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Urban development and cooperation games

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ABSTRACT

This paper investigates what makes developers and municipal planning authorities more (or less) likely to cooperate. It borrows methods from behavioural economics for eliciting the propensity of cooperation in different groups under different circumstances. Participants from private development companies, public planning, and related fields have played simple games in which they chose whether to cooperate in an urban transformation scenario (N = 269). By altering minor details, we learn about what makes people cooperate. The paper is able to quantify some human biases affecting the actions we observe in development projects: The findings indicate that people tend to be more cooperative towards people from the same sector, are less likely to cooperate in riskier scenarios, and *in situ*ations where some group members have fewer resources to contribute to the cooperative effort. Hopefully, the novelty of using economic experiments on planning and property development decision making could serve as an inspiration for other researchers in the field, although the methodology does carry limited external validity.

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Introduction

Most urban development is dependent on different actors working alongside one another. While the systems for spatial development differ from project to project, within countries, and between countries, they virtually always involve a public planning authority, and an entity that wants to develop land. The planning authority maintains public interests and allows or disallows projects according to some rules, plans, and guidelines. The developer may be a public, commercial, or private person who wants to build something to use, or a developer that wants to build something for commercial sale or lease.

This paper will focus on these two primary groups: The planners and the developers, and their attitudes towards cooperating. While these two groups have different goals and tools, they need each other (Peiser, 1990). Without private and public development projects it is hard to imagine how the economy would avoid stagnation, while a certain planning and regulation is necessary to avoid rampant inefficiency (Webster, 1998).

In many complex development projects, typically redevelopment within the existing city, planners have to deal with multiple developers working in the same area (Barlindhaug & Nordahl, 2018). The different projects will connect to, and benefit from, the same infrastructure and public spaces. Because these goods are difficult to exclude users from,

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and one developer's use of these goods does not noticeably diminish the benefit other developers and users get from the improvement, developers will have an incentive to freeride (DiPasquale & Wheaton, 1996). In other words, each individual developer will reach higher profits the more others pay to provide the goods, while they contribute as little as possible. One common strategy to do this is to delay development until all other public and private projects in the area are finished, and the infrastructure and public spaces are already in place. This can cause a standstill in a development area, particularly in brownfields where margins are small and significant improvements must be created (Melo & Cruz, 2017). When planning such non-excludable, non-rivalrous goods (in economics called public goods), the different actors can gain much by coordinating their respective projects, to maximise the benefits from these investments and avoid an environment where everyone tries to freeride (Klosterman, 1985). This paper therefore seeks to study cooperation both between planners and developers, and among developers.

'Cooperation' can here be any number of different activities, depending on the setting and actors in question: Among different public or private actors, between these groups, or with NGOs and civil society. Rather than looking at specific forms of cooperation and evaluating certain outcomes as good and others as bad, this paper focuses on any type of cooperation where public and/or private actors can work together for mutual benefit, but where working alone also is a viable option. In some situations, the decision of whether and how to cooperate will be a pure cost-benefit analysis. Some of the costs and benefits are, however, difficult to quantify, so the actors will have to depend more on 'gut feelings' and heuristics to decide (Rand et al., 2014). A good climate of cooperation implies an environment in which these biases push people towards cooperation *in situ*ations where costs and benefits of cooperating are difficult to calculate (Rand et al., 2014).

Scholars of many fields have created a rich body of literature looking into such attempts at freeriding and cooperation between humans. They try to answer questions such as: Why humans sometimes are able to cooperate even when it might be better for an individual to freeride; how to define group boundaries to sustain cooperation (Ostrom, 1990); why humans often feel bad about defecting from a cooperation scheme; or why one would be willing to pay to punish such defectors even when the signalling effect is eliminated (Fehr & Gachter, 2000). One important tool used to answer questions along these lines are economic experiments, where researchers study how human actions deviate from economic theory under controlled circumstances. As a field with multiple actors working besides each other in a network of different relationships, it is plausible that there is an underutilised potential for applying this methodology to urban development scenarios. Economic experiments are a viable tool for testing potential policies in various fields (Plott, 1987). This paper should be seen as a step towards doing the same in policymaking for market-based provisions of public goods in urban development by providing a methodological and theoretical framework.

To summarise this introduction, planners and developers are linked together (Peiser, 1990). Their goals are not fully aligned and they can see each other as opponents or collaborators, or, most likely, somewhere between these two, and there are benefits to seeing each other as collaborators (Codecasa & Ponzini, 2011). In the construction phase of the development, a good climate of cooperation between the actors can be more important than the climate within each firm, as disagreements with other actors can greatly disrupt their operations (Phua & Rowlinson, 2004).

The paper use economic experiments with planners, developers, and other people involved in urban development to gauge the climate of cooperation, and try to identify potential threats to it. More specifically, the paper tests the following hypotheses:

- Subjects are inclined to cooperate in a hypothetical development setting, even when it is individually suboptimal and payoffs are uncertain.
- Subjects will cooperate less in groups with people from different employment sectors.
- Subjects will cooperate less when faced with heterogeneous power levels within the group.

