of each division manager
   c. the earnings of each division manager
   d. nothing

3. Who reports the cost of each division:

   a. corporate headquarters
   b. division manager
   c. the cost report is a purely random whole number between 4,000 to 5,500 Lira.
   d. employee from the production department

4. What do division managers know?

   a. true costs and reported costs of all three divisions in their organization
   b. true cost and reported cost of their division
   c. only reported cost of their division
   d. only true cost of their division

5. The division manager's reporting decision has an impact on:

a. only their own earnings
b. the earnings of all three division managers in the organization
c. nothing
d. the fixed salary

6. How many decisions does each division manager have to make in each period?

a. Only one, the reporting decision
b. Two, first the reporting decision and then the peer sanctioning decision
c. A division manager can decide nothing
d. Three, reporting decision, peer sanctioning decision, and the group decision.

7. Please calculate the division manager's earnings based on the following example.

Assume the randomly drawn true cost is 5,000 Lira.
The division manager reported cost of 5,500 Lira to corporate headquarters.
The division manager receives no sanction points.

Including the fixed salary of 500 Lira, the division managers' earnings from this period would be:

a. 200 Lira
b. 500 Lira
c. 1,000 Lira
d. 1,500 Lira

8. How much are the division manager's earnings from the reporting decision reduced in the case of receiving a total of 10 sanction points from the other two division managers in one period?

a. 10%
b. 50%
c. 75%
d. 100%

Stage 2: Cost reporting task

At the beginning of each of the 10 formal decision periods,

- Each participant will be randomly assigned to a group of three division managers.
- Thus, each participant is assigned to a new group of three division managers in each period.
- Please note, as you will be grouped with two other division managers in each period, there may sometimes be a short waiting time.

Note that only 1 out of the 10 formal decision periods will be randomly drawn to determine your actual earnings and bonus payment today. Your earnings after peer sanctioning in Lira will be converted to £ at the rate of 200 Lira = £1.

Step 1: Receive information about true costs

[Internal reporting environment CLOSED]

True cost of your division in this period
5,000 Lira

[Internal reporting environment OPEN]

	True cost in this period
Your division	5,000 Lira
Division 2	5,000 Lira
Division 3	5,000 Lira

Step 2: Make cost reporting decision

"Dear division manager,

For the annual preparation of the budget plan, we need your support! Please submit your cost report for your division below. Thank you very much!

Sincerely,
Corporate headquarters"

The true cost of your division in this decision period is 5,000 Lira.
Your cost report to corporate headquarters: ____ Lira.

Message from corporate headquarters

"Dear division manager,

[Internal reporting environment CLOSED]

Thank you very much for your cost report! It is only through your valuable input that we are able to efficiently allocate our tight budget among all divisions every year!

[Internal reporting environment OPEN]

Further, SuperFruit Inc. has a achieved an **organization's profit of Lira**.

[Pooled Profit-Sharing PRESENT OPEN]

Thus, you *will receive a* **5% profit-share = Lira** *in addition to the fixed salary in this period.*

Sincerely,

Corporate headquarters"

Step 3: Receive information about earnings

[Internal reporting environment CLOSED/ Pooled Profit-Sharing ABSENT]

Your earnings:	
Fixed salary	500 Lira
Cost surplus (i.e., reported cost – true cost)	200 Lira
Total	**700 Lira**

[Internal reporting environment OPEN/ Pooled Profit-Sharing ABSENT]

Your earnings:	
Fixed salary	500 Lira
Cost surplus (i.e., reported cost – true cost)	200 Lira
Total	**700 Lira**

Cost reporting decisions of all division managers

	Revenues	Reported cost	Fixed salary	Division's profit	True cost
You					
Division manager 2					
Division manager 3					
Organization					

[Internal reporting environment CLOSED/ Pooled Profit-Sharing PRESENT]

Your earnings:

Fixed salary	500 Lira
Cost surplus (i.e., reported cost – true cost)	200 Lira
5% share of organization's profit	100 Lira
Total	**800 Lira**

[Internal reporting environment OPEN/ Pooled Profit-Sharing PRESENT]

Your earnings:

Fixed salary	500 Lira
Cost surplus (i.e., reported cost – true cost)	200 Lira
5% share of organization's profit	100 Lira
Total	**800 Lira**

Cost reporting decisions of all division managers

	Revenues	Reported cost	Fixed salary	Division's profit	True cost
You					
Division manager 2					
Division manager 3					
Organization					

Step 4: Make peer sanctioning decision

Please submit how many sanction points you want to assign to the other division managers to decrease their earnings:

[Internal reporting environment CLOSED]

	No. sanction points
Division manager 2	
Division manager 3	

[Internal reporting environment OPEN]

	Reported cost	True cost	Division's profit	No. sanction points
Division manager 2				
Division manager 3				

- You can assign between 0 to 10 sanction points to each of the other two managers.
- Each sanction point reduces the sanctioned division manager's earnings by 10%.
- The sum of sanction points received from the two other division managers determines the earnings reduction, which is capped at 100%.
- Note that assigning sanction points is also costly for the sanctioning manager.

Step 5: Receive information about earnings after peer sanctioning

You received a total of **6 sanction points** from the other two division managers and assigned 0 sanction points.

