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TRUST IN PPPS – A behavioral framing experiment on the paradoxical effect of ‘publicness’ on strategic behavior in PPPs

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ABSTRACT

Public-private partnerships (PPPs) have become widespread in the delivery of public services. This study explores behavioral mechanisms of building and eroding trust in partnering across sectors at the micro-level of interaction between public and private partners. It shows that partners’ sector affiliation can have adverse signaling effects on individuals’ intention to uphold effective partnerships over time, and that this intent is moderated by sector-specific attitudes. Tested with a novel and dynamic multi-stage behavioral experiment based on the classic centipede game ($N=482$; $Obs.=4,338$), results show that sector affiliation functions as a strong but potentially misleading signal for partners’ strategic behavior in PPPs and that sector-specific associations and attitudes asymmetrically moderate respondents’ will to collaborate. These findings contribute to micro-foundations of strategic behavior in PPPs, calling into question basic assumptions about coordination efficiency in cross-sectoral partnerships.

Keywords: *PPP, strategic risk behavior, trust, PSM, behavioral public administration.*

JEL: *H83, D91, D81, C73*

TRUST IN PPPS – A behavioral framing experiment on the paradoxical effect of ‘publicness’ on strategic behavior in PPPs

Public-private partnerships (PPPs) have become popular with policy makers worldwide (Klijn and Teisman 2003): Across sectoral boundaries, two or more often very dissimilar partners come together to co-create public goods and services, which are considered to be otherwise hard to attain (Hodge and Greve 2007; 2017). However, a large body of research points out how the success of cross-sectoral collaboration is too often subject to problems of coordination (Klijn and Teisman 2003) and lack of effective risk-sharing among partners (Hodge 2004). These problems often result in dramatic losses for public agencies, while private partners may ride free (Klijn and Teisman 2003; Hodge 2004; Edelenbos and Klijn 2007; Hodge and Greve 2007; Bryson et al. 2015).

From a behavioral perspective, strategic decision-making in PPPs is tough: In order to create stable and long-lasting relationships, partners in PPPs have to find ways to coordinate and bridge the very distinct logics and goals of the two sectors involved. In the public realm, bureaucrats are expected to strictly follow bureaucratic rules and to take into account issues of societal welfare (Simon 1945), whereas private actors are assumed to simply maximize their individual utility. Decision-makers in PPPs are required to anticipate their partners’ latent intentions and need to coordinate their own strategic choices accordingly so as to foster overall partner collaboration instead of sending signals that may undermine a *trustful* partnership (Connelly et al. 2011).

Trust is a multi-faceted multi-level construct both anchored in an individual’s general propensity to trust others, the perceived trustworthiness of their partners’, and in the specific situation in which a decision maker has to decide whether or not to trust (Mayer et al. 1995; Colquitt et al. 2007). In PPPs, establishing and maintaining trust between strategic partners

lowers the transaction costs involved in initiating and controlling the partnership because it facilitates information flow and coordination, encourages knowledge sharing and helps resolve disputes (Doz 1996; Das and Teng 1998; Das 2001; Klijn et al. 2010; Lamothe and Lamothe 2011). Trust directly influences agents' willingness to take risks and tolerate uncertainty in partnerships and it is always a function of *context* (Mayer et al. 1995). Prospect theory suggest that risk assessments are rarely based purely on objective evaluations of given information (Kahneman and Tversky 1979). In his prospect dynamic model of decision making, Kanner (2005) points out that the chance of individuals engaging in subjective assignment of risk based on their individual worldview and personal interpretation of the context of the decision becomes more likely as the decision situation (i.e. *context*) becomes more complicated. While partnering across organizational boundaries is challenging by default, PPP add another layer of complexity for decision making because it changes the context of choice into a cross-sectoral setting, arousing sector-specific attitudes, associations, and motivations such as public service motivation (PSM), however the dynamics of strategic behavior in PPPs are severely understudied.

A number of recent studies show that individuals' attitudes toward the public sector are systematically biased by sector-specific and often stereotypical associations (see, for instance, James and Moseley 2014; Marvel 2015; Olsen 2015; Marvel 2016; del Pino et al. 2016). For instance, public organizations are widely associated with higher red tape and lower efficiency while public servants and employees are often characterized as unamiable individuals with a low tolerance for risk and a higher tendency for delay (Rainey and Bozeman 2000; Baarspul and Wilderom 2011; Buurman et al. 2012). Prior research by Kanner (2005) suggests that individuals' perception of the riskiness of partnering across sectors could be substantially biased by their belief systems – i.e. their psychological associations – regarding the two sectors. Although these associations need not necessarily be negative, it is reasonable to assume that

individuals' strategies will be influenced by their assumptions about the strategic behavior of their partners' and result in dissimilar courses of action (Scharle 2002; Kanner 2005). Furthermore, game theoretical research on collaboration efficiency suggests that negative assumptions about partners' will or capacity to collaborate can have detrimental effects on strategic choice under risk and, ultimately, lead to partnership failure (Gulati et al. 2012; Bryson et al. 2015). Since sector-specific stereotypes function as a strong signal for (in)efficiency, it is logical to assume that partners' sector affiliation and sector-specific associations will substantially influence the strategic choices they make and, hence, affect the likelihood of PPP survival.

To test and extend this idea, the current study explores cognitive and behavioral mechanisms of cross-sectoral collaboration at the micro-level of interaction between public and private sector partners. Based on Mayer et al.'s (1995) classic dynamic model of trust, the experimental evidence of our study shows that the specific role people find themselves in – i.e. the role of being a public or a private sector decision-maker partnering with a private or public sector agent, respectively – substantially influences their intention to uphold effective partnerships, and that this relation is moderated by sector-specific associations and attitudes.

Specifically, the current study reports experimental evidence of a between-subject randomized vignette experiment employing a multi-stage choice experiment based on the classic centipede game (Rosenthal 1981). Using a large sample of $N=482$ German citizens, this study explores how the sector-specific context of choice influence individuals' likelihood to defect in a PPP setting. Analyzing $Obs.=4,338$ strategic decisions on whether to collaborate or defect under varying degrees of risk, it also reveals the decisive role of PSM, risk propensity, and general trust in determining this likelihood and shows that sector-specific attitudes and associations asymmetrically moderate people's decision to defect. These findings have important

implications for the micro-level governance of PPPs regarding team member selection and operational partnership management in the prospect of hidden characteristics, encouraging practitioners to create mechanisms that breed trust among partners to absorb the destructive capacity of anti-public and anti-private stereotypes as well as a dark side of PSM (see also Schott and Ritz 2018).

Although not central to this study, its innovative methodology comes with a number of crucial advantages. First, by opting for an experimental research design, the current study seeks to identify causal mechanisms based on systematic and balanced treatment variation, heeding to calls by Gilke et al. (2016), van Witteloostuijn (2015), and Walker et al. (2017). Second, to our knowledge, this study is the first to apply the centipede game (Rosenthal 1981) in the field of public administration (PA) and public management (PM) research, thus introducing a new tool for measuring the evolution and erosion of trust in a strategic choice environment over time. Third, this study combines both direct and indirect measures to answer calls for a more rigorous behavioral approach to PA research (Grimmelikhuijsen et al. 2017; Walker et al. 2017).

The remainder of this study is organized as follows: The second section draws on previous research on trust and sector-specific attitudes to develop a theoretical model and derive hypotheses on the role of trust on strategic behavior in PPPs. The third section introduces our take on a classic behavioral experiment developed to model the strategic dilemma at the core of risk governance in PPPs and describes the data raising procedure. The results of PPP-survival analysis and multi-level regression modelling are presented in section four. The final section discusses theoretical, practical, and methodological implications of these findings as well as limitations paving way for future research.

THEORY

A Model of Trust and Sector Affiliation

PPPs are organizational arrangements in which agents from dissimilar sectors collaborate in order to achieve a common and mutually beneficial goal. In contrast to (contractual) arrangements of privatization, in which public and private agents create a structure of hierarchy that can more easily be monitored by legal arrangements that clearly specify principal and agent, working together in PPPs involves mutual interdependence.¹ In case of partnership failure, both partners are vulnerable because of their shared accountability and legalistic control mechanisms are only weak remedies in such cases.

Following Mayer et al.'s (1995: 712) classic definition, trust is "the willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party". Consequently, trust is a dynamic and social phenomenon that is directly related to risk because the need for trust only arises in situations in which a meaningful incentive is at stake of which the trustor must be aware of (Johnson-George and Swap 1982; Mayer et al. 1995). In this perspective, trust is not the equivalent of risk taking but it is a willingness to take risk given a certain configuration of context, perception, and behavior (Mayer et al. 1995). Mayer et al.'s (1995) classic model is well recognized for its theoretical merit because it presents a holistic concept of trust including both the micro-level factors of trustor's and trustee's characteristics, attitudes, and behaviors as well as the macro-level factor of context and the larger outcomes of both parties' risk behavior. Furthermore, a large-scale meta-analysis

¹ This mutual interdependence is what differentiates *partnership* from mere *collaboration*. Trust is not a necessary condition for efficiency in mere collaboration because it does not necessarily put a party at risk at the will of the other party (Mayer et al. 1995).

conducted by Colquitt et al. (2007) largely confirms Mayer et al.'s (1995) concept and empirical evaluation (Mayer and Davis 1999) of this integrative partial mediation model of trust.