The first section further introduces the concept of cooperating for public goods in planning, describes the Norwegian planning system as the context for the games, and relates the topic to planning in general. Section two gives a brief overview of the literature of cooperation games. Section three describes and report from the experiments, and section four discusses what these findings imply for the dynamics of cooperative urban development.

Background

Brownfields and planning

One of the main reasons society regulates urban development, as opposed to all developers building only as the market dictates, is to make sure goods such as roads and parks are provided and made accessible for surrounding landowners and residents (Wong, Chan, & Yu, 2011). Thus, also libertarians recognise the importance of planning (Lai, 2002). In making these non-rivalrous goods non-excludable, they become prone to the pitfalls of traditional public goods, particularly under-provision (Alfano & Marwell, 1980). Profit-maximising developers will not want to spend more on public goods than what is necessary. The most common way to solve this problem is to let the public, usually represented by the municipality, provide most of these public goods. They can then recapture part of the added value from those that benefit from it through any one of a number of methods (Alterman, 2012).

If we imagine that we removed all public planning, how would housing projects be? They might still include some public areas if it is beneficial to forgo some units to increase the value of the others (Weigher & Zerbst, 1973). Greenery, for instance, can increase property values by 7–10 % in urban areas where vegetation is severely lacking, affecting prices of units more than a hundred meters away (Mei, Zhao, Lin, & Gao, 2018). In these cases, a profit-maximising developer will shape and dimension land uses to maximise the value added to their project, disregarding surrounding plots. This results in small public spaces in the centre of the projects, with minimal access to the people who are not residents. As developers do not receive the entire benefit from investing in aesthetic constructions, but pay the entire cost, they will also have an incentive to build less aesthetically than the social optimum where marginal costs equals marginal utility for the entire area.

Theoretically, in an environment with several developers facing the decision of how much to invest in providing these public goods, it is easy to see that they would all be better off if each of them were willing to pay for more than what gives the largest profit for the individual: This is a version of the prisoners' dilemma, in which multiple actors

choosing an individually sound strategy leads to an outcome that is worse for everyone, than if all actors would chose the less optimal strategy of cooperation.

In praxis, this will often happen. *In situ*ations where each individual developer would be better off by freeriding on other actors' public goods, they often refrain from doing so (Klosterman, 1985). This does not necessarily have to be only from the kindness of their hearts, but rather than there are certain incalculable benefits from assisting in the provision of public goods, and incalculable costs to freeriding. The greater preference someone has for contributing to public goods, the more likely they are to cooperate, *ceteris paribus* (Rand et al., 2014). So, which circumstances make the shapers of urban space pay for public goods beyond their individual preference when deciding how to invest?

One of the main selling points of channelling growth into redevelopment areas such as industrial- and logistics areas is to remove problems from the urban environment. These areas tend to cause air-, noise-, and visual pollution, which reduce the value of surrounding land for residential or commercial uses. By transforming them, they create urban areas that provide the surrounding areas with public goods, both by diminishing these negative effects and by adding public spaces, improved infrastructure, and service providers. Redevelopment affects more users and developers than scattered greenfield projects.

Planning systems and role divisions

In other words, as municipalities turn to urban redevelopment to accommodate growth, cooperating for public goods becomes more important. Different systems for planning and development will have different parameters for cooperation and the provision of public goods. In Norway, development is heavily dependent on private developers and the municipalities working alongside one another. The municipalities make superior plans for the development or conservation of all land within their borders. They also often supplement these with narrower thematic plans, such as for bike path networks or surface runoff management plans. In the main development and transformation areas, local authorities usually also make superior juridical binding zoning. The developers forward the detailed zoning plans for their projects (Falleth & Nordahl, 2017). The municipality will then approve or disapprove the proposal based on whether it fits into their own visions for the area and comply with the statutory plans. While the developer is preparing their zoning plans, they liaison with the municipality's planning department, who will inform them of what they must do to get their proposals approved. Depending on how strongly these two actors want to see the project completed, these requirements might differ: In areas where development land is in short supply and prices are high, developers will be willing and able to go a long way towards meeting any of the municipality's requirements. In areas where investments in development are hard to come by, the municipality will have to be less demanding or the developer will go elsewhere (Nordahl, 2006).

This is a type of public-private partnership, and as such, disagreements between the parties are prone to hamper the development effort (Glumac, Han, & Schaefer, 2013). For instance, information gaps causing asymmetric uncertainty (Thomas, 2003) or conflicting interests (Blokhuis, Snijders, Han, & Schaefer, 2012) are plausible sources of disagreements. Theory on the negotiations in public-private partnerships, as those

found in Norwegian property development, straddle both the normative and prescriptive approach, which warrants studying it through cooperation games (Glumac, Han, & Schaefer, 2016).

