

# Delegation and Implementation\*

Randolph Sloof

Ferdinand A. von Siemens

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## Abstract

We experimentally investigate how delegation affects the implementation of decisions. We specifically study whether responses to the exact same decisions – in our case project choices – depend on who has taken these decisions and which information was available to the decision maker. We find that participants implement decisions efficiently if they have taken them themselves, but reduce implementation effort if the identical decisions are imposed on them by other participants. This motivational effect of delegation is persistent only if participants must implement decisions that they themselves would not have taken given the available information. We finally find that potential implementation problems lead to more delegation, but only if the gathering of information necessary to make the right decisions can be easily ensured.

*JEL: C90, D20, D80, L20, M20.*

*Keywords: delegation, implementation, experiment, organisational economics.*

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# 1 Introduction

Organisational success depends on the quality of organisational decisions. The allocation of decision rights – the level of delegation – influences the quality of organisational decisions as it affects what and how information is employed in the decision making process.<sup>1</sup> However, already Fama & Jensen (1983) emphasise that organisations must not only take the right decisions, they must also ensure their subsequent implementation.<sup>2</sup>

The empirical evidence from organisational behaviour suggests that the way how decisions come about influences how these decisions are implemented. For example, Bennet (1998) and Ambrose, Seabright & Schminke (2002) find that workers who perceive to have little control over their work environment are substantially more likely to engage in deviant workplace behaviour. This includes not only absenteeism, neglecting instructions, and shirking, but also very dysfunctional behaviour like stealing, behaving rudely, or physical violence. Inspired by this observational empirical evidence, we explore experimentally the link between delegation and implementation of the exact same decisions. We study whether people feel demotivated to implement a given decision if this decision is imposed on them by somebody else. Our design provides insights on the underlying behavioural mechanisms. We finally study under what conditions potential implementation problems lead to more delegation, which has important implications for organisational design.

Our experimental setup is based on the model by Aghion & Tirole (1997). To investigate the link between delegation and implementation, we add an explicit implementation stage. We consider firms consisting of one manager and one worker. The objective of the firm is to choose and then implement one out of three projects. The payoffs associated with each of the projects are initially unknown to manager and worker. The manager first decides whether to delegate the right to choose the project to the worker. The worker then decides whether

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<sup>1</sup>See Brickley, Zimmerman & Smith (2004), Bolton & Dewatripont (2013), and Gibbons, Matouschek & Roberts (2013) for recent surveys of the extensive theoretical literature on the optimal allocation of decision rights in organisations.

<sup>2</sup>Fama & Jensen (1983) decompose organisational decision making into four steps: initiation (generation of information and project proposals), ratification (choice of project), implementation (execution of chosen project) and monitoring (measurement of performance and payment of rewards). They point out that initiation and implementation are typically allocated to the same agents and bundle these steps under the term decision management. In our experiment, we follow this structure as the same agents are responsible for both gathering information and implementation.

to gather costly information. Some information is revealed conditional on the information gathering of the worker, where the full extent of the information revealed is also affected by a random shock. Manager and worker always share the same information, thus we abstract from asymmetric information and communication. The organisational member with decision rights next selects one project for implementation. Finally, the worker exerts costly effort to implement the chosen project.

Our design innovation is that manager and worker do not always receive full information on all projects even if the worker decides to gather information. Optimal project choices depend on the available information. We thereby make it a priori likely that both managers and workers with decision rights in the end choose a project with the exact same payoff properties. Looking at implementation of this project reveals whether implementation of the exact same project depends on how the project choice has come about. We can thus identify whether delegation per se has a direct motivational effect on implementation.

We find that how decisions are taken affects implementation. Workers efficiently implement decisions that they have taken themselves, but they implement the very same decisions less efficiently if these decisions are imposed on them by managers. Bartling, Fehr & Herz (2014) and Owens, Grossman & Fackler (2014) find that some people value decision authority as such. Delegation might consequently improve implementation because it provides workers with the valued right to decide themselves. However, we show that implementation depends on the information that managers possess when making the decision. Our findings suggest that workers do not mind not being given decision rights as such. They rather seem upset only if managers abuse their decision rights to promote their own interests at the expense of workers. Furthermore, the motivational effect of delegation in our setup is unlikely to be driven by regret aversion or enhanced feelings of responsibility. Our insights concerning the behavioural mechanisms therefore complements the closely related findings by Fehr, Herz & Wilkening (2013) and Charness, Cobo Reyes, Jiménez, Lacombe & Lagos (2012) on the motivational effects of delegation. We discuss our contribution to these and other closely related papers at greater length after presenting our results in more detail.

Because reciprocity concerns seem to drive behaviour, our study also relates to the larger experimental literature on public goods provision and gift exchange, see for example Fehr, Kirchsteiger & Riedl (1998) and Fehr & Gächter (2000). These papers largely find that

people punish unfair actions by others when given the opportunity. But they do not look at the motivational effects of delegation, since they do not vary or endogenise the allocation of decision rights, which in their context refer to the right to choose wages or contributions. The gift exchange experiment by Charness et al. (2012) discussed later is an exception. Note that managers keeping decision rights per se need not necessarily be perceived by workers as unkind, as this may depend on how managers subsequently use their decision rights. Our experiment is essentially designed to explore this issue. We find no evidence of punishing centralisation per se.