Trust is the result of a dynamic feedback loop of a trustor's individual disposition and attitudes toward risk and trust (*trustor's propensity*), the perceived characteristics or *factors* that (potentially) deem the trustee trustworthy (i.e. the trustee's hidden characteristics with regard to his/her *ability*, *benevolence*, and *integrity* to act as promised), the perceived riskiness of a given situation (*perceived risk*), and both partners' *risk behavior* in the course of the partnership (Sitkin and Pablo 1992; Mayer et al. 1995; Sitkin and Weingart 1995). Thus, partners' individual propensity to trust others (*trustor's propensity*) is both a learning outcome of their general experiences and a contextual consequence of their situational embeddedness in the interactive and interdependent social structure of the partnership.

Building on Mayer et al.'s (1995) concept of trust and trustworthiness, Figure 1 illustrates these relationships but it adds one central factor for trust research in PPPs: the effect of *sector affiliation*. What differentiates PPPs from mundane partnerships is the fact that at least one partner comprises the psychological and socio-culturally constructed category of '*publicness*', which adds an additional layer of complexity to strategic choice (Connelly et al. 2011).

[Figure 1 here]

Prior research indicates that partner heterogeneity is one of the most serious obstacles for partnership success because perceived heterogeneity – '*otherness*' – can result in tension between partners that manifest in the long-term of partnership tenure (Gurevitch 1988). For instance, latent or explicit heterogeneity regarding institutional core objectives and values often manifests in concurrent long-term interests that eventually erode mutual trust and increase partners' likelihood to defect (Klijn and Teisman 2003; Hodge and Greve 2007; Bryson et al.

2015). Case-based research in the Netherlands by Klijn and Teisman (2003) revealed that decision-makers in PPPs find it especially difficult to make joint decisions and develop long-lasting, *trustful*, and effective relationships across sectoral boundaries. Mayer et al. (1995) point out that the positive effect of trust on collaboration efficiency is especially relevant in contexts where trustor and trustee have dissimilar characteristics, e.g. in the sense of originating from different sectors, because trust facilitates cohesion and is associated with organizational legitimacy, hence, increasing individuals' capacity and willingness to work together. Cross-sectoral research on managerial choice by Nutt (1999; 2005) shows that individuals follow dissimilar strategies when making decisions in the public compared to the private sector. For decades, scholarship has been busy exploring the institutional differences between the sectors (e.g. Bozeman and Bretschneider 1994; Rainey and Bozeman 2000) to investigate why people – most prominently managers and employees – behaved differently in the context of the public and the private realm (Brewer and Brewer 2011).

Classic theories on administrative behavior suggest that sector-specific peculiarities will affect the factors that Mayer et al. (1995) theorize as being decisive factors of trustworthiness. In his perennial work on *Administrative Behavior*, Simon (1945: 108) points out that the specific context of the public sector primes and frames the premises of decision-making on the level of the individual. He stresses that the evaluative processes of the human mind are bounded by the psychological environment constructed in the process of sensemaking (Weick et al. 2005). This means that knowing that the trustee belongs to the public or the private sector will influence the trustor's evaluation of the trustee's ability and willingness to fulfill his or her obligations in the partnership, it will affect the trustor's expectations regarding the trustee's benevolence and it will elucidate certain (positive or negative) assumptions about the trustee's integrity.

Mayer et al. (1995) point out that a given trustor can have dissimilar levels of trust for various trustees. Trustors infer expectations about the behavior of trustees based on implicit or explicit signals they receive from the trustee (Johnson-George and Swap 1982). *Ceteris paribus*, partners' sector affiliation is one of the most explicit of these signals.

Sector-affiliation and Adequacy of Trust

Generally speaking, public and private partners are expected to pursue dissimilar organizational goals and follow dissimilar institutional logics. These logics define what is regarded as *adequate* behavior in a specific situation under risk and mold risk perception and risk behavior accordingly (Fottler 1981; Gigerenzer and Gaissmaier 2011; Rohde and Rohde 2011). Private sector agents are expected to maximize individual profits while public agents must find a balance between achieving their specific strategic goals within the PPP and satisfying the broader objectives of societal welfare (Simon 1945, 69; Brewer & Brewer 2011; Buurman et al. 2012). Due to these restraints, public partners often experience a relative lack of discretion for strategic maneuver in PPPs under risk rendering them more vulnerable compared with private agents. Since both partners are cognizant of their partner's sector affiliation and stereotypical logics, we hypothesize that a partner's sector affiliation moderates the perceived contextual risk of the partnership as well as the interpretation of the factors of *perceived* trustworthiness.

Backward induction leads to two alternative hypotheses for this effect (Aumann 1998). First, rational agents might exploit the asymmetry of strategic discretion by unilaterally defecting from a PPP if their immediate subjective utility from defection is larger than the subjective expected utility of completing the PPP. Since private agents are assumed to be more likely to follow self-serving utility maximizing strategies (Simon 1945, 69; Brewer & Brewer 2011; Buurman et al. 2012) it follows that

Hypothesis 1a (H1a): Private (public) sector actors are more (less) likely to defect from PPPs under risk than private sector actors.

Alternatively, rational public agents might anticipate this asymmetry and interpret their partner's private-sector affiliation as a signal for lower trustworthiness (Weick et al. 2005; Connelly et al. 2011). As a consequence, rational backward induction would incentivize public agents to defect themselves early in the tenure of the PPP in order to prevent larger prospective subjective losses so that

Hypothesis 1b (H1b): Public (private) sector actors are more (less) likely to defect from PPPs under risk than private sector actors.

Sector-specific Attitudes as Cognitive Frames

In situations of incomplete information – i.e. comprising classic Knightian uncertainty (1921) of unknown outcomes and unknown probabilities – decision-makers predominately rely on attitude-based heuristic choice strategies or even on pure *gut feeling* informed by liking or disliking to come to any form of decision (Overskeid 2000; Loewenstein et al. 2001; Kanner 2005; Brighton and Gigerenzer 2015). PPPs are a typical context of Knightian uncertainty especially in the early stages of partnership tenure because partner can only speculate about their partners' hidden intentions and characteristics. Following Mayer et al.'s (1995) model, trustors might deduce logical (but heuristic) conclusions about their partners' trustworthiness and the likelihood that their cross-sectoral partners defect for self-serving reasons based on the trustor's individual attitudes toward the sectors especially in lack of further information about their partner's characteristics (see Figure 1).

Kanner (2005), Weick et al. (2005), and Colquitt et al. (2007) specifically argue that the evaluation of these signals itself is not free of the trustor's individual cognitive frames,

especially in a cross-sectoral context. These cognitive frames – the associative network stored in memory – are especially relevant for understanding risk behavior in PPPs: An emerging field of research in PA and PM shows that individuals are systematically biased by their stereotypical associations and attitudes toward the public sectors (e.g., James and Moseley 2014; Marvel 2015; Olsen 2015; Marvel 2016; del Pino et al. 2016). Attitudes form relatively stable patterns of learned behavior to regularly react toward objects of evaluation in a favorable or an unfavorable way (Schacter and Graf 1986; Chen and Bargh 1999; Conrey and Smith 2007) and abstract – often implicit – associations are the psychological foundations of these attitudes.

Unfortunately, empirical research worldwide reveals that people’s attitudes toward the public sector are skewed by typically negative (and often implicit) public sector stereotypes and associations (Butler et al. 2011; James 2011; Van Ryzin 2013; Olsen 2015; Marvel 2016; del Pino et al. 2016). Since associations prime attitudes and attitudes guide risk behavior (Cacioppo and Gardner 1999; Dolan and Sharot 2012), we argue that partners’ likelihood to trust each other and, hence, their risk behavior will be moderated by their implicit and explicit affective attitudes toward the sectors in the sense that

Hypothesis 2 (H2): PPP partners are less (more) likely to defect if they hold positive (negative) attitudes toward the other sector participating in the partnership.

DATA AND METHODS

Hypotheses were tested in a dynamic multi-stage behavioral experiment with randomized trials. The game is based on the classic centipede game (Rosenthal 1981) and complemented with a sector-specific contextual role framing treatment. This design combines advantages of two experimental procedures: First, it uses pre-tested vignettes elaborating a schematic but close-to-life PPP scenario to increase the ecological validity of its results (Neff 1979; Aguiñes and Bradley 2014). Second, the strictly controlled environment of an economic game setup allows for the systematic manipulation of context parameters – i.e. sector affiliation and risk – and the control of behavioral cues and incentives (Jilke et al. 2016; Walker et al. 2017).

Participants

The study relies on experimental responses of $N=482$ German citizens who made $Obs.=4,338$ strategic decisions in total. The data were collected in the form of an anonymous online experiment from October to November 2017 using a professional panel of (former) graduate students of PM, business administration, political science, and other social sciences at a large national university. Study participants were incentivized with the possibility of winning one of eleven significant money prizes (1x €250, 4x €150, 6x €50) to be paid out as online retail gift vouchers. Out of the total pool of 2,429 individuals, 646 took part in the online experiment, which corresponds to a response rate of 26.6%. Any incomplete responses were excluded rigorously from the dataset resulting in treatment groups of adequate sizes (public sector treatment: $n=263$; private sector treatment: $n=219$) for detecting small to medium sized treatment effects (Cohen's $d<|0.30|$, power=0.8, $\alpha=0.05$; $n=172$; Ellis 2010). Although not representative for the general population, this sample is an especially interesting target group for behavioral PA research because the future decision-makers of both public and private organizations are likely to be recruited from this particular group of respondents.