In the negotiations between Norwegian developers and municipalities, public goods such as parks are often an important topic. The developer will usually want to internalise the benefits from these investments as much as possible, by making them exclusive to the end users, while the municipality wants them to benefit the public as a whole (Webster, 1998). They will also disagree on the levels of investments: For instance, interior roads and walkways are necessary to build any multi-unit project, and will be a task of the developer by legal requirement linked to planning permission. Investments above this minimum will benefit the local area as a whole. Reduced congestion from better roads ripple out and people from a large catchment area utilise high-quality public spaces. Municipalities, in trying to maximise these expenses, bring these investments closer to the social optimum where marginal costs meet marginal benefits for the entire city. Planners are prone to see it as wresting power and resources from the wealthy and powerful, and give it to society and the disenfranchised. Developers, on the other hand, can see this as a fair and necessary part of development, or as extortion by greedy municipalities (Osborn, 1989). Often, they are more negative to the unpredictability of the municipality's demands and additions of requirements late in the process, which alters its financial boundaries, than the actual levels (Nordahl, Barlindhaug, & Ruud, 2008).

Common interests

Despite this adversarial relationship among the various developers and between them and the municipality, their common interests are strong (Svensson, Klofsten, & Etzkowitz, 2012). They all have a general interest in making good neighbourhoods, for any definition of 'good'. Good areas fetch higher prices. Municipalities both have a direct interest in making neighbourhoods nice for their citizens, and can gather more tax from end users. Municipalities, like the developers, have an interest in seeing transformation projects completed quickly as it removes less desirable land uses from the urban fabric and improves housing supply. A recent Norwegian survey found that public planners and private developers see each other as moderately willing to cooperate (Ulstein, Ruge, Dombu, & Olsen, 2018).

In areas with multiple developers active at the same time, this problem of public goods is the same: Each developer has an interest in the other developers investing heavily in public goods and opening their spaces to the general population. This benefit could be in the form of higher prices, but also reduced demands from the municipality to furnish common spaces for themselves, freeing up land for more lucrative uses. Developers in Norway do not have any formal tools to ensure that others provide these public goods, but depend on the municipality to ensure a fair distribution of costs (Sager, 2011). They can occasionally ensure higher contributions through legally binding bilateral agreements with other developers, although this is not common (Klosterman, 1985).

Cooperation experiments

Much intrinsic knowledge and 'gut feelings' goes into human decision-making, and gut feelings are based on predictable heuristics (Kahneman & Tversky, 1984). Real estate

scholars investigate for instance how heuristics cause risk (Wofford, Troilo, & Dorchester, 2010), affect risk perceptions (Dittmann, 2014), which in turn affect housing prices (Freybote & Fruits, 2015), and which settings push decision makers to lean on heuristics (Klamer, Bakker, & Gruis, 2018). While heuristics are often reasonable and can lead to better outcomes when decision makers face uncertainty, they will occasionally lead to solutions that are suboptimal at an individual or social level: As subconscious biases, they will influence decisions independently of applicability in a given situation.

It is difficult to find clear empirical evidence on what makes people cooperate beyond cost-benefit analyses: Looking at actual cooperation invariably brings in a plethora of case-specific variables regarding who are cooperating, about what, and under which circumstances. By simplifying 'willingness to cooperate' to 'propensity to contribute to public goods', public good game experiments used in behavioural economics and -psychology can illicit information about what makes humans more likely to cooperate on providing public goods. This methodology also helps separate actual motivators from the subjects' perceptions of their own motivators, which might be quite different (Adams, Disberry, Hutchison, & Munjoma, 2001).

Public goods games appear in many variants. They vary in design and complexity, but they share a few defining traits: More than one player must decide on a strategy. The strategies that are good for each individual are bad for the group as a whole, and everyone is better off if everyone choses strategies that are good for the group than if everyone choses strategies that are good for themselves. Out of these principles, we can design any number of games (for an overview, see Ledyard, 1994).

Ledyard also describes a 'minimalist' version: A number of players greater than two has an equal number of something valuable, such as points or coins. In an experiment setting, the experimenter endows these. The players chose to pay an integer of this to provide a public good. The value of the public good is double the sum of all contributions, and is divided equally between all players. The payoff for each player is then whatever they did not contribute to the public good, plus twice the sum of all contributions divided by the number of players. A perfectly rational actor playing this game would contribute nothing, as each unit contributed to the common pool gives two units divided by the number of players back to the actor, independently of the contributions of the other players. None of the players can get better off by contributing something, without also having a way to ensure that other players also contributes something. Formally, this means that the Nash equilibrium is for everyone to contributing nothing. This Nash equilibrium is, however, Pareto inefficient, as all players would be better off if they all contribute everything: each would then receive twice their initial endowment. This is thus a version of the famous prisoner's dilemma.

Real people, however, do not necessarily choose this strategy when the social and individual optimum clashes, neither in real-life situations (Ostrom, 1990) nor in games (Ledyard, 1994). In one-shot versions of the game, subjects tend to contribute between 40 and 60 percent of their endowment to the public good (Ostrom, 2000). There is no complete explanation for why people do this, but it is partially contributed to impure altruism: the simple notion that humans tend to feel good when contributing to other people's wellbeing, the so-called 'warm glow' (Andreoni, 1990). This 'irrational' bias is an important contributor to keeping society together, as the cost of constantly having to monitor the provision of public goods would make many of them unattainable.