Your earnings after peer sanctioning:

[Pooled Profit-Sharing ABSENT]

Fixed salary	500 Lira
+ Cost surplus (Cost report – true cost):	5,000 – 4,500 = 500 Lira
= Earnings from reporting decision	**1,000 Lira**
- Earnings reduction through sanction points	1,000 *60% = 600 Lira
- Cost for assigning sanction points	0 Lira
= Earnings after peer sanctioning	**400 Lira**

[Pooled Profit-Sharing ABSENT]

Fixed salary	500 Lira
+ Cost surplus (Cost report – true cost):	5,000 – 4,500 = 500 Lira
+ 5% share of organization's profit	75 Lira
= Earnings from reporting decision	**1,075 Lira**
- Earnings reduction through sanction points	1,075 *60% = 645 Lira
- Cost for assigning sanction points	0 Lira
= Earnings after peer sanctioning	**430 Lira**

Stage 3: Post-experimental questionnaire

Instructions

In stage 3, we will ask you some questions about your reactions to the cost reporting task and your background.

- This last step will take you about 10 minutes.
- The responses that you provide to the following statements and questions will not be shared with others. Only the researchers will view your anonymous responses after the study is complete.
- Please remember that you will only receive your fixed payment and a possible bonus payment from Stage 2 if you have completed the whole study.

Attention check

Why did corporate headquarters require a cost report from you as a division manager?

- There was no particular reason.
- To provide each division with an adequate budget and avoid excessive budgets.
- To choose the division manager of the month.

Manipulation checks

Please rate your degree of agreement with the following statements:

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

- In each period, I received information about the **true costs** of the other two divisions in my organization.
- My **cost reporting decisions** affected the earnings of the other two division managers in my organization.
- In each period, I received information about the **cost reports** of the other two division managers in my organization.
- By assigning **sanction points**, I could have affected the earnings of the other two division managers in my organization.
- From the information provided, I could infer the **honesty level** of the other two division managers in my organization.

Statements about the experiment

Please rate your degree of agreement with the following statements.

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

- It was important to me that I was viewed as honest.
- I wanted to maximize my earnings.
- In each period I interacted with the same participants.
- When other division managers reported higher costs than their true costs, I assigned sanctions points to them because I disapproved that they earned more than I did.
- When other division managers reported higher costs than their true costs, I assigned sanctions points to them because their decision decreased organization's profit.
- When other division managers reported higher costs than their true costs, I assigned sanctions points to them because they contributed less to the organization's profit and the 5% profit-share than I did.
- When other division managers reported higher costs than their true costs, I assigned sanctions points to them because their decision decreased the 5% profit-share of the other two division managers

Social expectation measurement

Please rate your degree of agreement with the following statements. When answering, think about your decisions in all 10 formal decision periods!

1 Not at all	2	3	4	5	6	7 Very much

- To what extent did you expect that the other two division managers would report the true cost to corporate headquarters?
- To what extent do you believe that one should report the true cost to corporate headquarters?
- To what extent did you believe that the other two division managers expected you to report the true cost to corporate headquarters?
- To what extent did you expect that the other two division managers were willing to assign you sanction points if you reported higher cost than true cost?

4 different scenarios

On this page, we ask you to think about how much cost you would report to corporate headquarters in the following 4 different scenarios:

You are a division manager. As before, the true costs have a possible range between 4,000 and 5,500 Lira. The true costs of your division and the other divisions for a given period are 4,500 Lira. Assigning sanction points **is not** possible.

How much cost would you report to corporate headquarters if:

Scenario	Your cost report in Lira:
1. The other two division managers • report **4,500 Lira** and • believe that you should report **4,500 Lira.**	
2. The other two division managers • report **5,500 Lira** and • believe that you should report **4,500 Lira.**	
3. The other two division managers • report **4,500 Lira** and • believe that you should report **5,500 Lira.**	
4. The other two division managers • report **5,500 Lira** and • believe that you should report **5,500 Lira.**	

Expected sanction points

Imagine another period in the cost reporting task...

You are a division manager. As before, the true costs have a possible range between 4,000 and 5,500 Lira.

The true cost of your division for a given period is 4,500 Lira.

Please indicate below how many sanction points you would expect from the other two division managers in sum if you submit the following cost report to corporate headquarters:

	No. sanction points from other division managers												
Your cost report:	0	1	2	3	4	5	6	7	8	9	10	…	20
4,500 Lira													
…													
5,500 Lira													

Questions about yourself Part 1

Please indicate the extent to which you agree or disagree with the following statements.

1 Strongly disagree	2	3	4	5	6	7	8	9 Strongly agree

8. Safety first.
9. I do not take risks with my health.
10. I prefer to avoid risks.
11. I take risks regularly.
12. I really dislike not knowing what is going to happen.
13. I usually view risks as a challenge.
14. When I do something wrong, I have strong feelings of shame and guilt.

Questions about yourself Part 2

Please indicate the extent to which you agree or disagree with the following statements.

1 Risk avoider	2	3	4	5	6	7	8	9 Risk seeker

- I view myself as a…

Background Information

Please be assured that the following information will remain confidential and will not be used to identify any individual participant.

Female (F), Male (M), Diverse (D), Prefer not to say (X)? _____

How old are you? _____ (Number)

What is your current academic degree? _____ (None, Bsc, Msc, PhD)

Have you ever gained experience in a budgeting process _____? (Yes/No)

Budgeting is the typically annual process in a company in which the available financial resources (budgets) for the next year are planned and approved for individual units (divisions, departments, cost centers).

How many years of experience do you have collected? _____(Number)

Final question

It would be very helpful if you could tell us at this point whether you have taken the post-experimental questionnaire seriously so that we can use your answers for our scientific analysis or whether you were just clicking and entering random answers to get to the end of the experiment as fast as possible? The answer to this question will not affect your final payment.

- I took the experiment seriously.
- I did not take the experiment seriously.