Contextual framing treatment

The contextual vignette introduced participants to a fictitious but realistic mega-project carried out collaboratively by a local government (i.e. the public partner) and by a for-profit construction firm (i.e. the private partner).² Both the partnership and the project are described in a very positive way, benefitting all stakeholders involved. This is to trigger neutral to positive associations (i.e. a low level of perceived situational risk) and to provide a logical reason as to why collaboration until project completion was the most beneficial – i.e. “rational” – option for all partners involved. The experiment is a non-zero-sum game. In each round, the instructions emphasized that participants’ individual expected utility in case of defection was substantially smaller than their expected utility in case of collaboration until the project was completed. Consequently, rational actors should interpret this setting in a way that will incentivize them either to defect in the very first node (Aumann 1998) or continue to the very end of the partnership to maximize their individual utility.

Next, respondents randomly received one of two treatments, asking them to assume the role of an executive manager in either of the two partnering organizations (*sector affiliation treatment*). Participants were informed that the PPP had been installed successfully, performing well and to mutual benefit. Yet, a contractual and legal loophole would now – ten planning periods before its completion – allow partners to unilaterally terminate the partnership to the disadvantage of the remaining partner, if they wished so. This is to create the interdependent vulnerability that makes trust necessary. *Ceteris paribus*, we assume that participants’ role frame will stimulate sector-specific associations and context-dependent behavior toward their partner from the other sector, influencing their likelihood to defect (*H1a* and *H1b*).

² See Appendix A.1 for a comprehensive description of the experimental setup and the vignette treatments.

Centipede game

The scenario described in the previous section was implemented as a pseudo³ two-player non-zero-sum centipede game set in the domain of gains (Rosenthal 1981; Kawagoe and Takizawa 2012). The centipede game is a finite game with a predefined number of rounds⁴ with linear increasing pay-outs and stable rules known to both players beforehand (McKelvey and Palfrey 1992). In this game, two players make consecutive strategic decisions to either cooperate in the prospect of a larger reward at the end of the game or defect to cash-in an immediate and smaller reward. If the first mover (player A) decides to defect and thus ends the game, the second mover (player B) will have substantial disadvantages from A's decision. In this way, the centipede game models the classic dilemma of a conflict between short-term self-interest against long-term considerations of mutual benefit, a core problem of incentive structures in PPPs under risk (Wang et al. 2018). The centipede game is the classic game of trust in partnerships: The pie shifted between the two players grows with each round. Consequently, it is rational and beneficial for all players to continue the game but they will only decide to follow this strategy if they feel that they can trust in their partner's ability and integrity to abide by the partnership agreement so that, in the end, they will both profit from sharing the full pie.

In the setup employed in the current study, the centipede game consisted of a maximum of 10 rounds (i.e. the maximal PPP tenure). The exact narrative of the scenario is presented in Appendix A.1. In each round, players had two choice options: either stand by the PPP

³ The online-experiment was played with only one respondent at a time but the vignette-scenario was framed as a two-player situation stressing that the opposing party also had the power to terminate the PPP without further notice. However, the experiment was programmed as to always signal that the opposing partner wished to continue the collaboration. We use this mild form of deception to dramatically increase the perceived realism of the – explicitly fictitious and controlled – scenario. Following the advice for a reasonable use of deception in economic experiments by Cooper (2014), the introduction reassured participants that their monetary incentive payout was absolutely independent from their performance in the game, that the objective of this experiment was studying the psychological dynamics of cross-sectoral partnering, and participants were adequately debriefed at the end of the experiment.

⁴ 100 rounds in Rosenthal's (1981) original setup, hence the name. See Figure 2 for an illustration.

agreement (thus betting on the relatively larger but risky overall pie) or defect to materialize a substantially smaller individual but immediate reward, causing their partner to lose out completely. Figure 2 displays the centipede game structure with individual prospective rewards for each partner in case of collaboration and defection. The progression of the payout structure was informed by Madden et al.'s (2009) *Probability Discounting Questionnaire* because its trade-off tasks provide a validated scheme for systematically varied expected utility under risk.

[Figure 2 here]

Dependent variable

After each round of the centipede game, respondents were asked to indicate whether they wished to collaborate and proceed to the next period or defect and, consequently, terminate the collaboration and the game. Consequent, individuals' exit node in relation to the maximum of 10 rounds serves as the main dependent variable, i.e. the relative likelihood of PPP survival (*PPP survival; min.=1; max.=10*).

Independent variables

Sector-specific associations. Respondents were asked to think carefully about the role they were asked to assume and to key in at least *three associations* they spontaneously attributed to the sector they were affiliated in (i.e. the public sector if they were to act as a senior civil servant or the private sector if they were asked to assume the role of a strategic manager at the construction firm, respectively). These explicit associations were manually coded and matched with Vö et al.'s (2009) *Berlin Affective Word List* (BAWL-R), a systematic inventory of several thousand German words experimentally tested for their emotional arousal, i.e. the positive and negative feelings they are associated with implicitly. Matching respondents' stated sector-specific associations by their emotional valence helps us to reveal whether respondents held

relatively more negative or positive attitudes toward the sectors in a systematic procedure. We calculate a compound valence score based on the rank-adjusted geometric means of Vö et al.'s (2009) list (continuous; range: *min.*=-3 to *max.*=3) for each sector. This procedure results in two independent variables (*public sector association* and *private sector association*) which we use to test *H2*. Following Brauer et al.'s (2000) example, we also assess respondents' *explicit attitudes* toward the two sectors as part of the socio-demographic questionnaire to complement the revealed items generated from the association input. Respondents were asked to indicate their explicit attitudes toward the public and the private sector on two single seven-point Likert-type items (order randomized between subjects to inhibit order and priming effects) ranging from 1='very negative' to 7='very positive'.

Control variables – Trustor's propensity

Prior research by Mayer et al. (1995), Barsky et al. (1997), and Hartog et al. (2002) suggests that individuals' will to collaborate is influenced by individual preferences regarding risk, uncertainty, and the trustworthiness of others in general. This argument is straightforward since a considerable body of research – see, for instance, Sitkin and Weingart (1995), Colquitt et al. (2007), Dohmen (2011), or Rohde and Rohde (2011) – shows that risk attitudes prime trust and mediate strategic decision-making and risk behavior. Respondents' *risk propensity* was revealed with Madden et al.'s (2009) *Probability Discounting Questionnaire* (PDQ) using Weißmüller's (2016) algorithm.⁵ We measure individual's *tolerance for uncertainty* with Dalbert's (1999) scale on general and work-related tolerance for uncertainty (eight six-point Likert-type item; range: 1='strongly disagree' to 6='strongly agree'). Higher sum-scores

⁵ Based on the idea of hyperbolic discounting, Madden et al.'s (2009) PDQ is a measure to reveal individuals' implicit risk preferences based on the analysis of in-total 30 dyadic trade-off tasks between systematically varied relatively smaller but fixed pay-outs and relatively larger but probabilistic pay-outs. Respondents' pattern of choice and preference reversals allows deriving a specific numeric discounting parameter for each respondent. This parameter is a reliable predictor for preferences and choice under risk and robust against conscious manipulation (Green and Myerson 2004).

indicate higher tolerance for uncertainty. People differ in their motivation to help others and to make meaningful contributions to common welfare, which are important issues in PPPs. We measure *public service motivation* (PSM) with Kim et al.'s (2012) 12-item Likert-type scale, opposite value labels ranging from 1='absolutely disagree' to 7='absolutely agree'. Participants' *general trust in others* was measured with Yamagishi and Yamagishi's (1994) six-item Likert-type *General Trust Scale* with opposite value labels ranging from 1='strongly disagree' to 5='strongly agree'. Furthermore, people have different capabilities in evaluating numerical performance information. Respondents' *numerical literacy* was tested and controlled with the first seven items of Weller et al.'s (2013) *Abbreviated Numeracy Scale*.⁶ Finally, respondents' *age* and *gender* were controlled for in order to balance treatment-groups for socio-demographic differences that might affect collaboration capacity.

Analytic procedure and model estimation

We test our hypotheses in two consecutive steps. After a preliminary descriptive analysis, the focus, first, lies on the treatment effect of sector affiliation on *PPP survival* (*H1*) by conducting survival-based mixed effects logistic regression analyses. Second, the association-based dynamics of the relation between sectorial affiliation and *PPP survival* are deciphered by adding interaction terms to test for moderation effects (*H2*) in a second model. All models were clustered at the individual level to take into account the conditional contribution of each respondent, which is a consequence of the varying number of game periods played by each person.

⁶ This scale originally comprises eight items of statistical word problems of varying complexity. We omitted the last and most complex item for the sake of research pragmatism to prevent higher dropout rates due to survey length.

RESULTS

Descriptive results

The dataset comprises responses by $N=482$ participants, 90% of which were German citizens. On average, respondents took 14.6 minutes to complete the full experiment and survey. Table 1 presents the descriptive sample statistics and respective correlations with reliabilities. The sample comprises relatively more female participants (61.2%) and respondents are on average $M=24.7$ ($SD=4.94$) years old. The PDQ reveals that the sample is predominantly risk averse ($\ln(h)$: $M=0.96$, $SD=0.80$; risk neutrality at $M=0.00$) and that they slightly prefer to avoid uncertainty ($M=2.54$, $SD=0.66$; six-point scale).