Heterogeneity

These experiments find that many different factors can influence contribution levels, such as the framing of the game, how the groups are formed, or how much the subjects think their opponents will contribute. One such venue of research is the heterogeneity of the subjects: Do groups with some shared characteristics contribute more to public goods? Altruistic cooperation such as contributing to common-pool resources *in situ*ation where freeriding would get you more resources, most likely originated through evolutionary preference of the individual's own genes (Henrich & Henrich, 2007). This implies that humans have certain positive biases towards people similarities to themselves, any trait that can contribute to making a person feel kinship to another would increase contributions (Alvard, 2009). Orbell, Van de Kragt, and Dawes (1988) investigated the effect of allowing discussions in the groups, and found that contributions were higher in groups that received the non-discussion treatment if they believed they contributed money to other members of the same treatment group than those playing the game in a different room. The experimental findings, however, are not unanimous. Dawes, McTavish, and Shaklee (1977) found that people were just as likely to defect in an 8-player prisoner's dilemma if the players had been talking together for 10 min about unrelated things, than if they had not been communicating at all. Brown-Kruse and Hummels (1993) did a similar experiment with particular attention to the subjects' genders. They noticed that females contributed more if they had been socialising a few minutes with the other subjects than in completely anonymous groups. Men contributed the same independently of this treatment, and more than women contribute in either case. Repeating the games, however, reduced this effect, and it was in neither case statistically significant.

Urban development projects put heterogeneous groups together to provide public goods. It is important that perceived differences between the individuals do not hinder good cooperative efforts (Turok & Bailey, 2004). If differences between people make them less likely to cooperate with each other, the perceived heterogeneity of the different actors involved in urban redevelopment could decrease the propensity for cooperation.

Power balance

Development companies vary greatly in size and have constantly fluctuating financial boundaries, and their power relative to the development authorities differ: in dense, urban municipalities in post-industrial economies, building rights are in great demand and willing capital is abundant, while the opposite often is the case in rural municipalities and small towns. Moreover, the benefit from the public good does not necessarily create any immediate resources for all beneficiaries that they can use to justify contributing to the good: If a landowner is not currently in the process of developing, an increased development potential does not directly benefit them. Most people have a disinclination for cooperating on providing a public good with people that contribute little to the good, so this could be a potential hindrance for cooperation (Carpenter, 2007). Many experiments focus on the effect of heterogeneous power relationships among the actors (see, for instance, Brekke, Konow, & Nyborg, 2017). Power is a many-faceted term, but for any interpretation of the concept its distribution is of paramount importance to the outcome of a urban development with multiple actors (Leengoed, Blokhuis, Schaefer, Vries, & Snijders, 2008).

Development and cooperation experiments

Cooperation amongst developers and between developers and public authorities is not much studied using behavioural economics. The most important theoretical underpinning for this topic is Measuring and Comparing Planning Cultures: Risk, Trust and Cooperative Attitudes (Li et al., 2019). Here, the authors use economic experiments in an urban development context, to quantify certain cultural differences between Belgium, the Netherlands and Norway. The sample they use is small, making it hard to draw very wide conclusions, but it illustrates the potential of economic game experiments to learn about the subtle traits that influence people when they make decisions.

Glumac et al. (2016) combines a game experiment with several choice experiments to analyse the negotiation process between municipalities and developers. Using this complex methodology, they develop a model giving concrete advice for municipalities on what sort of developers they ought to cooperate with, and what type of agreements they ought to push for in a brownfield area with a given set of attributes. This level of concreteness is relatively rare in behavioural economics that tend to preface any advice with a long list of reservations.

Methods

To study factors that might influence the provision of public goods, this paper uses a public good experiment in which subjects can chose to contribute points to a common pool or keep them for themselves. Changing the specific conditions of the experiments and observing the changes in contributions to the common pool reveal some factors that help or hinder cooperation between different actors in urban development. These experiments are modelled after Ledyard's (1994) public goods game. These games are often set in a setting that mimics an aspect of the topic of study to increase external validity. This game therefore poses the game as an urban development scenario. For practical reasons, the subjects does not play against each other, but the instructions tell them to imagine that they play the game against other people. Such hypothetical games are frequently used in experimental psychology, although games against actual opponents are preferable if possible (Schroeder, Nettle, & McElreath, 2015).

Experimental design

The experiment is as follows: Three players are constructing one block of apartments each, bordering a common area. Each player starts with a hundred points. They then decide independently to contribute any share of these points, from 0 to 100, to a common investment pool for improving the quality of the common area. This pool is doubled, representing the sum of the added sales value of all three blocks. The players share the benefit of the investment, in the form of greater sales values, evenly between themselves independently of their contributions. In other words, the result for each player is two thirds the sum of all contributions, plus whatever they withhold from the common pool. As in Ledyard's game, the Nash equilibrium is for each player to contribute nothing, as contributing anything without any way of making the others contribute something will reduce

their payoff. However, the solution of no one contributing anything is worse for everyone than everyone contributing.