We next investigate the conditions under which potential implementation problems affect delegation. For this we compare delegation rates in the above main treatment to a control treatment in which efficient implementation is ensured by design. Parameters are first set such that workers have strong monetary incentives to gather information, no matter whether managers delegate decision rights or not. Workers can therefore effectively obstruct only the implementation of decisions if they are unhappy with the choices of their manager. Under this condition, we find that implementation problems make delegation more likely. Due to implementation problems, managers actually have incentives to only take decisions that are in the best interest of their workers. This eliminates the very incentive for managers to keep their decision rights.

We finally look at two additional treatments in which workers have weaker incentives to gather information if managers do not delegate. The two punishment options – obstructing information gathering and implementation – are thus on a more level playing ground. In this case, we no longer find that implementation problems lead to more delegation. The reason is that workers refuse to gather information if managers do not delegate. This makes delegation optimal, no matter whether there are potential implementation problems. We conclude that implementation problems lead to more delegation only if information gathering by workers is ensured, because they fear that managers make bad decisions otherwise.

## **2 Experimental Design**

We consider firms consisting of one manager and one worker. Production within this firm consists of identifying, choosing, and implementing one of three available investment projects. We first generally describe the strategic interaction between manager and worker. We focus

on our main treatment that studies the motivational effects of delegation on implementation.

1. Manager and worker face three investment projects.  
These investment projects have unknown payoff characteristics.  
The manager decides whether to delegate formal decision rights to the worker.
2. The worker observes the delegation decision of the manager.  
The worker then decides whether to gather information at costs  $c = 5$ .
3. No information on the projects is revealed if the worker gathers no information.  
Full or partial information is revealed if the worker gathers information.  
Getting full or partial information then happens with equal probability  $p = 0.5$ .  
Manager and worker always have the same and thus symmetric information.
4. The manager or worker with formal decision rights chooses a project for implementation.  
The project choice can be based on the previously revealed information.
5. Full information on the project chosen for implementation is revealed.  
The worker chooses effort  $e \in \{1, 2, \dots, 10\}$  to implement the project.

We next fill in all the specific details. The three projects come in three different payoff combinations. For the treatment labelled Implementation, the payoff combinations of the projects depend on the implementation effort by the worker. They are summarised in the first panel of Table 1. Manager-High yields  $40 + 5e$  to the manager and  $60 + e$  to the worker. Worker-High yields  $30 + 5e$  to the manager and  $90 + e$  to the worker. Both-Low yields  $e$  to the manager and  $-60 + e$  to the worker. Manager and worker know that the three projects come in these three monetary payoff combinations. But initially they do not know which of the three projects is connected to which monetary payoff combination.<sup>3</sup>

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<sup>3</sup>The initial situation is essentially like choosing one out of three facedown cards. Everybody knows the deck of cards: one card Manager-High, one card Worker-High, and one card Both-Low. But nobody knows which facedown card is which. Because the total deck of cards is known, flipping over one card not only reveals information on this card, but also on the remaining two facedown cards.

Table 1: Payoff Combinations

	Projects		
	Manager-High	Worker-High	Both-Low
Implementation			
Payoff Manager	$40 + 5e$	$30 + 5e$	$e$
Payoff Worker	$60 + e$	$90 + e$	$-60 + e$
Control			
Payoff Manager	90	80	10
Payoff Worker	70	100	-50
Implementation - Information Gathering at Stake			
Payoff Manager	$40 + 5e$	$30 + 5e$	$e$
Payoff Worker	$60 + e$	$90 + e$	$e$
Control - IGaS			
Payoff Manager	90	80	10
Payoff Worker	70	100	10

Note that for all three project types, the payoffs for both worker and manager are increasing in the worker’s effort. This captures the common situation in which managers provide workers with monetary incentives to properly implement the chosen projects. But following the large literature on moral hazard and agency costs, we assume that providing workers with very strong monetary incentives is either not possible or prohibitively expensive. Workers can thus “game” the system and divert implementation effort to hurt managers at relatively low personal costs. Basically, workers can find cheap ways to seriously thwart the implementation of any project, so that managers’ monetary payoffs are more sensitive to their effort than their own payoffs are. This provides some room for procedural concerns to affect behaviour.

With our information structure we aim to study whether implementation of the exact same project – more specifically project Manager-High – depends on who has chosen the project and with what information at one’s disposal. The reason is that our design ensures that this project is not only chosen by the manager but also sometimes by the worker himself.

The argument runs as follows. If the worker does not gather information, no information on the projects is revealed. If the worker gathers information, both manager and worker always learn which of the projects is project Manager-High. Whether they get additional information on the remaining two projects depends on chance. With probability  $p = 0.5$  the monetary payoffs of the other two projects become publicly known. Otherwise, no additional information is obtained. We say throughout the paper that a decision maker is uninformed if she has no information on any project, that she is partially informed if she only knows which project is project Manager-High, and that she is fully informed if she has information on all three projects. Note that manager and worker always have the same information on the projects. To focus on implementation, we therefore abstract from information asymmetries and communication.