[Table 1 here]

Respondents report average levels of *PSM* ($M=3.48$, $SD=0.70$) and *trust in others* ($M=2.54$, $SD=0.66$; six-point scale). They express slightly negative attitudes towards both sectors when asked explicitly (public: $M=2.83$, $SD=1.44$; private: $M=2.76$, $SD=1.47$; 5-point scale; $t(482)=0.770$, $p=0.442$, $d=|0.513|$). Regarding their sector-related associations, respondents ascribe more negative affective valence to the public sector ($M=0.31$, $SD=1.30$) compared with the private sector ($M=0.51$, $SD=1.39$) but this result is only indicative; $t(1,444)=2.801$, $p=0.005$, $d=|0.095|$). Participants are above average capable of handling numerical information ($M=4.70$, $SD=1.40$), which indicates that their responses to the experiment are reliable and not biased by a lack of numeracy.

Hypotheses testing

At first glance, the descriptive analysis shows relatively little variance between the two treatment conditions if we only focus on the overall likelihood of *PPP survival* ($min.=1$,

$max.=10$; $M=8.62$, $SD=2.90$). On average, respondents decided to uphold the PPP for $M=8.51$ ($SD=3.08$) periods in the public treatment and for $M=8.73$ ($SD=2.67$) periods in the private treatment; $t(4,336)=0.010$, $p=0.010$; $d=-.078$. Although the differences between treatment groups appear small, there is significant variance between the two treatment groups in the course of the game periods if individual dispositions are taken into account.

One reason for the small size of the treatment effect is revealed by inspecting the smoothed hazard function (Figure 3). The graph shows the relative frequency of defection (in percent) by treatment in each game period. In the first two periods, public sector agents are revealed to being less likely to defect than private sector agents while the former exhibit substantially higher rates of defection in the four last periods.

[Figure 3 here]

This result is substantiated by individuals' explicit perception of their partners' trustworthiness. Figure 4 reveals that agents partnered with a private sector agent experience a valley of trust (Aven 2015) while we find no equivalent trend for agents partnered with a public sector agent, *ceteris paribus*. As a consequence, we find that while public sector actors are less likely to defect in the beginning of the PPP lifetime, they become significantly more likely to defect, after incentives to defect transgress a certain threshold in period six.

[Figure 4 here]

Table 2 reports the results of the mixed-effects logistic regression estimates (see Table 2).⁷ The main effects model (see Model I in Table 2) is well-specified (Wald $Chi^2(10)=84.49$, $p<0.000$) and reveals a negative association between the likelihood of *PPP survival* and collaborating

⁷ Appendix A.2 presents further analysis to investigate the prevalence of sample-size induced artificial inflation of model estimates. Results show that the results are *not* substantially biased by artificial inflation.

with a private sector partner (*treatment effect*: $\beta_1 = -0.258$, $p = 0.049$). This suggests that *H1a* has to be rejected because public sector agents are significantly more likely to defect from the PPP, hence causing its termination.⁸ *H1b* cannot be refuted. Furthermore, the model reveals that *PPP survival* is also directly and substantially influenced by respondents' *explicit attitudes about the public* ($\beta_3 = 0.239$, $p < 0.000$) but not by their private sector attitudes ($\beta_4 = -0.078$, $p = 0.227$). In line with our theoretical expectations, individual characteristics such as respondents' *revealed risk preference* ($\beta_5 = -0.069$, $p < 0.000$), their general level of *trust in others* ($\beta_7 = 0.311$, $p = 0.006$), and (indicatively) their individual tendency to *avoid uncertainty* ($\beta_8 = -0.139$, $p = 0.099$) also explain substantial amounts of variance, while the model does not reveal age ($\beta_9 = -0.013$, $p = 0.390$) or gender effects ($\beta_{10} = -0.192$, $p = 0.131$) in relation to *PPP survival*. Respondents' level of PSM is a surprisingly influential driver of people's likelihood to collaborate: We find that higher levels of PSM are strongly and negatively associated with *PPP survival* ($\beta_6 = -0.359$, $p = 0.000$). This means that high-PSM individuals are substantially more likely to defect from the PPP than low-PSM individuals are.

H2 predicts that the relationship between sector affiliation and the likelihood of *PPP survival* is moderated by respondents' sector-specific associations because these associations would determine individuals' interpretation of having a partner from the public or the private sector and, hence, moderate trust in their cross-sectoral partner. The dynamics of this attitude-based moderation effect were analyzed by estimating a second mixed-effects logistic regression model (Model II in Table 2) including interaction terms between sector-specific treatment and the two compound affective valence scores derived from respondents' associations with the two sectors. The model is well specified (Wald χ^2 (12) = 141.49, $p < 0.000$) and posthoc analysis showed that multicollinearity was not an issue. In Model I, sector-specific associations have a

⁸ An alternative and equally valid interpretation would be that respondents in the role of private sector agents are significantly more likely to maintain the PPP under risk.

substantial negative effect on the likelihood of *PPP survival* ($\beta_2=-1.68, p<0.000$). Explicitly stated attitudes toward the public sector were positively associated with *PPP survival* ($\beta_3=0.28, p<0.000$) while those toward the private sector had no reliable association with *PPP survival* ($\beta_4=-0.10, p=0.126$).

[Table 2 here]

In contrast, Model *II* shows that sector-specific associations strongly and statistically reliably predict *PPP survival* ($\beta_3=-1.63, p<0.000$). The relationship is negative, which means that either way, pronounced public or private sector attitudes have a detrimental effect on the likelihood of respondents' will to uphold beneficial long-term collaboration with cross-sectoral partners. This finding is strongly supported by the result that under both treatment conditions interaction effects with revealed public and private sector associations are robust and positive (public: $\beta_5=1.51, p<0.000$; private: $\beta_6=1.81, p<0.000$).

An inspection of the marginal effect plots of sector-specific associations on *PPP survival* within their respective 95%-confidence intervals by treatment (Figure 5) reveals that both positive and negative associations with the public sector result in a parabolic moderation effect on the marginal likelihood of *PPP survival*. In contrast, sector-specific associations with the private sector do not have a similar complex moderation effect but, with a positive slope, have a linear marginal effect on the likelihood of *PPP survival*. Since results show that the valence of sector-specific associations moderates the strength of the signaling effect of partners' sector affiliation on *PPP survival*, *H2* cannot be refuted.

[Figure 5 here]

DISCUSSION AND CONCLUSION

The findings from the experiment provide striking evidence for a signaling paradox: Public sector agents are more likely to terminate the PPP and follow risk strategies that are a higher threat to PPP survival than private sector agents even if their partner only sends positive signals for collaboration. For public sector actors, the information cue of knowing that they collaborate across sectors with a private sector agent increases the likelihood of terminating the PPP early to the severe disadvantage of their partners' shared profit on the one hand but also to the detrimental loss of the general public's because the mutually beneficial PPP project is unilaterally terminated. In this way, public actors' assumption about the idiosyncratic, self-serving characteristics and potential hidden intentions of their private sector partners is enough to severely compromise public actors' fundamental role as outcome-oriented providers of public services. This result is in line with the predictions of prior qualitative scholarship by Scharle (2002), Klijn and Teisman (2003), Kets and Sandroni (2014), and Bryson, Crosby, and Stone (2015) and substantiates these lines of reasoning with first experimental quantitative results.

This result is striking because it shows that, in the context of PPPs, private sector affiliation functions as a signal strong enough to evoke negative assumptions about partners' intentions to collaborate and erode trust – even in the face of explicit information indicating that there is no logical reason for partners to defect. This finding resonates with prior empirical research by Calanni et al. (2014) and with conceptual ideas about the adverse effect of 'otherness' on collaboration efficiency by Kets and Sandroni (2014) and Gurevitch's (1988) effects of otherness. Furthermore, our findings are in line with prior PA and PM research arguing that the origins of organizations' (dis)ability to coordinate and collaborate effectively across sectoral boundaries lie on the micro-level, i.e. within the *individual* members of an organization and that

PPP survival is, thus, dependent on individual idiosyncrasies (Lewis and Weigert 1985; Klijn and Teisman 2003; Calanni et al. 2014; Bryson, Crosby, and Stone 2015).

This effect cannot be explained by rational deduction based on the information provided in the experiment and since the effect is not mirrored by private sector actors in a reciprocal way (which would point toward a pure homophily effect), it is apparent that the private sector signaling effect echoes another behavioral phenomenon of unconditional negativity previously observed in citizen-state interactions and called *anti-public sector bias* (e.g. James and Moseley 2014; Marvel 2015; Olsen 2015; Marvel 2016; del Pino, Calzada, and Días-Pulido 2016). However, results provide strong indications for an *anti-private sector bias*. Our results show that despite neutral signals, people are more likely to assume that private sector actors will defect and – hence – defect themselves in order to minimize losses to public welfare. This escalation of strategic choice is intriguing and tragic because it is only this biased *anti-private sector* assumption that eventually *causes* losses to public welfare by terminating the PPP – a paradox resonating loudly with the classic prisoner’s dilemma. Yet, this anti-private effect is not a bias in the sense of a cognitive illusion as defined by, for instance, Camerer (1998) or Rabin (1998), but represents exactly what Herbert Simon defined as a rational heuristic within the boundaries of a specific context (Simon 1945; Gigerenzer and Gaissmaier 2011). It is not irrational for public actors to assume that private sector partners may act more selfishly because the latter are not obliged to serve the public interest. Consequently, the *bias* in the *anti-private sector bias* is not a cognitive illusion but it is a *consequential bias* in strategic choice based on an erroneous interpretation of actors’ anticipation that private partners will defect even against their own best interest. Our findings are, therefore, fully in line with Simon’s (1945) model of bounded yet rational behavior within the specific context of the public sector and illustrate quantitatively how strategic choice in PPPs is bounded by context-dependent heuristics.