The experiments were carried out at planning- and development conferences in Norway in 2017 and 2018. As opposed to most economic experiments which use students for their readily availability, the subjects here were developers, public planners, consultants, and others with employment ties to urban development. A breakdown of the number of subjects in each of these employment cohorts are in Table 2. The subjects were not paid: Payment would hardly enhance the realism as decision makers in the situations the experiment mimics would only indirectly benefit from the decision. Furthermore, most studies on the subjects indicate that there is usually no significant difference between monetary and hypothetical payoffs (Camerer & Hogarth, 1999), alternatively that experimenters should 'pay enough or don't pay at all' which would be prohibitively difficult with the at least moderately well-paid subject pool (Gneezy & Rustichini, 2000).

Results from consultants and other professionals from fields related to development from the private and public sectors are included to provide information about the environments in which developers and planners operate. To what extent these people influence the development process will depend entirely on their specific background and the project's organisation. In other words, the findings for these cohorts are of secondary importance to cooperation between developers and planners.

The instructions tell the subjects to imagine playing with two others from two different employment cohorts: developers, public planners, or one of each. This latter option is only used if the player is in the private sector. This gives two different treatments for both of the two groups:

- A public employee playing with two developers (henceforth labelled MPP).[1]
- A private-sector employee playing with two developers (PPP).
- A public employee playing with two municipal planners (MMM).
- A private-sector employee playing with one developer and one municipal planner, (PPM).

The MPP and PPM treatments mimic the typical Norwegian model of urban redevelopment. Multiple independent developers and a public planning authority work alongside each other, all with an interest in creating a good urban environment but not particularly coordinated. However, the public player does not have any power to coordinate or force cooperation from the others, as unlike the situation the game emulates. The PPP treatment represents a situation with less government intervention. Lastly, the MMM treatment mimics a situation where different public entities, such as the road authority, public mass transit companies, and environmental agencies are involved in the development of the same area. These entities can have just as conflicting interests as private developers have with the planning authorities, so cordial cooperative environments are important (Desfor & Jørgensen, 2004).

The experiments use these two treatments to see whether the contributions differ depending on with whom players think they are playing. From a payoff-maximising point of view, who a person plays with should not matter for whether one contributes, as a player will get most points by contributing zero in any case. Yet the aforementioned 'warm glow' effect might influence the players to a different extent based on in which employment cohort

the other players are. If players think that people from a certain employment cohort are more prone to contribute, most of them will in turn contribute more (and vice versa) (Wade-Benzoni, Tenbrunsel, & Bazerman, 1996).

All subjects play game one as described above. Out of the 269 subjects, 241 then play a second round of the game, with one of two minor alterations to the rule. Table 1 summarises all these different treatments and what they test, while Table 2 details the number of subjects playing each game. Game 2 introduces an uncertainty element in the second round: The subjects are told that upon completing the construction project the market will be either strong or weak. If the marked is strong, the contributed pool is tripled rather than doubled. If it is weak, it is simply divided out to the players without being doubled. Modelled after the thought experiment in *Risk, Ambiguity and the Savage Axioms* (Ellsberg, 1961), half of the subjects are told the chance of either market is 50%, while the other half are just informed of the possibility of a weak or strong market. In other words, the first group is dealing with a risk element, and should be better able to calculate the expected returns of their investments, as they have a concrete chance with which to operate. The second group is dealing with ambiguity, or unknown probabilities, although they can imagine the chance of the two outcomes being normally distributed around 50–50: with no information on the risk distribution, the odds of a strong market could be anywhere from zero to 100%, which averages out to 50%. In either case, the expected returns for contributing to the common pool is the same as in the base game, with each subject losing on average 1 point per three points contributed. As developers cite uncertainty and risk as significant barriers to development investments (Farris, 2001), this should hamper contributions to the public good. Ellsberg's findings indicate that the ambiguous treatment, in which the subjects do not know the distribution of positive and negative outcomes, is less appealing to subjects than knowing for a fact there is a 50–50 chance. A total of 87 subjects receive this treatment, all from the private pool as market risk is mostly relevant in private development.

Game three address heterogeneous endowments, played by 161 subjects. The subjects were told they start with either a large endowment of 200 or a small endowment of 50 points, and that they are playing in groups where two players start with 50 points and one 200. This game mirrors that some developers and municipalities have roomier budgets and stronger financial resources to provide public goods than others do.

After the games, the subjects filled in a one-page questionnaire about their demographic and professional background. The questionnaire also asked to what degree they agree with the following statements: 'Is lack of cooperation between private developers a problem for urban transformation?' and 'Is lack of cooperation between private developers and municipalities is a problem for urban transformation?'

Table 1. A summary of the traits the paper studies, and which game element tests them.

Trait	Game element
Propensity for cooperation in different employment cohorts	Normal public goods game
Importance of sector heterogeneity of players in groups for propensity to cooperate	Some players play with opponents from the same sector, others play with people from different sectors
Importance of risk and uncertainty for propensity to cooperate	Players are told there is a chance for a greater or smaller payoff from the common pool. Some players are told the risk distribution, others are not.
Importance of heterogeneity of endowments in groups for propensity to cooperate	Some people are told they have fewer points to contribute than their opponents do, while others are told they have more.