A fully informed manager is likely to select project Manager-High since this promises her the highest payoff. However, also a partially informed worker may well opt for Manager-High, because he risks getting the bad project Both-Low when selecting a project with unknown payoffs. Parameters are set such that a partially informed worker maximises his expected payoff by selecting and then fully implementing Manager-High.

We compare the most interesting and informative situations: the choices of Manager-High by (i) fully informed managers, (ii) partially informed managers, and (iii) partially informed workers. If workers only care for the actual decision, their implementation effort should be the same in all three situations. However, if there are motivational effects of delegation per se and workers also care about how decisions have come about, then implementation effort should be high if workers choose Manager-High rather than if the same project choice is imposed on them by managers.

We next study whether implementation problems affect delegation. To experimentally gauge the importance of implementation, we introduce an additional treatment labelled Control in which the implementation effort is exogenously set at  $e = 10$ . Because the worker makes no effort choice, we do not mention implementation at all in the instructions. The payoffs of this treatment can be found in the second panel of Table 1. If implementation was always efficient – and thus equal to 10 – then the project payoffs in the treatments Implementation and Control would be the same, and there should be no differences in the delegation rates. Payoffs are such that workers maximising their expected payoffs gather information, no

matter whether managers delegate decisions rights. Managers maximising their expected payoffs then keep the decision rights since this allows them to choose their most preferred project for implementation.

We finally add two treatments to explore the conditions under which implementation problems might affect delegation. Project Both-Low is really bad for workers in our original treatments Implementation and Control. This ensures that workers gather information even if managers keep control. Workers should thus withhold implementation effort rather than refrain from gathering information if they want to hurt managers for keeping control. For certain project decisions this may well be applicable. Yet one could also imagine situations in which differences between projects are smaller for the worker and gathering information is less valuable to him. In our treatments labelled Implementation-IGaS and Control-IGaS we increase workers' payoffs under project Both-Low. We summarise the payoffs in the third and fourth panel of Table 1. Gathering information remains optimal for workers even if managers keep control. But the costs of not gathering information are reduced. We can thus explore whether withholding implementation effort still plays a prominent role if not gathering information is also a cost-effective instrument to discipline managers. Abbreviation IGaS stands for Information Gathering at Stake.

The experiment was programmed using the z-tree programming package by Fischbacher (2007). Subjects were recruited with the software ORSEE by Greiner (2003). After reading paper instructions, subjects answered computerised control questions to verify their understanding. Subsequently they learned their role (manager or worker). Roles were kept fixed during the experiment. We framed the experimental interaction as described in the main text so that participants can more easily get into the strategic situation (see the Appendix for sample instructions). Subjects were therefore explicitly labelled either manager or worker, managers decided whether or not to delegate decision rights, et cetera. The experiment consisted of 20 periods. In each period, subjects were paired in couples of one manager and one worker. We employed a stranger design with at least two independent matching groups per session.



Table 2: Experimental Details

	Sessions	Matching Groups	Subjects
Implementation	4	8	74
Control	3	6	56
Implementation-IGaS	3	7	70
Control-IGaS	3	7	62

Note: Matching groups varied in size between 8 to 12 subjects.

For each treatment we ran three or four sessions with 14 to 26 subjects. In total 272 subjects participated. Subjects were mostly undergraduates from the University of Amsterdam. Due to variation in show up, matching groups contained between 8 and 12 subjects.<sup>4</sup> Table 2 provides an overview of the experimental details. At the end of experiment subjects filled out a questionnaire. Overall earnings equalled the sum of the earnings in the 20 periods. The conversion rate was 1 eurocent per point earned. On top of that, subjects received a fixed fee of 3 euros. Subjects earned on average 18 euros for about 80 minutes.<sup>5</sup>

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<sup>4</sup>In the treatment Control we had one matching group of 4 subjects, and in Implementation-IGaS we had one matching group of 6 subjects. Since these matching groups are too small to exclude repeated game effects, we disregard them in the ensuing data analysis.

<sup>5</sup>In the two IGaS treatments, we ran a second experiment after the one reported here. Subjects were informed about this at the start of the sessions, but did not learn anything about the contents of the second experiment still to come. We informed subjects that the first and the second experiment were completely separated. To keep overall payments comparable, subjects received a fixed fee of 3 euros in Implementation and Control to compensate for the lack of earnings from the second experiment. More information on the second experiment is available upon request.