This result is intriguing in several ways because it stands in contrast to normative choice theory and base-level assumptions about collaborative behavior of people with high levels of PSM. First, normative choice theory predicts that rational actors should defect at the first possible node to minimize behavioral uncertainty and cash in any amount larger than zero. This is the optimal strategy in the assumption of backward induction (Aumann 1998), and it would also be in line with prior findings on the antecedents of free-riding (Albanese and van Fleet 1985). In contrast, hardly any participant defects at the first node, which indicates that respondents adopt mixed strategies that do not reflect classic assumptions about human choice. Prior empirical research using the centipede game shows that this behavior can be attributed to the expectation of a small chance that the other partner will be an altruist (McKelvey and Palfrey 1992).

The second prediction from game theory is that rational actors' likelihood to defect grows linearly with each round since the incentive to terminate the partnership grows with each round while the expected utility from upholding the partnership at the end node is constant so that the marginal utility decreases with each round (Aumann 1998). In contrast, the smoothed hazard function has a flattened negative parabolic slope (see Figure 5) with peak hazard in round seven. The form of this slope can be interpreted as an indicator of how actors' trust in their partner erodes as incentives to defect grow up to a certain threshold, which is typical behavior in strategic alliances with potentially conflicting interests to defect (Kawagoe and Takizawa 2012; Krockow, Pulford, and Colman 2015). Also, it is logical to find that the relative defection hazard decreases in the final rounds of the PPP because for the remaining actors a learning effect regarding their partners' intention might have set in.⁹

⁹ An alternative interpretation could be that – knowing that the experiment would only last up to a maximum of ten rounds – respondents primed to act as private sector agents are led to behave more myopically and thus fail to engage in backward induction.

Third, results show that sector-specific attitudes and associations are influential drivers of strategic behavior in PPPs. While private-sector associations have a linear positive effect on the likelihood of PPP survival, which means that higher emotional involvement increases decision-makers' willingness to uphold cross-sectoral collaborations over a long period of time, the effect of public-sector associations is parabolic. This means that holding either very negative or very positive associations toward the public sector is beneficial to the likelihood that people will opt to uphold the PPP until completion, which indicates that, in fact, emotional involvement with the public sector *in general* is positive for *PPP survival* irrespective of the direction of valence. Additionally, this finding indicates that people who are passionless about the public sector are actually less likely to collaborate until PPP completion. The latter finding is in line with prior experimental research from economic psychology by Arora et al. (2012), who show that lower levels of emotional involvement lead to lower levels of trust in partners and, consequently, decrease collaboration efficiency in social good games. Trust is an essential micro-foundation of collaboration (Ostrom 1998). Consequently, public sector practitioners may want to fill positions that involve the strategic management of critical situations in cross-sectoral partnerships with employees who are highly involved and passionate toward the cause of the PPP. Special care should be given to the establishment of a transparent and truly trustful relationship between all partners involved. Furthermore, these results have important practical relevance for the governance of risk in PPPs: Practitioners may want to conclude from our findings that it is wise to establish a shared culture of communality within the PPP to inhibit the adverse effects of perceived cross-sectoral differences.

Fourth, results show that people reporting high levels of PSM are especially likely to terminate the PPP early. This is surprising because high PSM is usually regarded as a robust indicator for a higher likelihood of pro-social behavior (Esteve et al. 2015), a higher likelihood of trusting and of behaving more trustworthy (Tepe 2016), and people with high PSM are especially likely

to self-select into the public sector presumably in the prospect of putting their motivation to help others and contribute to the greater good into action (Crewson 1997; Vandenabeele and Skelcher 2015; Esteve et al. 2016). Yet, the data show that PSM *increases* the likelihood of defection. It is important to note that the effect of PSM was more than five times the size of the effect of being a risk-averse person while the negative effect of PSM was about equal to the positive effect of being a generally trustful person. One reason for the strength of this negative association between PSM and the likelihood of *PPP survival* could be that high-PSM people hold a relative preference in favor of the public sector in general and that they may, thus, disapprove of general concept of cross-sectoral partnering as described in the treatment scenario of the current experiment (Crewson 1997).¹⁰ On the other hand, the adverse effect of PSM is still puzzling because defecting from the PPP – and, thus, causing its termination – is clearly adverse to societal welfare at least as described in the scenario of the current experiment. In this sense, this finding is in contrast to prior research by, for instance, Bullock, Rainey, and Stritch (2015) and may provide further evidence for the dark side of PSM (Schott and Ritz 2018), calling for further research.

Limitations and future research

Like any form of experimental research, our study is subject to limitations. First, its empirical evidence is based on decisions made by graduate university students. We are confident in our findings because prior empirical research by Falk et al. (2013) and Mullinix et al. (2015) shows that student and non-student samples hardly differ in behavioral experiments incorporating social preferences. Furthermore, this sample of future bureaucrats and managers is an especially characteristic and interesting target group for PA/PM research. Yet, future studies are

¹⁰ The current study was conducted with a sample of German citizens who are accustomed to the European continental tradition of public administration, which comprises a relatively strict legal and organizational distinction between the sphere of the public and the private sector. Studies conducted in countries with other administrative traditions might find dissimilar effect of sector-affiliation on PPP collaboration efficiency.

encouraged to assess the external validity of our findings by replicating our experiment – ideally with public and private sector executives.

Conceptual replication studies are encouraged to use our experimental design to investigate within-sector collaborations in both the private and public sector and compare the results with findings for cross-sectoral collaborations in PPPs. This would provide an even more nuanced picture of framing and signaling effects since in PPP settings, almost by definition, the role framing of one partner (as public or private) implies a simultaneous framing of the other partner (as the opposite). This limited our possibilities to causally attribute the observed effects to the framing either of the self or the other. Consequently, future research is needed to examine how the special incentive structures in PPPs affect strategic behavior. We assume that our knowledge about the micro-mechanisms of behavior in PPPs will gain substantially by the use of more elaborate economic research methods in PA and PM scholarship.

Conclusion and practitioner's advice

This study reveals that sector-specific attitudes and the perception of otherness can have adverse consequences for the likelihood of pursuing and upholding mutually beneficial PPPs. While changing individuals' negative (implicit) attitudes and associations toward cross sectoral partners is a long-term endeavor, practitioners might want to consider some firsthand remedies. The key factor eroding trust between partners, *ceteris paribus*, is the perception of heterogeneity between partners which is related to partners' presumably negative hidden characteristics and hidden intentions. As a first step, practitioners might want to engage in actions that create a sense of communality shared by all members of the partnership within their specific PPP project right from its initiation and throughout its lifetime tenure until its completion. This can be achieved by practical measures of team management for instance by explicitly and recurrently communicating the mutual benefits created through the partnership as well as by promoting a

shared set of values that are espoused across partners' sectoral affiliations. Values provide justification for behavior and should (explicitly and implicitly) be codified in the partnership's strategy, its goals, and its managerial philosophy by implementing them on the micro-level of collaboration (Tompkins 2005). Acculturation transformational and symbolic management techniques by, for instance, providing rituals, stories, and mission statements both in the initial phases and throughout the lifetime of the PPP can help create and maintain emotional attachment and diminish the risk of partner alienation because it builds psychological bridges across sectoral and organizational boundaries, promoting the PPP's ultimate objective of long-term stability and cross-sectoral mutual synergy for all partners involved (Schein 1992; Huxham & Vangen 2005; Tompkins 2005). Simple measures such as establishing an interactive and visible system of artifacts – e.g. in the form of a PPP brand, common spaces to actually work together, flat hierarchies and collaborative organizational structures, processes, and events – can be hands-on and relatively easy ways to achieve the desired outcome of bringing partners more closely together. These tangible artifacts of communality may seem mundane but they are tangible and affective economical reminders to all agents that although partners might originate from different sectors they do actually share a common course in the partnership, providing spaces of dialogue in which trust can evolve and stabilize (Gurevitch 1988). In short, everything that makes the partners less alien – less *other* and *strange* – will help reduce the adverse effects of sector-specific attitudes and help reinforce the micro-foundations of successful collaboration in PPPs under risk.