Table 2. Average contributions with the different treatments by employment cohort, with the number of subjects. . Column 1 shows the employment cohort, column 2 shows if the row relates to games to all subjects in the given employment cohort or just the subjects playing in groups with the private-sector players (PPP), two private sector and one public sector (PPM), three public sector (MMM) or one public sector and two private sector (MPP). Columns 3, 5, 7, 9, and 11 show the average investment in each group and each game type. Columns 4, 6, 8, 10 and 12 show the number of subjects in each group and each game type.

				Game two (uncertainty)				Game three (Endowments)			
		Game one		Risk		Uncertainty		Large		Small	
	Treatment	Average investment	N	Average investments	N	Average investments	N	Average investments	N	Average investments	N
Private developers	Developer average	58	78	49	20	47	21				
	PPP	60	53	41	8	53	12	84	17	28	21
	PPM	55	25	55	12	40	9				
Consultants	Consultants average	63	57	53	19	47	13				
	PPP	67	40	55	10	38	8	105	15	45	10
	PPM	54	17	52	9	63	5				
Other private	Other private average	59	26	64	10	53	11				
	PPP	60	19	53	6	58	6				
	PPM	57	7	82	4	47	5				
Public Planners	Planners average	63	68								
	MMM	64	57					99	25	38	29
	MPP	55	11								
Other public	Other public average	56	40								
	MMM	59	32					89	13	35	17
	MPP	43	8								
	Grand Total	**60.1**	**269**	**53.9**	**49**	**48.7**	**45**	**100.7**	**70**	**35.5**	**77**

Findings

This section looks at the findings of the different treatments described above, and the more important findings from the survey. Generally, the average contributions of 60, 1% for the base game were quite high when compared to similar experiments, where the contributions typically range from 40 % to 60 % (Ledyard, 1994; Ostrom, 2000). Only eight of 269 subjects (3 %) chose the point-maximising strategy of contributing zero.

Employment sector heterogeneity

Game one displays variations in contribution stemming from heterogeneity in the employment background of the group members. For the sample as a whole, and for each employment cohort, contributions are smaller from subjects in heterogeneous groups. When told they play with people from other sectors average contributions were lower than when playing with people from the same sector. This fits well with previous studies regarding contributions in heterogeneous groups. This effect is particularly strong for members from the public sector, who contribute on average 13% less when told they play with members from the private sector, and consultants, who contributed 19% less with opponents from the public sector. Only 18% of public planners gave more than the median contribution of 60 in the MPP groups, while 51% gave more than this in the MMM groups. Interestingly, this effect exists predominantly among females, as previously found by Brown-Kruse and Hummels (1993). Balliet et al (2011) summarises a long line of literature on gender differences for cooperation in that the genders are in general equally cooperative, but react to different treatments in different ways. For instance, all-female groups are less cooperative than all-male groups, while females are more cooperative in mixed groups.

Contributions by employment cohort

Game one also displays the general willingness to contribute to public goods. Looking at the average contributions in each sector there appears to be some differences between the sectors, with consultants and public planners contributing the most on average, followed by other public, then other private, and lastly private developers. Upon closer inspection, however, virtually all of this stems from uneven distribution of the heterogeneous and homogenous treatments: In some of the employment cohorts, more subjects were playing in heterogeneous groups, which reduces the average contributions of all subjects in that cohort. After normalising[2] the average results within each employment cohort based on the distribution of people playing with players from the same or different cohort, there is virtually no difference between the average contributions of developers (57.0), consultants (60.7) other private (58.6), and municipal planners (59.7). The 'other public'-cohort contributed a weighted average of 50.9, an anomaly caused by only eight subjects receiving the heterogeneous treatment.

Risk

Game 2 introduces uncertainty: The subjects who played a second round with a chance of triple payment from the common pool and a chance of no additional benefit contributed on average 18% less than in the normal version of the game. When facing risk 49% (46

subjects) reduced their contributions, while 12% (11 subjects) increased them. These trends were somewhat stronger for developers. The average drop was 15% under the ambiguity treatment and 14% in the risk treatment. The players who knew the distribution of high and low payoffs did not contribute more relative to their earlier contributions, than the players who only knew that there was a chance for either.

Endowments

The games with different levels of endowments displayed that heterogeneous endowments lead to the participants contributing 5% fewer of the available points. Among the subjects with large endowments, 50% (35 subjects) contributed a smaller share of their 200 points than they contributed when everyone started with 100, but 59% (41 subjects) contributed more when looking at the absolute numbers. Forty percent of the less endowed increased their contribution in relative terms. Thirty percent of the subjects with 200 points gave exactly 50 points.

Survey results

In the questionnaire that followed the games, most subjects reported a lack of cooperation between the municipalities and private developers to be a problem: only 8 out of the 269 subjects who answered, disagreed with the statement 'lack of cooperation between private developers and municipalities is a problem for urban transformation'. How strongly subjects agreed with this statement seemed to be a good indicator of contributions in cross-sector cooperation: 68 subjects played games across sectors, either public workers playing with two developers or private employees playing with one developer and one public planner. Out of these, those who 'strongly agreed' contributed 23% more than those who simply 'agreed' with the statement did. The trend is the same for each employment cohort. 'No opinion', 'disagree', and 'strongly disagree' were also options, but only four subjects in the heterogeneous groups chose these. Subjects were also asked if they agreed that lack of cooperation between private developers was a problem for redevelopment, but there was no clear relationship between the level of agreement with this and contributions in the games.