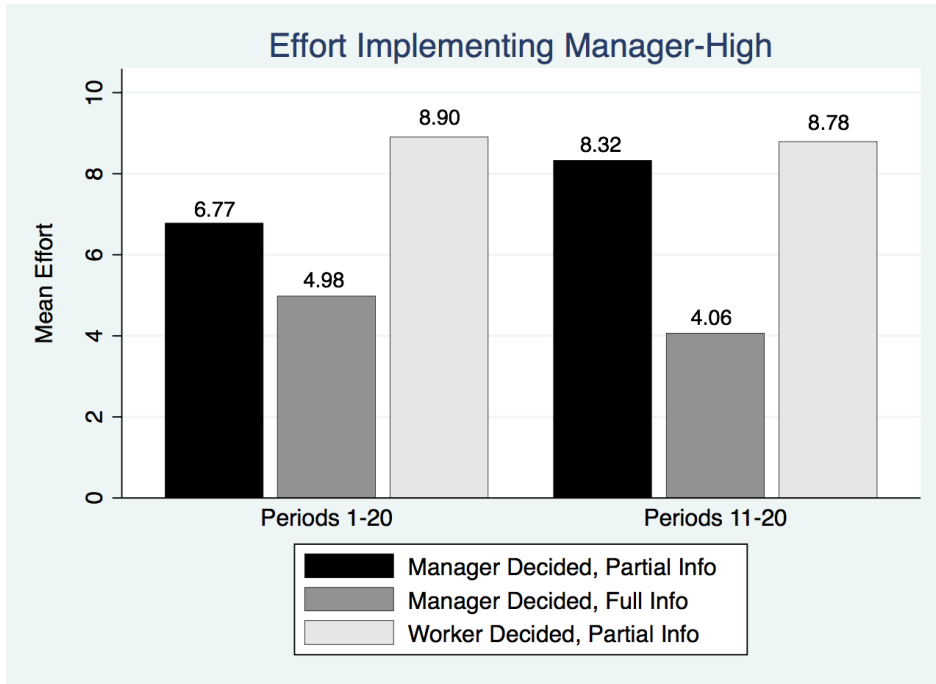
### 3 Empirical Results

We first study whether delegation indeed improves implementation. We then investigate whether implementation problems lead to more delegation. We finally explore the conditions under which implementation problems lead to more delegation.

#### 3.1 Delegation Improves Implementation

To study the motivational effect of delegation, we look at how workers implement the exact same project Manager-High conditional on how the project choice has been taken. Figure 1 illustrates our main result. We put average effort in numbers above the bars.<sup>6</sup> We focus on our treatment Implementation; conclusions are the same in our treatment Implementation-IGaS unless stated otherwise. The precise average effort levels for all treatments plus the results from all statistical tests are summarised in Tables 4 and 5 in the appendix. Statistical tests throughout the paper are based on the distributions of matching group averages.

Figure 1: Average Effort Implementing Project Manager-High.



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<sup>6</sup>We focus on project choices by partially informed workers and partially and fully informed managers. Results concerning the other situations – for example accidental choices by uninformed decision makers – do not change our conclusions. They are available from the authors upon request.

If workers only care about the project, implementation of the exact same project Manager-High should not depend on how the project choice has come about. Yet we find that workers exert more effort after they have chosen Manager-High themselves rather than after fully informed managers have selected the project (8.90 versus 4.98 looking at all periods, and 8.78 versus 4.06 looking only at the second half of the experiment). These differences in effort are statistically significant ( $p$ -values less than 0.05).

Our results suggest that implementation effort is affected by procedural concerns. Frey, Benz & Stutzer (2004) distinguish two sources of procedural utility. First, people may derive direct utility from institutions or decision rules as such. For example, people may intrinsically value having voice in the decision making or decision rights as such.<sup>7</sup> Second, procedural utility may result from how people feel being treated by others. If participants were motivated by the possession of authority as such, they should exert little implementation effort after partially informed managers have chosen project Manager-High. Taking data from all periods, workers choose an average effort of 6.77 after partially informed managers have chosen Manager-High. This is lower than the effort after partially informed workers have made the project choice themselves ( $p$ -value of 0.03). But the difference vanishes if we focus on the second half of the experiment. Average effort after partially informed managers have made the project choice is then high at 8.32. It is thus no longer significantly different from the average effort of 8.78 after partially informed workers have chosen the project themselves ( $p$ -value of 0.41). Experienced workers seem to realise that they would have made the same project choice as their manager, so that there is no reason to punish her. It thus seems that negative reciprocity with respect to the taken decision – and not preferences over the allocation of decision rights as such – drive behaviour in our setup.

This finding complements the existing literature on the motivational effects of delegation. Fehr et al. (2013) find that participants with decision rights search too much for information, while those without decision rights search too little. They convincingly argue that those with decision rights probably regret having exerted too little search effort if they fail to find information on the projects, because exerting higher effort would then have lead to their preferred project choice. Those without decision rights, however, regret having exerted too

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<sup>7</sup>Empirical evidence for direct preferences for voice and preferences for decision rights as such is provided by Yamamori, Kato, Kawagoe & Matsui (2008), Ong, Riyanto & Sheffrin (2012), Bartling et al. (2014), Owens et al. (2014), and Sloof & von Siemens (forthcoming). Corgnet & Hernán González (2014) show that giving voice can improve cooperation if and only if the voiced suggestions are followed.

much search effort if they are overruled by those with formal authority, because their effort is then wasted. Workers and managers can reduce anticipated regret by exerting more or less effort, depending on who holds the decision rights. In our experiment, implementation effort is not chosen under uncertainty. By design it is thus impossible that something might happen which could make workers regret their effort choice. Regret aversion therefore cannot drive the observed motivational effects of delegation in our setup.