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Table 1: Correlations, reliabilities, and descriptive results

	1	2	3	4	5	6	7	8	9	10	11	12
Study variables												
1. PPP survival	—											
2. Public sector affiliation ^a	-.04*	—										
3. Public sector associations (revealed)	.05**	-.11***	—									
4. Public sector attitude (explicit) ^b	-.01	-.03*	.09***	—								
5. Private sector attitude (explicit) ^b	-.03	.02	.00	.04**	—							
Control variables												
6. Risk propensity (revealed)	-.02	.09***	-.01	.04**	.06	—						
7. Trust in others (explicit)	.06***	.03	.03*	-.01	.07***	.03	—					
8. Uncertainty avoidance (explicit)	-.06***	.02	.07***	.00	.06***	-.01	-.10***	—				
9. PSM (explicit)	-.02	.02	-.03*	.01	-.07***	.03*	-.02	.04**	—			
10. Female ^a	-.02	-.03	.02	.01	-.01	.03*	-.04*	-.07***	.08***	—		
11. Age ^a	.04**	.01	-.01	-.05**	.05**	.11***	.15***	-.04*	.06***	-.08***	—	
12. Numeracy	.08***	.01	.02	-.02	.01	-.03	-.05***	.01*	-.11***	-.19***	-.04	—
<i>M</i>	8.62	.55	.40	2.83	2.76	3.59	2.54	2.54	3.48	.61	24.7	4.70
<i>SD</i>	2.90	.50	.91	1.44	1.46	3.16	.66	.66	.70	.49	4.93	1.40
<i>range</i>	0–10	1 / 0	-1.83–2.60	1–7	1–7	.33–15.31	1–5	1.30–5.30	1.85–5.80	1 / 0	17–51	0–6

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; ^a distribution in treatment groups controlled for balance with between-group two-tailed *t*-tests, all n.s.;

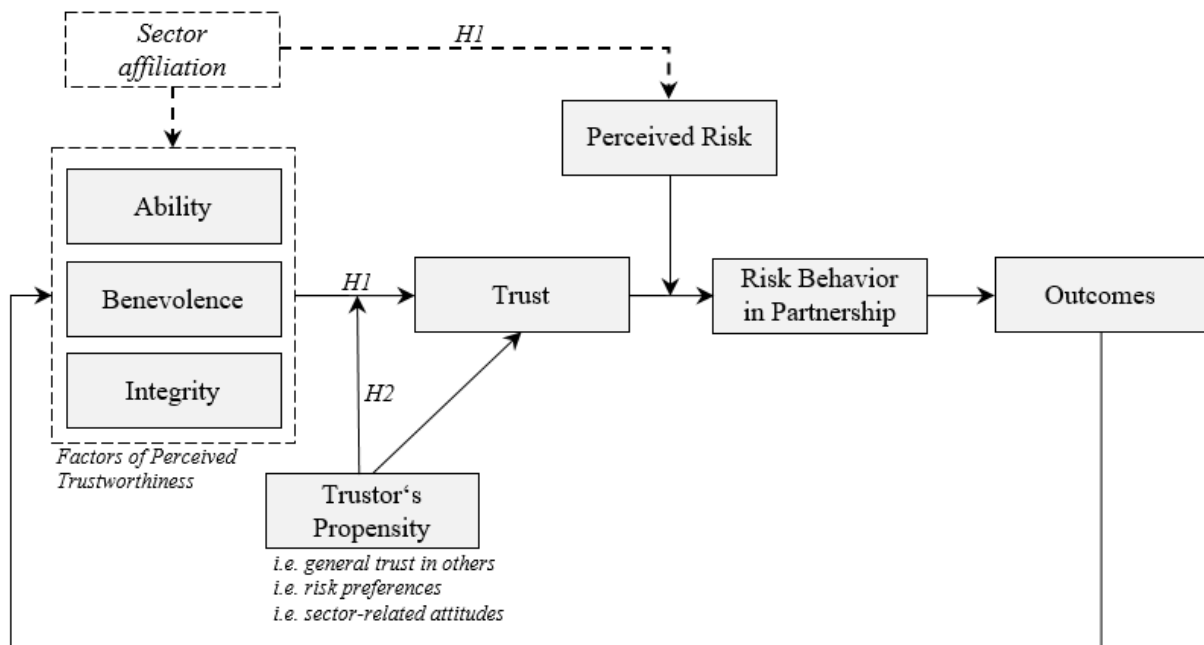
^b stated attitudes centered for normalization.

Table 2: Mixed-effects logistic regression analysis on *PPP survival*

	<i>Model I</i>					<i>Model II</i>				
	β	<i>p</i>	<i>SE</i>	<i>[95% CI]</i>		β	<i>p</i>	<i>SE</i>	<i>[95% CI]</i>	
Treatment effect										
Public sector affiliation (i.e. <i>collaborating with a private sector partner</i>)	-.26*	.049	.13	-.52	-.00	-.15	.302	.14	-.43	.13
Subject-level effects										
Sector-specific associations	.08	.141	.06	-.03	.19	-1.68***	.000	.22	1.25	2.12
Public sector attitude	.24***	.000	.07	.11	.37	.28***	.000	.07	.15	.42
Private sector attitude	-.08	.227	.07	-.21	.05	-.10	.126	.07	-.23	.03
Two-way interactions										
Public sector treatment x public sector associations						-1.88***	.000	.24	-2.36	-1.40
Private sector treatment x private sector associations						-1.41***	.000	.21	-1.81	-1.00
Control variables										
Risk aversion (revealed)	-.07***	.000	.02	-.10	-.03	-.06***	.000	.02	-.10	-.03
PSM (explicit)	-.36***	.000	.09	-.54	-.18	-.34**	.001	.10	-.53	-.14
Trust in others (explicit)	.31**	.006	.11	.09	.53	.39**	.001	.11	.16	.60
Uncertainty avoidance (explicit)	-.14†	.099	.08	-.31	.03	-.09	.297	.09	-.26	.08
Female	-.19	.131	.13	-.44	.06	-.29*	.019	.12	-.53	-.05
Age	-.01*	.016	.02	-.04	.02	-.01	.436	.02	-.05	.02
Intercept	4.38***		.59	3.23	5.54	4.18***	.000	.62	2.96	5.41
<i>Obs.</i>	4,338					4,338				
<i>N</i>	482					482				
<i>Wald Chi² (df)</i>	84.49***					141.49***				
<i>df</i>	10					12				
<i>AIC</i>	2,064.27					1,999.36				
<i>BIC</i>	2,134.39					2,082.24				
<i>-2*Log Likelihood</i>	2,042.27					1,973.36				

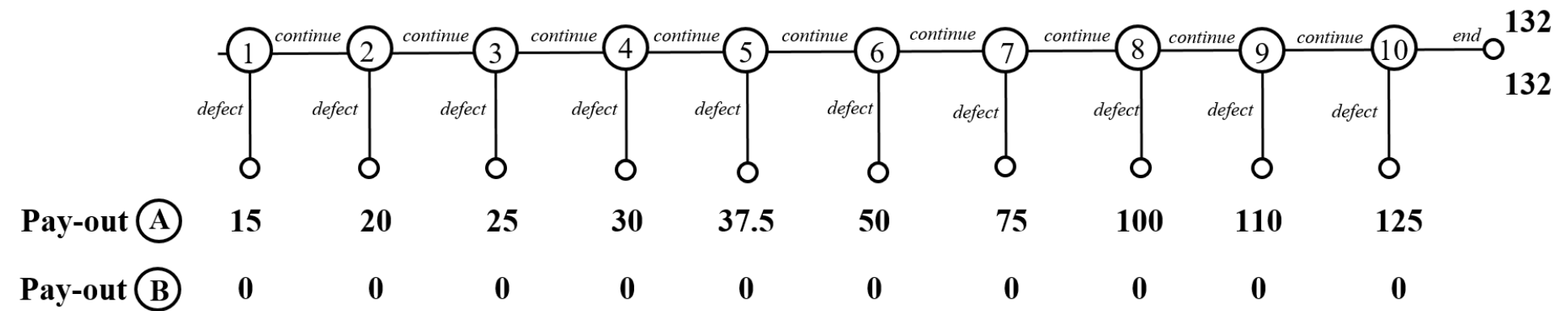
Notes: Clustered at individual level for conditional contribution, robust standard errors; explicit attitudes centered. Model I: main effects; Model II: combined model with interaction effects. † $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 1: Theoretical model of trust in PPPs



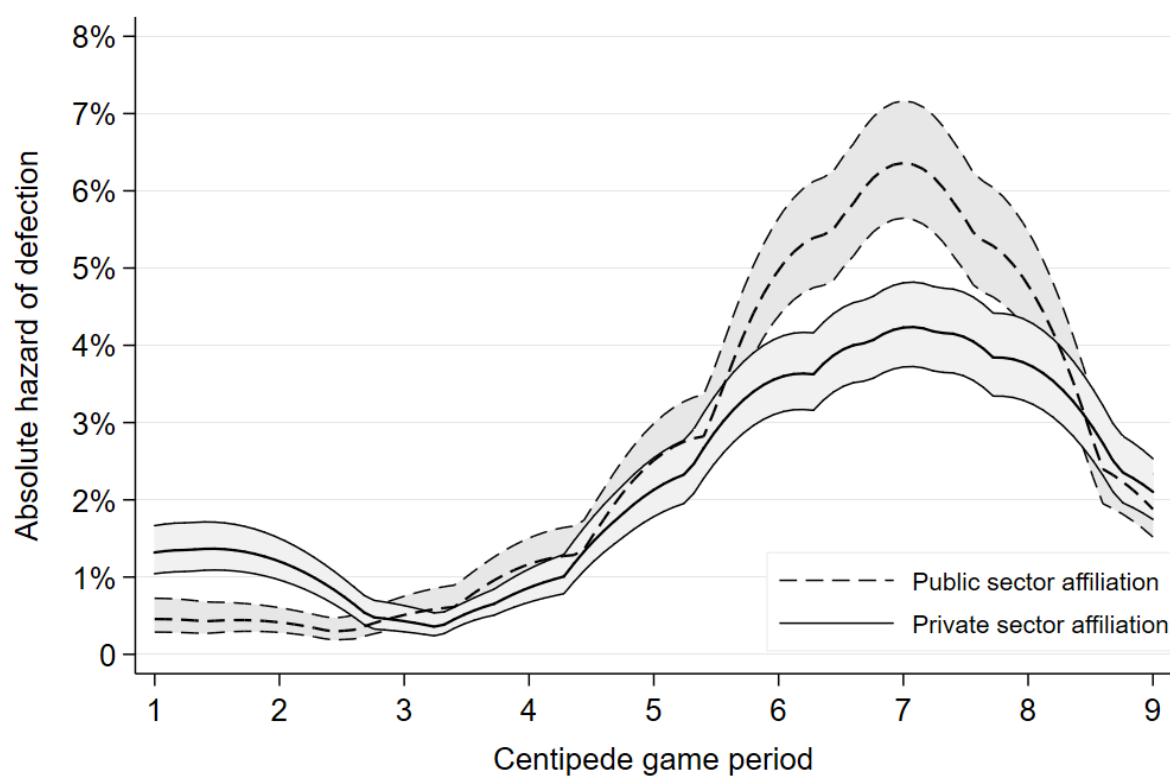
Note: Adapted from Mayer et al.'s general model of trust and trustworthiness (1995: 715).