Discussion

The findings support the three hypotheses in the introduction:

- Almost all subjects are inclined to cooperate in a hypothetical development setting, even when it is individually suboptimal and payoffs are uncertain.
- Average contributions are lower in most groups when faced with heterogeneity of employment backgrounds.
- Average contributions are lower when faced with heterogeneous power levels within the group, but worse-off subjects contribute a larger share than when everyone has the same.

Employment sector heterogeneity

In most countries, planning and spatial development requires the municipal planning authorities, other public entities, and private developers to work together. For this to happen efficiently, there ought to be a good working environment between these groups. The findings indicate that there are some negative biases and poor social relations to the private sector among Norwegian public planners. The experimental methods used in this paper would be a viable way to test potential policies to alleviate this. For instance face-to-face interactions as opposed to electronic communication could lead to better results in the game, which would indicate that municipalities should employ it more frequently in real-life negotiations.

Developers as a cohort do only exhibit a weak preference for cooperation with other developers, unlike the other employment cohorts studied here and most previous studies on heterogeneous and homogenous groups. This is a minor strengthening of the notion of there being a certain culture of reluctance towards cooperation between private developers, although there does not seem to be any particular negative bias *against* other developers.[3]

Employment cohorts

Average contributions among all groups (60.1) were on the high end of the normal range of comparable experiments using other settings and subjects. The data do not support any claim that some individuals in the development process are more communally minded, while some are more calculating.

Risk

Development, and particularly urban transformation and housing development, is risky business. The 18% dip in contributions after introducing a risk element to the payoff strengthens the hypothesis that developers are reluctant to engage in cooperation in an uncertain environment. The findings indicate that risk for instance stemming from volatile housing markets and uncertainty about public regulation will make developers less likely to resort to cooperation, even where the expected returns from the project are sustainable. This is the same for developers in particular and for the sample as a whole. As much uncertainty and risk in private development stems from the municipalities altering the project boundaries late in the process (Nordahl et al., 2008), these findings argue for greater predictability in public planning policy.

One way developers mitigate risk is to cooperate in joint ventures, as this makes them less dependent on any one project. The findings could indicate that risk stemming from limited knowledge about prospective partners makes this type of cooperation less likely to happen: A developer starting cooperating with another developer stand to lose much not only if the partner is actively dishonest, but also if they are incompetent or get into financial difficulties. A person might very well be willing to trust another, but still reluctant to enter cooperation with them, if it increases the project's riskiness.

Contrary to what Ellsberg (1961) found, ambiguity in the payoff structure from the common pool was not less appreciated than risk. It is plausible that more subjects assume the odds of a strong or weak marked were evenly distributed without being informed about it. Furthermore, previous studies have indicated that subjects are more positive towards ambiguous uncertainty in games where they feel they have some expertise, even if the expertise is not

relevant for the outcome of the game (Dimmock, Kouwenberg, & Wakker, 2015). More than half of the subjects (147 of 269) reports having 10 or more years of experience with development or related fields, which can lead to over-confidence when facing ambiguity.

Endowments

There is a small drop in average contributions when the players no longer have homogeneous endowments. Quite many well-endowed subjects are unwilling to contribute more than they know the others are able to. This implies that actors who are not in a position to contribute to public goods are deterrent, presumably because players are wary of free riders. Most development projects, and virtually any redevelopment project, will create public goods for surrounding landowners whose plots become more attractive. Usually these will not be in a position to reciprocate: if they are not using the land for residential purposes or planning to develop them as such, they might not recognise these changes as positive at all. The data indicate that the existence of such unwitting free riders is occasionally detrimental to cooperation in development, which makes cooperation more difficult in areas with many landowners and interest spheres. Also, quite many subjects employ a heuristic that when they are in a strong position, they contribute as much as they can hope the weaker parties will contribute but nothing more. A policy implication of this could be that the municipality ought to shift the infrastructure burden further towards what each project is able to carry, as opposed to what the developers with the most profitable projects think is fair: In Norway, these costs are often divided according to the size of the projects, not the profitability, which benefits the latter developers who sell in an area that is already largely developed. On the other hand, developers' perception of fairness should also be relevant for the cost distribution, although that is outside the scope of this study. Table 3 below summarises these findings.

Table 3. A summary of the findings.

Trait	Game element	Findings	Interpretation
Propensity for cooperation in different employment cohorts	Contributions in normal public goods games	Contributions are quite high compared to previous studies.	There is something else than pure profit-maximization that makes people want to cooperate.
Importance of heterogeneity of players in groups for propensity to cooperate	Some players play with opponents from the same sector, others play with people from different sectors	Planners and consultants contribute less when they play with people from other sectors. Developers contribute the same.	There are certain negative biases amongst planners against developers, and amongst consultants against planners.
Importance of risk and uncertainty for propensity to cooperate	Players are told there is a chance for a greater or smaller payoff from the common pool. Some players are told the risk distribution, others are not.	Risk and uncertainty about payoffs both reduces willingness to contribute to public goods.	People are more likely to cooperate in predictable environments.
Importance of endowment heterogeneity in groups for propensity to cooperate	Some people are told they have fewer points to contribute than their opponents, while others are told they have more.	Players with small endowments contribute a larger share while players with large endowments contribute a smaller share than if everyone has the same.	Knowing some actors are benefitting from a public good without contributing in kind makes it less appealing to contribute to the good, even when these actors are unable to contribute.