Our findings also complement Charness et al. (2012) who study a gift exchange game in which managers first decide whether or not their workers can set their own wage in addition to choosing effort. They find that workers setting their own wage exert higher effort for a given wage. They argue that workers with wage setting power feel more responsible for the overall outcome, which enhances their willingness to generate and share surplus. In our experiment, workers exert substantially more effort after partially rather than fully informed managers have chosen project Manager-High. In our treatment implementation, these differences in effort are statistically significant no matter whether we look at all periods or only the second half of the experiment ( $p$ -values of 0.03 and 0.04).<sup>8</sup> But in both situations workers are equally (i.e. not) responsible for the project choice: the project was chosen by the managers, while workers did their best to gather information. The difference in behaviour thus cannot be driven by feelings of responsibility, because the differences in information arise due to the chance element in our information structure. Workers are not responsible for this chance element.

Finally, note that reciprocal workers might punish managers for keeping control by refusing to gather information. The workers who implement project choices by at least partially informed managers therefore form a self-selected sample. This raises the question whether the observed differences in effort might be driven by selection. However, the workers who decided not to punish managers by not gathering information are presumably less reciprocal than the workers implementing their own project choices. Selection thus makes it more difficult to find the observed motivational effects of delegation. Further, our treatments Implementation and Implementation-IGaS differ in the monetary incentives to gather information and thereby in the costs of selection. Selection should be stronger in Implementation-IGaS. Comparing effort choices across these treatments yields no statistically significant differences. We therefore do not believe that the observed differences in effort are driven by selection.

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<sup>8</sup>In our treatment Implementation-IGaS, the difference in effort is statistically significant only in the second half of the experiment ( $p$ -values of 0.14 and 0.09).

**Result 1** (i) *Delegation improves implementation of the exact same projects.* (ii) *Workers are not motivated by giving them decision rights as such, but punish managers for promoting their own interests. The motivational effect of delegation thus seems to be driven by negative reciprocity.* (iii) *Regret aversion and feelings of enhanced responsibility are not the mechanism behind the motivational effects of delegation in our setup.*

### 3.2 Implementation Promotes Delegation

We next study whether implementation problems affect delegation. For this we first compare the delegation fractions in our treatments Implementation and Control. Remember that in Control we ensure efficient implementation by design, so that implementation problems cannot affect delegation. We report our results in Table 3 where we take observations from all periods into account. Conclusions are the same when we focus on the second half of the experiment. The first column of the table reveals that managers delegate in 39% of all cases in our treatment Control. They delegate in 72% of all cases and thus much more frequently in our treatment Implementation. This difference is statistically significant ( $p$ -value of 0.01).

Table 3: Delegation and Information Gathering Fractions

	Delegation	Info - No Del	Info - Del	Information Effect
	(1)	(2)	(3)	(3) - (2)
Implementation	0.72	0.74	0.99	0.25
Control	0.39	0.77	0.99	0.22
$p$ -value	0.01	0.78	0.37	0.78
Implementation-IGaS	0.70	0.38	0.94	0.56
Control-IGaS	0.64	0.23	0.97	0.73
$p$ -value	0.25	0.23	0.14	0.09

Note:  $p$ -value based on Mann-Whitney ranksum tests comparing relevant matching group averages across treatments.

Managers delegate to avoid implementation problems. They could also avoid implementation problems by taking decisions in the best interest of workers. Fully informed managers indeed choose Manager-High in 99% in Control but only in 71% of the cases in our treatment Implementation. The difference in project choices is statistically significant ( $p$ -value of 0.01).

In Implementation, managers seem to realise that they need the good will of workers for successful implementation. They therefore often opt for project Worker-High. But this makes it less beneficial to keep decision rights in the first place, which after all has the purpose of ensuring the choice of project Manager-High. Managers are therefore more likely to delegate.

However, we observe high levels of delegation not only in our treatment Implementation, but also in our treatment Control, where we have no implementation problems by design. The reason for the overall high levels of delegation is that delegation improves the gathering of information. This holds despite the fact that by our choice of parameters, workers have monetary incentives to gather information also if managers keep control. Table 3 reveals that workers essentially always gather information after delegation. Information gathering drops to 74% and 77% of all cases if managers keep their decision rights. Wilcoxon signrank tests not reported in the table reveal that these differences are statistically significant ( $p$ -values less than 0.03). There thus exists an Information Effect of delegation, which we summarise in the last column of the table. But this effect is similar at 22% and 25% in both Control and Implementation, where the difference is not statistically significant ( $p$ -value of 0.78). Thus, managers do not delegate more in Implementation than in Control because the Information Effect is stronger in Implementation. It rather seems that implementation problems lead to the observed differences in delegation.

Last but not least, we want to explore the conditions under which implementation problems lead to more delegation. We thus look at delegation in our treatments Implementation-IGaS and Control-IGaS. In these treatments, it is no longer catastrophic for workers if the project Both-Low is accidentally chosen by uninformed managers. Workers might thus be more easily willing not to gather information in order to punish managers for keeping control. We should thus see that delegation generates a larger Information Effect, so that implementation problems become less important for delegation choices. We summarise our results in the bottom half of Table 3.