Figure 2: Extrinsic game structure

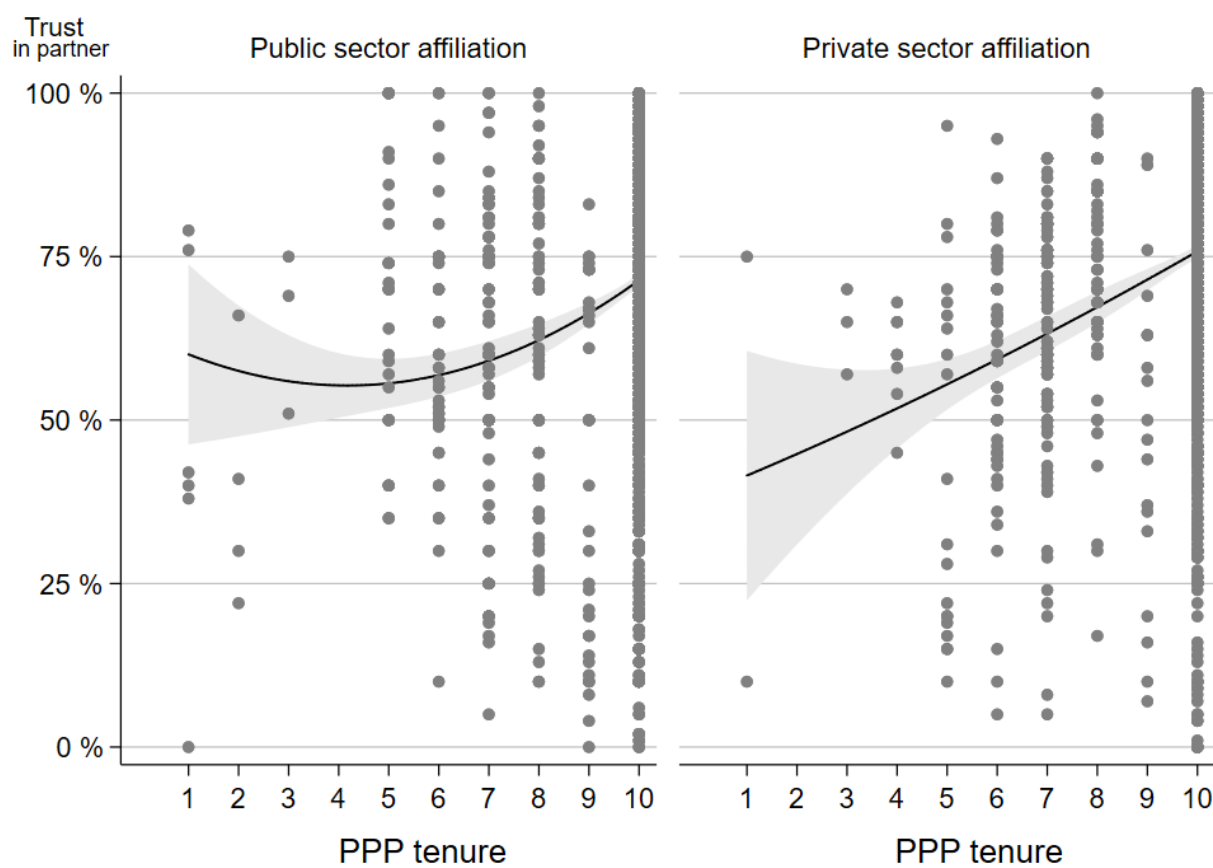


Note: Hypothetical pay-outs in million €

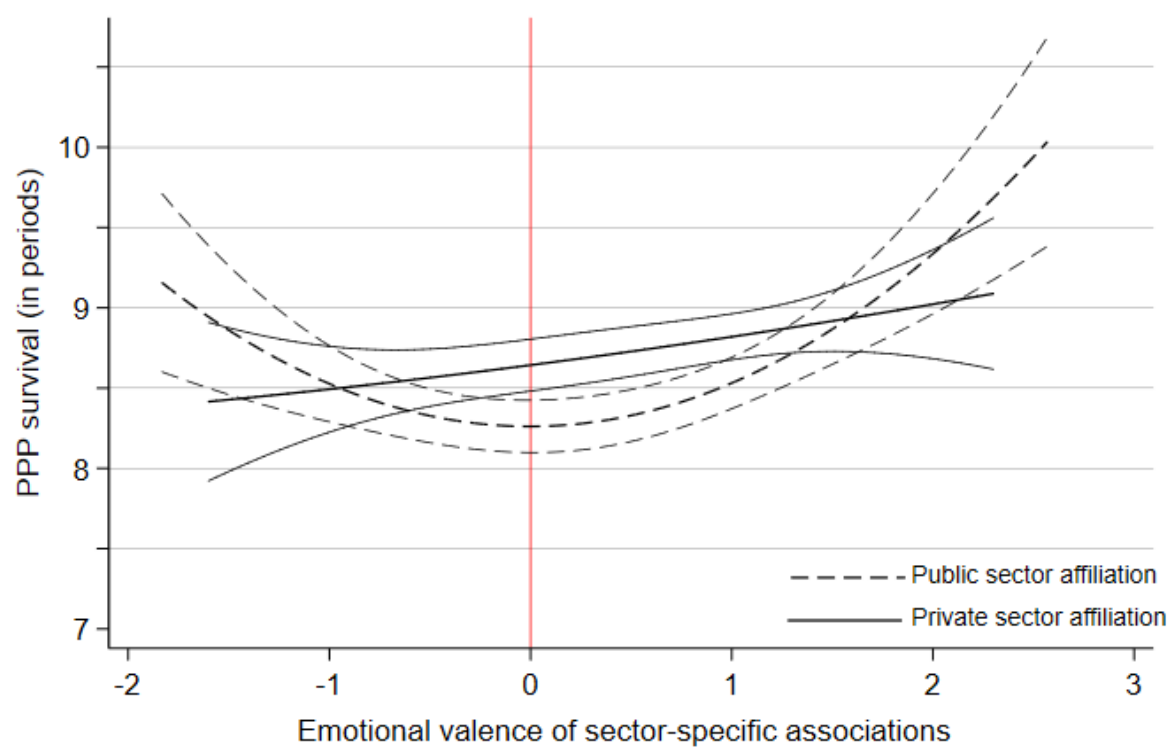
Figure 3: Smoothed hazard function on *PPP survival* by treatment



Note: Absolute hazard smoothed functions of partners' defection in per cent by game period and by treatment; kernel density estimated with Epanechnikov kernel to minimize the mean squared error.

Figure 4: Trust in partners by treatment-based sector affiliation.

Note: Shaded areas indicate 95%-CIs; grey dots denote exit nodes in centipede game.

Figure 5: Marginal effects plot of sector-specific associations on *PPP survival* by treatment

APPENDIX (Supplementary online material)

A.1 Experimental setup and treatment stimuli. English translation, original German codebook upon request.

1	General introduction	
2	<p>Introduction to performance rating task [all study participants]:</p> <p>‘Please consider the following scenario:</p> <p>As a result of a generous subsidy from the federal government, new building land has been laid out in your home town a few years ago, on which a new large town district is to be built. This project is considered to be very positive for future urban development by all stakeholders.</p> <p>However, in spite of the federal funding granted, the investment costs for the construction of roads and for the development of the site are very high so that the city cannot bear these costs for the development of the neighborhood on its own and, consequently, has established a long-term partnership with a large construction company from the private sector. It has been contractually agreed that costs and returns of this project are going to be shared equally.</p> <p>This partnership has been working very well for several years and to mutual benefit. But suddenly, an unforeseeable problem arises for which none of the two partners are to blame: There are rumors that the Federal Government’s funding program will be terminated early in the coming years. Consequently, the partnership is now in much more distress. If the neighborhood development was not completed, the whole project could lead to disastrous financial losses.</p> <p>Unfortunately, no special clause was agreed upon for such a case, so that if one of the two partners now decided to withdraw prematurely from the project, this would leave behind the other partner with all the liabilities and without means of penalty for the other partner.</p>	
3	<p>Vignettes and explicit sector specific associations [prime]: Study participants randomly receive one of two vignette treatments, followed by up to 10 rounds of deciding on whether they wished to continue the partnership.</p>	
4	A	<p>[Public Sector Treatment]</p> <p>Imagine that you are a civil servant in the higher service of the city administration. This means that you decide whether the collaboration with the private company should to be maintained.</p> <p>Please think carefully about the role you are taking on in this experiment. Imagine how it is to work in the public sector, how it feels like. What are the immediate associations that come to your mind in relation to the public sector and to the people working in the public organizations?</p>