In countries where power shifts from the public to the private, it is reasonable to worry about the state of public goods in the urban fabric, and whether developers will try to freeride to the best of their abilities by only providing the bare necessity for meeting municipal demands. In a system where the developers have much influence on what gets built while public planners mostly influence the cityscape through giving or denying building permits, good relationships between planners and developers give can give the planners back some creative influence, while also making the application process easier for developers (Peiser, 1990). Of course, cooperation giving more power to developers and planners might remove power from other groups such as neighbour organisations and NGOs. As custodians of the balance between the different interests, municipalities must as always ensure that power is not shifted too far: A wealth of literature on regime theory describes how an alliance of developers and planners can marginalise other groups with interests in the city (Mossberger & Stoker, 2001).

Relevance outside Norway

Unlike most other countries, developers in Norway forward the detailed zoning plans, giving them a larger role in shaping the cities. However, the dynamics between public actors (Nelson, 2001), between the developer and the planner, and between developers, is relevant in any market economy (Van Meerkerk, Boonstra, & Edelenbos, 2013). Many countries where planning and visions for the urban environment is almost or completely exclusive to municipalities, are looking to shift more planning responsibility over to developers (Sager, 2011). This can be to gain an edge in the global competition between cities, reduce public expenses, or increase market investments in urban development.

Previous studies using similar experiments (see, for instance, Herrmann, Thöni, & Gächter, 2008), reveal significant differences between countries in contributions and to what extent subjects react to different treatments. Also, Norwegian society is characterised by a high degree of trust and cooperation between people and between the public and private sectors, when compared to other European countries (EVS, 2008). One might find the many of the same trends in other countries, but should expect variations.

Conclusions

Developers, planners, and other actors in the development process do not make cooperation decisions from pure cost-benefit analysis. Heuristics such as uncertainty avoidance, preference for homogenous groups, and aversion to perceived unfairness can all become barriers to efficient cooperation.

The survey reveals that the subjects overwhelmingly agree on the premise of the paper, the importance of cooperation between developers and municipalities. They also mostly agree on the importance of cooperation amongst developers. The goals of these actors can be overlapping or conflicting, and it poses a problem if they are unable to identify which is which. Both developers and the planning authority will have an interest in making projects that are good for the end users (for any given definition of 'good'). However, the developers have less incentive to make projects that are good for the rest of the city. Furthermore, they

also have a strong incentive to use their economic and spatial resources effectively, which might put them at odds with other developers and planners.

In all sector cohorts and under all treatments, the average contributions were quite high compared to similar experiments, and only eight subjects (3%) chose the point-maximising strategy of contributing nothing. This implies that most subjects are prone to cooperation. However, the experiments are able to identify uncertainty of payoffs as a barrier to contributions to the public good in this particular setting. Heterogeneity in group composition or endowments is also problematic. Particularly people from the public sector contribute much less on average when told they are playing developers: public planners have a (deserved or undeserved) negative view of developers, which can make cooperation between these groups more difficult. Developers, planners, and others who want to foster Pareto efficient cooperation in development should keep in mind that potential partners will be vary of risks, and will prefer to cooperate with others who have similar backgrounds and financial opportunity spaces. Beyond this, more researches are needed to offer concrete advice on what types of cooperation would be most beneficial, and how best to implement it.

The experiments used in this paper are able to indicate some such biases as being relevant for a subject group's propensity for cooperation. We should therefore consider similar methods as potentially viable venues for identifying problematic biases in urban development decision-making, and for testing hypotheses. It should also be considered when evaluating possible policies for improving private-sector contributions to public goods. This could be done as simply as translating a suggested policy into a game element, and see whether it alters contributions.

The method, however, carries some limitations. These experiments would not generally be able to falsify a hypothesis: The lack of a trend between a factor as operationalised in a game and contributions in that game does not necessarily mean that this factor does not influence the likelihood of successful cooperation projects. Firstly, a game mechanism might be unable to operationalise the real-world bias it intends to elicit. Secondly, the bias in question might influence game contributions differently than it influences propensity for cooperation. If these two issues are kept in mind, finding no or a weak trend would nevertheless imply that the investigated bias is not important for a group's propensity to cooperate.

Notes

1. The M stands for Municipal as Municipal planners are the primary group of focus, although some M players are from other public bodies.
2. This normalisation is simply the average value of the two treatments (PPP and PPM or MMM and MPP) within each employment cohort (planners, developers and so on).
3. Consultants do not share the developers' disregard of group heterogeneity and contribute a lot less if they are told they are playing with public planners than with developers. It is hard to pinpoint whether this is important, as consultants' influence over the decision making in a project will vary a lot from organisation to organisation.

Data availability

The data used are available from the author upon request.

Disclosure statement

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Notes on contributor

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