We find that the information effect of delegation is now much larger. Keeping control reduces workers' information gathering from 94% and 97% to 38% and 23% in the IGaS treatments. Wilcoxon signrank tests reveal that these decreases in information gathering are statistically significant ( $p$ -value less than 0.02). The Information Effect is 56% and 73% points. In our treatments Implementation and Control, the information effect is – although statistically

significant – much smaller at 20% to 25% points. The larger information effect induces managers to delegate in the IGaS treatments. Delegation fractions are therefore high at between 70% and 64%. We find no statistically significant differences in delegation between Control-IGaS and Implementation-IGaS ( $p$ -value of 0.25). We conclude that implementation problems lead to more delegation only if information gathering by workers is essentially ensured.

Several papers investigate experimentally whether people delegate decision rights in order to avoid the attribution of unpleasant decisions. Sebald (2010) and Aldashev, Kirchsteiger & Sebald (forthcoming) further extend existing reciprocity models by assuming that, instead of actions, players choose procedures that may contain explicit randomisation over actions. The key assumption is that players do not hold each other responsible for the outcomes of chance moves.<sup>9</sup> Blount (1995), Charness (2004), Bolton et al. (2005), Brandts, Güth & Stiehler (2006), Charness & Levine (2007), Falk, Fehr & Fischbacher (2008), and Maximiano, Sloof & Sonnemans (2013) provide further empirical evidence for this argument. In contrast, in our setup managers cannot delegate decisions to a randomization device, but rather to workers themselves.

Moreover, Bartling & Fischbacher (2012), Coffman (2011), Fershtman & Gneezy (2001), and Hamman, Loewenstein & Weber (2010) study strategic delegation in dictator and ultimatum games. Their question of interest is whether principals can shift responsibility and attain higher payoffs by delegating an unfair allocation choice to third parties who are essentially in the same role as the principals themselves. Managers in our setup decide whether they want to delegate decision rights to workers who are in the very other role than managers themselves. This allows us to study how workers respond to the same decision, conditional on whether this decision was imposed on them by somebody else, or whether they themselves have taken this decision. We summarise our second set of empirical findings as follows.

**Result 2** *(i) Implementation problems lead to more delegation. But only if the information gathering by workers is ensured, because bad decisions have very bad consequences for workers. (ii) Implementation problems push managers to use their decision rights not in their own, but*

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<sup>9</sup>Here procedures matter because they may alleviate attribution of responsibility. Procedural preferences can also be based on the idea that people care about an ex ante equal expected distribution of payoffs, i.e. that people have equal opportunities, see Bolton, Brandts & Ockenfels (2005), Krawczyk (2011), and Trautmann & Wakker (2010).

*in the interests of workers. This reduces the managers' incentives to keep decision rights in the first place. (iii) Delegation improves the gathering of information required to make good decisions.*

## 4 Conclusion

In this study we document that delegation improves implementation. Implementation problems can lead to more delegation, but only if not gathering the information needed to make good decisions is no real option. Our results point at potentially fruitful avenues for future research. In our experiments, workers face positive but small and exogenous monetary incentives to efficiently implement organisational decisions. But real organisations jointly decide on the level of delegation and the use of incentives. Our results suggest that organisations might have to complement centralisation with strong incentives to ensure implementation, since upset members of the organisation want to punish the withholding of autonomy by thwarting implementation. This contrasts the usual argument that organisations must employ strong incentives to counterbalance the loss of control resulting from delegation, see for example Prendergast (2002). Additional experiments could extend the current design so that managers jointly decide on delegation and the incentive strength during implementation. This might complement the empirical management accounting literature – e.g. Nagar (2002) and Abernethy, Bouwens & van Lent (2004) – suggesting a complex link between delegation and incentives.

New experiments could also further explore the interaction between information gathering and implementation. If workers control both information gathering and implementation, both can be used as punishment threats to discipline managers. In our two-by-two treatment design, these two threats (varied independently) appear either very weak or very strong. This makes the two threats close to perfect substitutes in two out of four treatments, while in the other treatments effectively only one threat remains. It would be interesting to look at situations in which threats can be of intermediate strength. Information gathering and implementation could then truly be complements, that is, only in tandem they induce managers to delegate.<sup>10</sup> It would also be worthwhile to study how managers could redesign the organisational decision

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<sup>10</sup>Note though that a priori it was far from obvious that the treatments Implementation and Implementation-IGaS would lead to the same delegation fractions. Ex-ante we expected that adding an implementation stage to the treatment Control-IGaS would still induce more delegation, thereby pointing at complementarities.



making process such that workers can voice their discontent in less destructive ways, in turn making it easier for managers to keep decision rights. More generally, applying the insights from multitask-principal-agent-models to situations where agents have multiple punishment technologies seems particularly fruitful for future work.

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## Appendix: Tables

Table 4: Effort Implementing Project Manager-High

	Manager Decided Partial Info	Manager Decided Full Info	Worker Decided Partial Info
Periods 1-20			
Implementation	6.77	4.98	8.90
Implementation-IGaS	6.60	6.30	9.10
Periods 11-20			
Implementation	8.32	4.06	8.78
Implementation-IGaS	9.33	5.60	9.40

Note: Only the implementation treatments are considered.