		<p>Please specify at least 3 attributes:</p> <p><i>[open response]</i></p> <p><i>[open response]</i></p> <p><i>[open response]</i></p> <p>As a reminder, you are a civil servant in the higher service of the city administration, this means that you are in the position to decide whether the collaboration with the private company is to be maintained or terminated.</p> <p>So far, the collaboration has been very fruitful and, at this moment, the changes in policy are only rumors. You also know that it is an advantage for both the city you represent and the partner company from the private sector to continue the partnership.</p> <p>A glance at your calculations shows you that the partnership project must last only another 10 planning periods in order to generate the maximum total return for all participants. Then each of the two partner organizations would receive € 132 million funding, but only if the partnership is maintained until the end of the 10 planning periods.</p>
	B	<p>[Private Sector Treatment]</p> <p>Imagine that you work as a senior manager in the private sector construction firm. This means that you decide whether the collaboration with the city administration should to be maintained.</p> <p>Please think carefully about the role you are taking on in this experiment. Imagine how it is to work in the private sector, how it feels like. What are the immediate associations that come to your mind in relation to the private sector and to the people working in private companies?</p> <p>Please specify at least 3 attributes:</p> <p><i>[open response]</i></p> <p><i>[open response]</i></p> <p><i>[open response]</i></p> <p>As a reminder, you are a senior manager working at the private construction firm, this means that you are in the position to decide whether the collaboration with the city administration is to be maintained or terminated.</p>

		<p>So far, the collaboration has been very fruitful and, at this moment, the changes in policy are only rumors. You also know that it is an advantage for both the firm you represent and your public sector partner (the city) to continue the partnership.</p> <p>A glance at your calculations shows you that the partnership project must last only another 10 planning periods in order to generate the maximum total return for all participants. Then each of the two partner organizations would receive € 132 million funding, but only if the partnership is maintained until the end of the 10 planning periods.</p>
5	<p>Centipede Game Trials:</p> <p>[maximum of 10 rounds, depending on respondents' decision whether or not to continue the partnership; partner descriptions adapted to prior role framing treatment.]</p>	
	1	<p>Please decide under these conditions (planning period 1 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of €15 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €15 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
	2	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 2 of 10):</p>

	<p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of €20 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €20 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
3	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 3 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of €25 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €25 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p>

		<p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
	4	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 4 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of €30 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €30 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
	5	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 5 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of € 37.5 million and your partner ([the private construction company/the city administration]) €0 million.</p>

		<p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €37.5 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
	6	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 6 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of €50 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €50 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>

7	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 7 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of €75 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €75 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
8	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 8 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of €100 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €100 million.</p>

	<p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
9	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 9 of 10):</p> <p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of € 110 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €110 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
10	<p>Thank you very much!</p> <p>Your partner has also decided to maintain the collaboration.</p> <p>Meanwhile some time has passed and you have to decide again (planning period 10 of 10):</p>

	<p>If you decide to terminate the partnership now, your organization ([the city administration/the private construction company]) will receive an amount of € 125 million and your partner ([the private construction company/the city administration]) €0 million.</p> <p>Please note that your partner can also decide at any time to terminate the partnership without prior notice! This would mean that your organization ([the city administration/the private construction company]) will receive €0 million and your partner ([the private construction company/the city administration]) will receive €125 million.</p> <p>If you work together until the end, your organization will receive €132 million and your partner will also receive €132 million.</p> <p>Do you want to maintain the partnership?</p> <p><input type="checkbox"/> yes</p> <p><input type="checkbox"/> no.</p> <p>How likely is it that your partner will also wish to maintain the partnership?</p> <p>[slider: 0 --- 100] %</p>
6	Probability discounting questionnaire (Madden et al., 2009)
7	Tolerance for uncertainty (Dalbert 1999)
8	PSM (Kim et al. 2012)
9	<p>Explicit attitude about the public sector, single 7-point Likert-type item:</p> <p>‘If you think about the public sector in general your thoughts are...’</p> <p>1=‘very negative’ to 7=‘very positive’.</p>
10	<p>Explicit attitude about the private sector, single 7-point Likert-type item:</p> <p>‘If you think about the private sector in general your thoughts are...’</p> <p>1=‘very negative’ to 7=‘very positive’.</p>
11	Trust in others (Yamagishi and Yamagishi 1994)
12	<p>Socio-demographic questionnaire:</p> <ul style="list-style-type: none"> - year of birth - gender - citizenship - field of study - education - prior work experience and intent to apply to public sector.

13	Numeracy (Weller et al. 2013)
14	Acknowledgement and end of study

A.2 Additional analysis on artificial inflation bias

The empirical evidence presented in the current study relies on a relatively large number of observations ($Obs.=4,338$) nested in a sample of $N=482$ respondents. Larger sample sizes are generally regarded as beneficial regression analysis because a higher number of respondents increases power and, hence, reduces the likelihood of committing type II (β) errors, i.e. falsely accepting a null hypothesis (Banerjee et al. 2009).

Yet, large sample size can also cause artificial inflation of p -values resulting in models that identify statistically significant but inconsequential effects. In very large samples, p -values quickly cross the threshold levels typically interpreted as statistical significance – $p<0.05$; $p<0.01$; $p<0.001$ – see Lin et al. (2013) for an extensive discussion.

Consequently, we test our empirical results for inflation bias by drawing a random sample of our data (controlled for treatment balance) and re-run the multi-level mixed effects regression analysis. We repeat this procedure and, by each step, systematically halve the number of drawn observations until we reach the minimum sample-size to detect statistically significant effects in between-group mean comparisons, i.e. $Obs.>172$ (Ellis 2010).

Figure A.2.1 presents the results of this step-wise procedure. The test reveals that the results presented in the main body of the current study are largely robust against artificial inflation. Especially the results regarding respondents' revealed *risk aversion*, *uncertainty avoidance*, and their *explicit attitude toward the public sector* remain stable. In contrast, the treatment effect – *public sector association* (i.e. collaborating with a private sector partner) – becomes sign-indicative and exhibits considerable variation if sample sizes are reduced. This indicates that although the partners' sector does function as a cue for the trustworthiness of a partner, the main drivers of whether or not people decide to defect from the PPP are still their individual dispositions and attitudes, predominantly their level of *PSM* ($\beta_3=-0.359$, $p<0.000$), their *general trust in others* ($\beta_7=0.311$, $p=0.006$), their *revealed risk propensity* ($\beta_3=-0.069$,

$p<0.000$) and their *attitude toward the public sector* ($\beta_3=0.239$, $p<0.000$). We already discuss this *caveat* in more detail in the discussion section of the main study and are, hence, confident in our findings.

TABLE A.5.1: Regression results on the likelihood of *PPP survival*

	<i>Model I</i>	<i>Model II</i>	<i>Model III</i>	<i>Model IV</i>	<i>Model V</i>
Treatment effect					
Public sector affiliation (i.e. <i>collaborating with a private sector partner</i>)	-.258* (.049)	-.156 (.383)	-.071 (.790)	-.307 (.457)	-.105 (.881)
Subject-level effects					
Sector-specific associations (revealed)	.082 (.141)	.108 (.172)	.103 (.392)	.025 (.888)	.362 (.186)
Public sector attitude	.239*** (.000)	.176† (.062)	.306* (.036)	.507* (.028)	1.044* (.033)
Private sector attitude	-.078 (.227)	-.108 (.213)	.002 (.990)	.212 (.273)	.345 (.364)
Control variables					
Risk aversion (revealed)	-.069*** (.000)	-.050† (.056)	-.088** (.009)	-.145*** (.000)	-.183** (.001)
PSM (explicit)	-.359*** (.000)	-.229† (.084)	-.178 (.367)	.479 (.158)	.390 (.348)
Trust in others (explicit)	.311** (.006)	.214 (.185)	.426† (.086)	-.028 (.930)	.141 (.818)
Uncertainty avoidance (explicit)	-.139† (.099)	-.265* (.029)	-.183 (.355)	-.508† (.073)	-.762† (.099)
Female	-.192 (.131)	-.273 (.122)	-.032 (.897)	-.115 (.778)	.386 (.533)
Age	-.013 (.390)	.002 (.933)	.001 (.968)	.048 (.331)	.015 (.856)
Intercept	4.383*** (.000)	3.931*** (.000)	3.088* (.015)	2.411 (.198)	4.085 (.216)
<i>Obs.</i>	4,338	2,170	1,085	543	272
<i>N</i>	482	482	482	482	(482)
<i>Wald Chi</i> ² (10)	84.49***	33.42***	25.43**	21.81*	17.84
<i>p</i>	.000	.000	.005	.016	.058
<i>AIC</i>	2,064.27	1,090.77	526.91	228.18	103.29
<i>BIC</i>	2,134.39	1,153.28	581.79	275.44	142.95
<i>-2*Log Likelihood</i>	2,042.27	1,070.77	504.91	206.18	81.29

Notes: Multi-level mixed effects regression estimates clustered at subject level for conditional contribution; heteroscedasticity-robust standard errors; direct effects models (p -values in parentheses); † $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$. The estimates of Wald's Chi (df), AIC, and BIC indicate that models IV and V are substantially biased and should not be selected.

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