Table 5: Statistical Significance Comparing Implementation Manager-High

	Implementation	Implementation-IGaS
Periods 1-20		
Manager Partial Info - Manager Full Info	0.03	0.14
Manager Full Info - Worker Partial Info	0.03	0.06
Manager Partial Info - Worker Partial Info	0.03	0.04
Periods 11-20		
Manager Partial Info - Manager Full Info	0.04	0.09
Manager Full Info - Worker Partial Info	0.05	0.09
Manager Partial Info - Worker Partial Info	0.41	0.90

Note:  $p$ -value from Wilcoxon signrank tests comparing matching group averages.

## **Appendix: Instructions**

### **General Remarks**

The following instructions are from the treatments Control-IGaS and Implementation-IGaS. We indicate in brackets below the paragraphs where the instructions of these two treatments differed. In these treatments, the main experiment was followed by a second experiment. We clarify at the beginning of the instructions that the two parts are completely separated. Instructions for the different parts of the experiment were handed out separately, and only after all subjects had completed the previous part or parts. Spillovers from the second to the first experiment are thus ruled out. Instructions for the second experiment are available upon request.

The instructions for the treatments Control and Implementation were identical except for the payoff combinations of the three investment projects, and in that we there did not conduct a subsequent second experiment. The conversion rate was the same, yet in order to keep overall final payoffs similar, we included an additional show-up fee of 3 euros.

In all treatments, subjects filled out a questionnaire at the end of the experiment. The questionnaire is not included. Subjects had to computerized answer control questions before the experiment could start. The control questions are attached at the end of the appendix. The current general remarks and the title were, of course, not included in the instructions for the experimental subjects.

### **Instructions**

Thank you for participating in this experiment. The amount of money you earn depends upon the decisions you and the other participants make. Today's session consists of two separate experiments: Experiment 1 and Experiment 2. These experiments are completely separated. Thus, in each experiment you will interact with different individuals, and your actions in one experiment will have no consequences at all in the other experiment.

In each of the two experiments you can earn points. The conversion rate is such that 1 point corresponds to 1 eurocent (so that 100 points equal 1 euro). Your overall earnings equal the sum of your points earned in the two experiments.

We will pay out your overall earnings in cash after you have completed both experiments and filled out a final questionnaire. We ensure that your final earnings remain confidential: no other participant will learn your final earnings.

Below you will find the instructions for Experiment 1. Instructions for Experiment 2 follow after the first experiment has been completed. Please do not communicate with other participants during the session. If you have a question, please raise your hand. The experimenter will then come to your table to answer your question in private.

## Experiment 1

In Experiment 1 there are two types of participants: managers and workers. One half of the participants will be managers; the remaining half will be workers. You will be randomly assigned one of these roles. Which role you have you will learn at the start of Experiment 1. Your role will not change during this experiment.

Experiment 1 consists of 20 project implementation decisions (i.e., 20 periods). For each project implementation decision, one manager and one worker are randomly paired. You are never paired with the same other participant twice in a row.

**[Treatment Control-IGaS]** In every project implementation decision, the manager and the worker face three projects (A,B,C) that can be implemented. These projects differ in the points that they yield the manager and the worker upon implementation. Three payoff combinations are possible. One project labeled 'Manager High' yields **90 points to the manager and 70 points to the worker**, one project labeled 'Worker High' yields **80 points to the manager and 100 points to the worker** and one project labeled 'Both Low' yields **10 points to the manager and 10 points to the worker**. The problem is that manager and worker do not a priori know which payoff combination corresponds to which project. Each period the three payoff combinations are randomly assigned to projects A, B and C. Thus, over the periods project A corresponds to different payoff combinations etc.

**[Treatment Implementation-IGaS]** In every project implementation decision, manager and worker face three projects (A,B,C) that can be implemented. These projects differ in the points that they yield manager and worker upon implementation. Three payoff combinations are possible. One project labeled 'Manager High' yields **90 points at most to the manager and 70 points at most to the worker**, one project labeled 'Worker High' yields **80 points at most to the manager and 100 points at most to the worker** and one project labeled 'Both Low' yields **10 points at most to the manager and 10 points at most to the worker**. The problem is that manager and worker do not a priori know which payoff combination corresponds to which project. Each period the three payoff combinations are randomly assigned to projects A, B and C. Thus over the periods project A corresponds to different payoff combinations etc.

The manager initially decides whether to take the final project implementation choice, or whether to delegate this decision to the worker. Before the project implementation decision is made (either A, B, or C), the worker can choose whether or not to gather information on the payoffs of the projects. Gathering information on the projects costs the worker **5 points**.

## Sequence of Actions

The precise timing of the decisions and the resulting distribution of information that follows from these decisions are as follows. There are three phases:

### *Phase 1*

The manager chooses between **Delegation** and **No Delegation**.

### *Phase 2*

The worker observes the manager's delegation choice. The worker then chooses between **Information** and **No Information**. Information costs the worker 5 points.

Depending on the worker's information gathering decision, worker and manager may or may not learn the characteristics of the three projects before the implementation decision is taken.

If the worker has chosen **Information**, both the worker and the manager always learn which of the three projects A, B or C corresponds to the '**Manager High**' payoff combination (that is, 90 for the manager and 70 for the worker). Whether they receive additional information on the other projects depends on chance. With **50%** probability also the payoffs of the two other projects become known. With the remaining **50%** probability both worker and manager do not learn to which projects the two other payoff combinations correspond.

If the worker has chosen **No Information**, no information about the projects is revealed at all to both the worker and the manager before the implementation decision is taken.

### *Phase 3*

If the manager opted for Delegation in Phase 1, the worker chooses which project to implement. He or she can choose between either A, B, or C. If the manager opted for No Delegation in Phase 1, the manager decides him- or herself which project to implement.

### **[Treatment Implementation-IGaS]** *Phase 4*

Both manager and worker learn the payoff characteristics of the project implemented. The worker then chooses how much effort to exert to successfully complete the implemented project. Effort is an integer between 0 and 10. The payoffs manager and worker obtain from the project are increasing in the worker's effort.

## Payoffs

**[Treatment Control-IGaS]** The three possible payoff combinations of the projects are summarized in the table below:

	<b>‘Manager High’</b>	<b>‘Worker High’</b>	<b>‘Both Low’</b>
<b>Manager</b>	90	80	10
<b>Worker</b>	70	100	10

The number of points earned by manager and worker are their points from the implemented project as given in the table above, minus for the worker, the costs of the information gathering decision (either 5 or 0 points).

**[Treatment Implementation-IGaS]** The worker’s effort determines the actual payoffs obtained from the project implemented, as follows:

	<b>‘Manager High’</b>	<b>‘Worker High’</b>	<b>‘Both Low’</b>
<b>Manager</b>	$40 + 5 \times \text{Effort}$	$30 + 5 \times \text{Effort}$	$0 + \text{Effort}$
<b>Worker</b>	$60 + \text{Effort}$	$90 + \text{Effort}$	$0 + \text{Effort}$

For example, if the implemented project corresponds to the ‘Worker High’ project and the worker chooses an effort level of 6, the manager earns  $30 + 5 \times 6 = 60$  points while the worker gets  $90 + 6 = 96$  points from the implemented project. Note that the larger the effort the worker puts in, the closer the actual payoffs are to the maximum payoffs possible. Further, putting in more effort benefits the manager more than the worker; and putting in less effort hurts the manager more than the worker.

After each project implementation decision (period) you will get an overview over the decisions you and the participant you were matched with took in that period. You will also learn the payoffs that you and the other participant you were matched with earned.

Your overall payoffs from Experiment 1 equal the sum of points earned in the 20 project implementation decisions.



### **Control questions. [All Treatments]**

- Is the following statement correct? The number of points that I earn in Experiment 1 equals the sum of the points that I earn in the 20 project implementation decisions. [true]
- Is the following statement correct? I will keep the same role during all 20 project implementation decisions. [ true ]
- Is the following statement correct? I will be matched with the same other participant during all 20 project implementation decisions. [ false ]
- Is the following statement correct? In each period always one project corresponds to "Manager High," one corresponds to "Worker High," and one corresponds to "Both Low." [true]
- Is the following statement correct? If the worker chooses Information, both manager and worker always learn the payoffs of all projects. [ false ]
- Is the following statement correct? The manager and the worker always obtain the same information about the projects. [ true ]

### **Further control questions. [Treatment Control-IGaS]**

- Consider the following sequence of hypothetical decisions and events. In Phase 1 the manager chooses No Delegation. The worker chooses Information in Phase 2 and the payoffs of all projects become known. In Phase 3 the manager implements project C, corresponding to "Manager High." How much does the worker earn? [ 65 ]
- Consider the following sequence of hypothetical decisions and events. In Phase 1 the manager chooses Delegation. The worker chooses Information in Phase 2 and the payoffs of only project B, corresponding to "Manager High," become known. In Phase 3 the worker implements project B. How much does the manager earn? [ 90 ]

### Further control questions. [Treatment Implementation-IGaS]

- Is the following statement correct? The more effort the worker puts in, the higher are the payoffs of both manager and worker. [ true ]
- Is the following statement correct? Suppose the worker chooses low effort under project "Manager High" and high effort under project "Worker High." The manager then earns more under project "Worker High." [ true ]
- Consider the following sequence of hypothetical decisions and events. In Phase 1 the manager chooses No Delegation. The worker chooses Information in Phase 2 and the payoffs of all projects become known. In Phase 3 the manager implements project C corresponding to "Manager High." The worker chooses an effort level of 7 in Phase 4. How much does the worker earn? [ 62 ]
- Consider the following sequence of hypothetical decisions and events. In Phase 1 the manager chooses Delegation. The worker chooses Information in Phase 2 and the payoffs of only project B, corresponding to "Manager High," become known. In Phase 3 the worker implements project B corresponding to "Manager High." In Phase 4 the worker chooses an effort level of 5. How much does the manager earn? [ 65 ]